# Artificial Intelligence: Reshaping Human Life and Envirnoment

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# Contents

# Introduction

Artificial Intelligence (AI) is a rapidly evolving technology with far-reaching implications for our lives and the environment. It is transforming the way we interact with each other and our environment. AI is being used to create smarter, more efficient and safer systems, from autonomous vehicles to smart cities. AI-powered systems are increasingly being used to automate processes, reduce costs, and improve services.

AI is also being used to monitor and analyze environmental data, enabling us to better understand and manage natural resources. AI can be used to help reduce environmental impacts by identifying and predicting environmental changes. AI-powered systems can be used to monitor and analyze a range of data, from air and water quality to energy consumption.

AI can help us to detect and predict environmental problems, such as air and water pollution, and to plan and implement solutions. AI can also be used to improve the efficiency of our energy use, helping us to reduce our carbon footprint. AI can also be used to help protect wildlife and reduce the impact of climate change on ecosystems. AI-powered systems can be used to detect and monitor endangered species and to identify and track

## About Book

This book, Artificial Intelligence: Reshaping Human Life and Behavior, explores the ever-growing impact of artificial intelligence on our lives. Written by two experts in the field of AI, the authors examine how AI is changing how we interact with the world, our relationships, and our understanding of human behavior.

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# Chapter 1
# Deep Learning:
## Algorithms, Techniques, and Applications — A Systematic Survey

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## ABSTRACT

*Deep learning has become one of the hottest research topics in the machine-learning world, with tremendous success in several sectors. The summary and inductive reasoning procedures of deep learning are mostly used in this study. It begins by outlining the history and present state of deep learning globally. The second part of the chapter explains the fundamental structure, the traits, and a few types of traditional deep learning techniques, including the stacked auto encoder, deep belief network, deep Boltzmann machine, and convolutional neural network. Thirdly, it discusses the most recent advancements and uses of deep learning in a variety of industries, including speech recognition, machine learning, computational linguistics, and healthcare. Finally, it outlines the issues and potential possibilities for deep learning studies in the future.*

## INTRODUCTION

Machine learning is becoming increasingly common in recent studies and has already been united into a wide range of applications, namely processing of visual perceptions, analysis of image, audiovisual recommendations, impact of social links, information retrieval, etc. Deep learning, "also recognized as representations learning (Abadi, 2016), is commonly included in these simulations by different machine-learning algorithms." The growth of massively efficient and learning techniques studies has been facilitated by the rapid expansion and accessibility of data as well as the significant advancements in process control. Deep learning significantly outperforms its predecessors and is based on traditional neural networks. To design of multiple-layered learning approaches, it incorporates graph developments with inequalities between neuronal. Some of the new deep learning models were already implemented and significant improvements have been shown throughout numerous applications, like Natural Language Processing (NLP), visual data management, voice recognition and so on (Ossama, 2014, Abel, 2017).

The performance of machine-learning algorithms has historically depended heavily on a consistency of input vectors interpretation. Compared to a standard data visualization, a poor data interpretation sometimes resulting in poorer results. Consequently, for just a long period of time, feature extraction has become a significant research path in machine learning, concentrating on constructing features from the dataset and leading to many studies conducted. In addition, feature extraction is always unique to the environment and involves considerable human work. For example, various types of samples, such as Histogram of Directed Gradients (HOG) (Abel, 2017), Scale Invariant Feature Transform (SIFT), and Bag of Words (BoW), are being investigated and compared in machine vision. When a new function is introduced and works well enough for decades, it will become a standard. Recent incidents, like voice recognition and NLP, also occurred in many other environments.

Relatively speaking, deep learning techniques facilitate faster extraction of information, allowing scientists to extract discriminatory features without limited knowledge of the subject and manual effort (Sami, 2016). These strategies provide a layered data modeling framework where it would be possible to extract the high-level features from upper level of the systems, whereas the lower features are retrieved from bottom layer. Initially, different types of designs are motivated by Artificial Intelligence (AI), which simulated the function of a main brain modalities in the human. Our neurons can derive the description of the data spontaneously through various scenes. The input is the knowledge that the scenario receives from eyes, whereas the confidential images are the result. This review presents an overview of deep learning from various points of view, such as background, obstacles, possibilities, techniques, architectures, implementations, and distributed and cloud-based strategies.

## Objectives of the Proposed Survey

This report tries to give an overall picture and communicate scientific knowledge with colleagues, though deep learning is recognized an enormous area of scientific. Whereas other previous report reports concentrated mostly on a specific deep learning scope (Berant, 2013, Leo, 2003), the uniqueness of such a report would be that it emphasizes on numerous perspectives of learning techniques thru the summary of a higher-sensitive documents, the knowledge of a researchers, as well as the scientific advances in neural network-based research and the development.

The primary issue facing by deep learning nowadays would be to practice the vast available information at disposal. Even as dataset becomes broader, increasingly nuanced, and much more difficult, deep learning is becoming a vital method for data analytics. In our survey the major aspects of deep learning which demand 1st-priority attention, especially parallel processing, interoperability, energy, and optimizations. In diverse disciplines, like RNNs for Language processing and CNNs for image analysis, various kinds of neural networks are designed to solve different existing issues. The report includes summarizes and evaluates common deep learning instruments across each deep learning approach, like DeepLearning4j, TensorFlow, Torch, and evolutionary algorithms. In conjunction, various technologies for deep learning are evaluated to encourage many scientists extend their perspective on deep learning.

The remainder of this paper is structured as follows. Advanced deep learning models are momentarily discussed in Section 2. In deep learning, section 3 addresses many algorithms, techniques, and frameworks. As neural networks are being used for voice and image processing and also industry-focused implementations through NLP, Section 4 offers a wide variety of deep learning algorithms. In the future, Section 5 highlights the difficulties and possible study approaches. After that, this episode ended with Section 6.

## BACKGROUND

## Deep Learning Networks

Throughout this section, we are going to see about some familiar deep learning networks like recursive neural network, recurrent neural network, conventional neural network, and model for deep generative.

## Recursive Neural Network

RvNN can categorize outcomes employing constituent vectors and create recommendations in a hierarchy organization. Recursive Auto associative Memory (RAAM) (Davide, 2016), a technology required to handle items with any structures, including such as tree or graphs, is used to construct a RvNN. The technique was to construct a fixed-width probabilistic model from a recursion data structure of various sizes. To apply this technique, the Back - propagation learning Via Framework (BTS) training technique has been proposed (Chen, 2015). BTS uses a stochastic gradient descent technique that is comparable to the traditional learning algorithm, but it can also support a tree-like topology. Auto association is used to communicate the networks toward recreate patterns of the input nodes there at output neuron. A phrase is subdivided into words, but an imagery is unglued into several portions of significance. RvNN computes the scores of a potential pair in order to combine them and construct a syntax tree. RvNN computes a score for the merge's believability for each coupling of subunits. The highest-scoring pair is then concatenated to form a composing vector. RvNN generates (1) a larger zone with numerous units, (2) a composing vector characterizing the territory, and (3) the membership functions after each convergence. The dynamic word representations of the entire continent are at the base of the RvNN tree - like structure.

*Figure 1. A Simple Recursive Neural Network (src: https://en.wikipedia.org/wiki/Recursive_neural_network)*
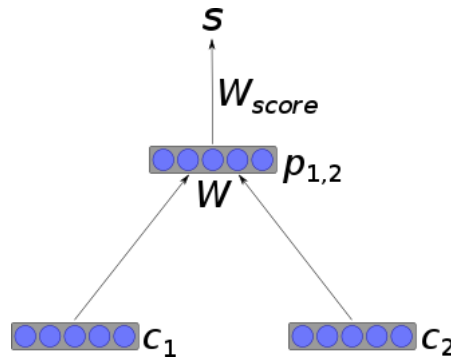


## Recurrent Neural Network

RNN (Ting, 2014) seems to be another frequently being used successful neural learning method, particularly in NLP and voice analysis. Unlike standard neural networks, RNN makes use of the channel's consecutive layers. This characteristic is crucial in numerous circumstances when the data sequence's level of preparation conveys valuable knowledge. For instance, understanding a phrase or term requires understanding its context. With input neurons x, concealed (state) parts s, and return vertices y, an RNN can be seen as a group of preferential memory space.

*Figure 2. The Generalized architecture of RNN*
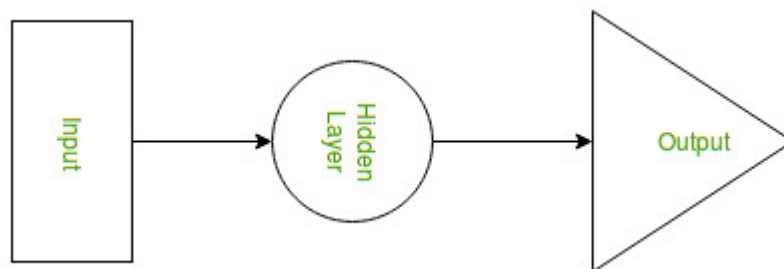


## Conventional Neural Network (CNN)

CNN is a well-known and commonly used deep classification technique (Tianqi, 2015). It has been widely used in a variety of applications, including natural language processing (Sharan, 2013), voice recognition (Hsieh, 2013), and machine vision, to mention a very few. Its architecture is modeled by neurotransmitters in humans and other animals' brains, comparable to typical neural network models. It resembles the visual system of a cat's brain, which is made up of a complicated series of neurons

(Timothy, 2016). CNN offers three parts of this activity, as explained in (Hazan, 2010), including prior to distributing, shallow connections, and comparable descriptions.

## Model for Deep Generative

Deep generative models (DGMs) are one type of neural based model with a large number of hidden layers that have been accomplished to estimated difficult, high-dimensional prospect disseminations with a large amount of data. Again, when the DGMs have been effectively trained, we could use them to evaluate the every observable and make a sample from its properties. In recent years, evolving DGMs is the recent areas in AI based research. Some breakthroughs have even made it into the public eye, such as recent accomplishments in creating efficient images, multimedia properties. In spite of improvements, a number of mathematical and practical challenges prevent DGMs from being widely used: designing and training a DGM for a specific dataset remains difficult, and determining why a model is or is not useful is much more difficult. We present DGMs and present a clear scientific model for describing the different prominent tactics: normalizing flows (NF), variational autoencoders (VAE), and generative adversarial networks (GAN) to help enhance the theoretical understanding of DGMs (GAN).

## BACKGROUNDS AND PROCEDURES FOR DEEP LEARNING

Numerous deep learning processes help to increase learning efficiency, extend the range of applicability, and streamline control procedures. But computational intelligence models' extraordinarily lengthy training times prove to be a significant problem for scientists. Adding extra training examples and prediction models can also significantly boost generalization ability. To expedite deep learning computation, several ground-breaking techniques are developed in the research. Deep learning systems include the deployment of flexible modular deep learning methods as well as analytic applications, dissemination strategies, and infrastructure maintenance. They have been created to facilitate system-level research in this area while also facilitating the integration process. This section introduces a few of these excellent approaches and environments.

## Transfer Learning

Some researchers have engrossed on the unsupervised machine learning difficulty in deep learning, given the substantial development into controlled deep learning. However, using unstructured methods to gather repeatable characteristics has recently produced positive results in a number of situations. Over the past ten years, the awareness of a self-taught education model remained passionately contested in the literature (Moataz, 2011). The most well-liked uncontrolled deep learning methods in recent years have been design and project like GANs and VAEs. For process that gives (Rasool, 2013), for instance, trains and employs GANs as a constant feature representation. This network creates a high-level feature extraction technique from unstructured data that can be used for uncontrolled face recognition. The resulting features could also be used to find other elevated objects, such human body parts or wildlife features. A synthetic probabilistic networking for unsupervised classification is presented by (Bengio, 2014) as just a replacement to the parameter estimation depending on transitioning generators of Markov chain.

## Optimization Techniques in Deep Learning

a)     **Centralized Optimization**

In DDLS that employ centralized enhancement, an unique optimizing instances (often known as a parameter server) is in charge of modifying a specific vehicle component. Measurement systems just use concentrations generated by cluster members performing transfer learning (workers). The flow of information in a system throughout retraining is shown in Figure 3. It's important to note that the terms parametric service and workforce describe to application operations rather than actual hardware. We'll assume for the moment term so each functionality works on a separate computer.

*Figure 3. Implementation of centralized optimization*
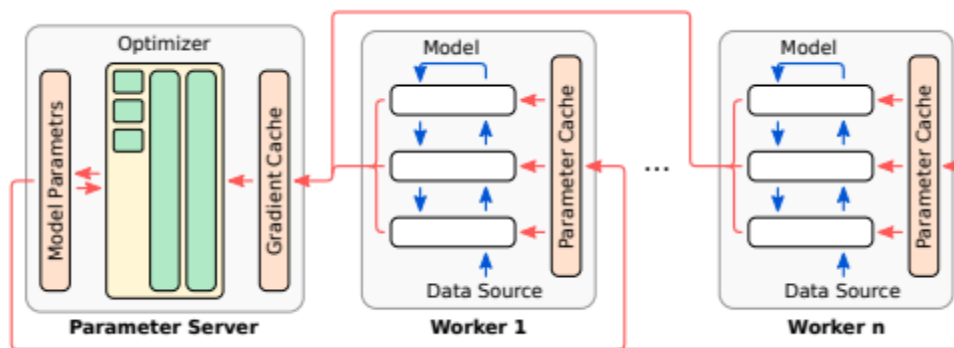


By aggregating all communications at the these should, the simulation may well be maintained attractively while the costly task of determining each variation is distributed amongst some of the clustered devices. This makes it simple to find per-parameter declines for massive number of base classifiers. Whether or not operations among agents are handled statically or dynamically can have a varied impact on the effectiveness. Since a discrete parameter service seems to be the only agent with right access to a particular estimation of parameters, its position continuously represents the quality of the training procedure. Data administration is greatly streamlined as a result, but individuals now have a manufacturer engagement. To ensure that the values the model produces are appropriate, each employee must periodically retrieve it again. In multiple clusters, this ongoing need for interaction concentrated on same networking devices can easily lead to a congestion. In redistributing the variable service responsibility, the majority of centralised performance tuning DDLS employ communication techniques. Flow of information in a cluster with decentralization optimizing is shown in Figure 4. The central server builds the subsequent global modeling state by merging the local model replicates (J- -) that the employees independently teach. searches for stochastic gradient minimum itineraries with strong applicability features by examining the nonlinear function (Feng, 2015). Instead of centralizing the optimization cycle onto to the group like conventional DDLS accomplishes, decentralized systems undertake classification models independently in each employee. To align the different points of view and create a better incentivize, some form of adjudication is necessary (Zisserman, 2016). Decentralized minimization can sometimes

be employed if certain workers are unable to satisfy the storage overhead for repeating both the slope computation and the optimizing process. Figure 4 shows the data flow in a distributed structure.

*Figure 4. Dataflow in clusters that implements decentralized optimization*
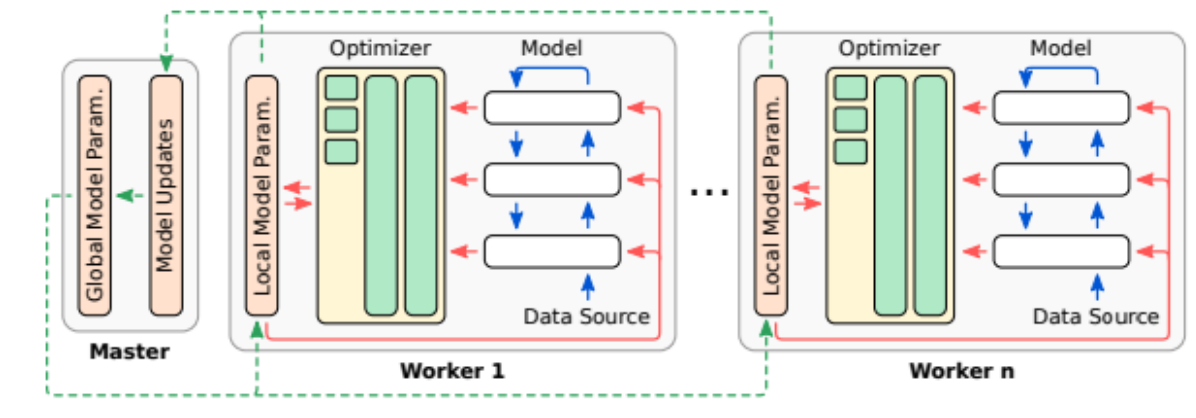


## Deep Learning in Distributed System

The development of decentralized deep learning algorithms has helped more to enhance the training time because the performance of feature learning is confined to a single-machine system. Data synchronization and prototype simultaneously are the two basic strategies for the modeling process in a distributed architecture. Each model is built using the specified subset of data, and the modelling is replicated throughout all computational platforms to allow data synchronization. After a specific length of time, the frequencies alteration requires to be synchronized amongst endpoints. Model concurrency, in comparison, uses a single theory to handle all the data, among each nodes in responsible of calculating some of the model's attributes. A model synchronization technique, to the contrary hand, divides the training phase across several GPUs. A simple model-parallel approach evaluates just a portion of the simulation on each GPU. For case, the structures with two GPUs could practice each of them to generate one LSTM erection for a model consisting of two LSTM layers. The model-parallel approach has the benefit of enabling enormous deep neural network learning and predictions (Abadi, 2016).

## Deep Learning Frameworks

Table 1 includes information about CNN, RNN, and DBN's licensing, core language, supported interface language, and framework support. From Table 2, it is clear that C++ is frequently utilized to construct deep learning architectures since it speeds up training. The majority of the abovementioned architectures greatly facilitate GPU through the order to speeding up matrices processing.

*Table 1. The Comparison of different Deep Learning Models*

| Background | Authorization | Core Language | Interface Support | CNN & RNN Support | DBN Support |
|---|---|---|---|---|---|
| (Abadi, 2016) | Apache 2.0 | Python | C/C++, Go | Yes | Yes |
| (Sami, 2016) | BSD | Python | Python | Yes | Yes |
| (Tiangi, 2015) | Apache 2.0 | C++ | C++, Perl, Julia, etc. | Yes | Yes |
| (Ting, 2014) | BSD | Lua | Lua | Yes | Yes |
| (Dong, 2014) | MIT | C++ | Python, C++, & BrainScript | Yes | No |

## DEEP LEARNING APPLICATIONS

The Figure 5, shows that, various applications of deep learning in various fields. we explained one by one applications in the below the parts;

*Figure 5. Different Applications of Deep Learning*
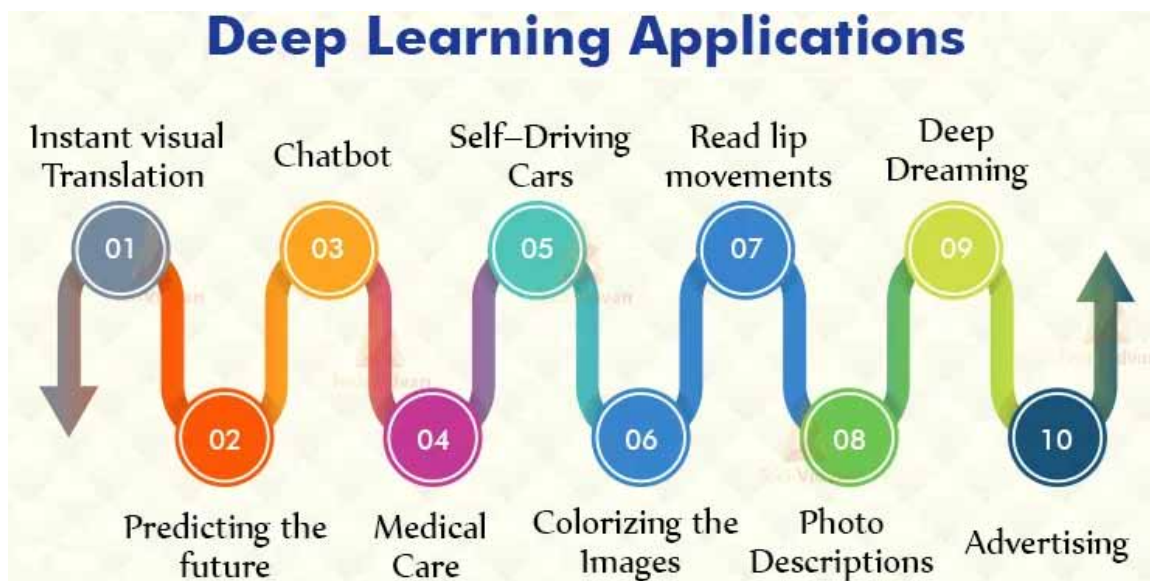


### A. AI based Helper

Automated systems are cloud-based applications that understand human language voice recognition and execute them as directed by the client. A few examples of virtual personal assistants are Amazon Alexa, Bing, Cortana, and Google Assistant. They need network devices in order to perform at their best at work is shown in Figure 6.

*Figure 6. Applications of AI Assistant*
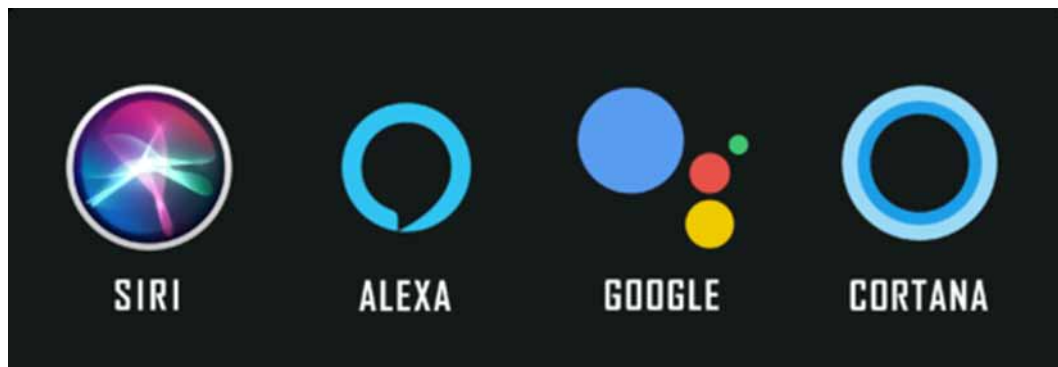


B. **Bots**

The Figure 7 shows that, Bots applications. Bots can quickly resolve customer problems. A bot is an artificial intelligence (AI) application that enables interactive text or text-to-speech communication between users.

*Figure 7. Working Architecture of Bots*

## C.    Medical Sector

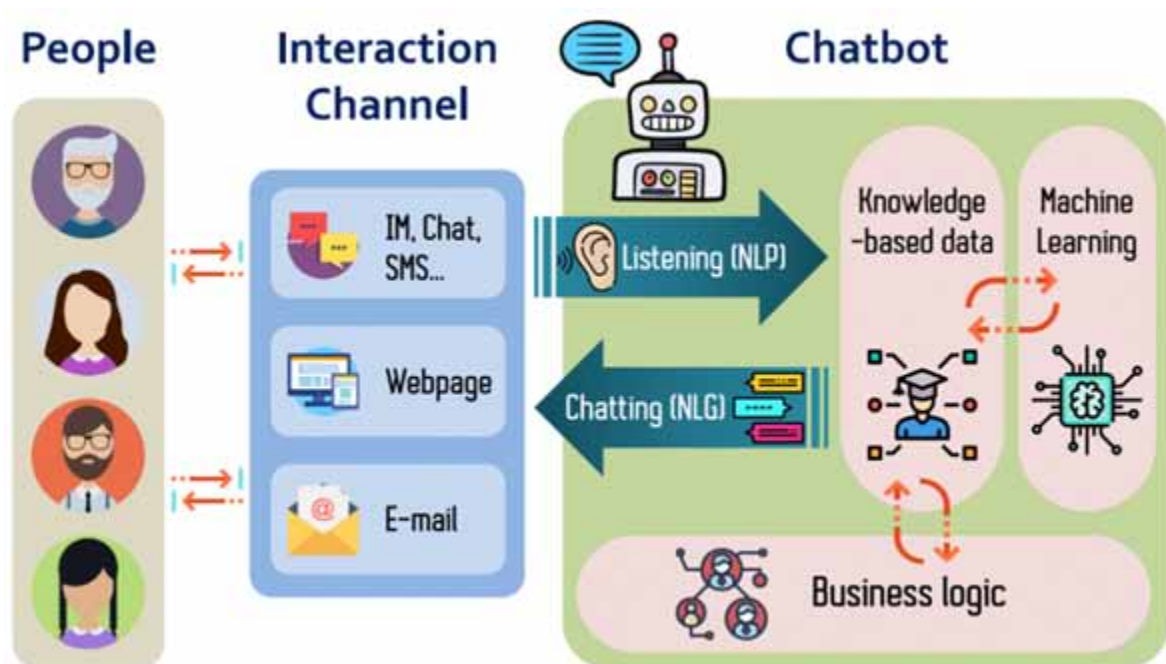The medical field has become a stronghold for deep learning. Computers can now help with illness treatment and classification thanks to deep learning. Medical imaging is extensively used in pharmaceutical research, clinical research, and the detection of potentially fatal chronic diseases such as cancer and macular degeneration is clearly shown in Figure 8.

*Figure 8. Applications in Medical Field*
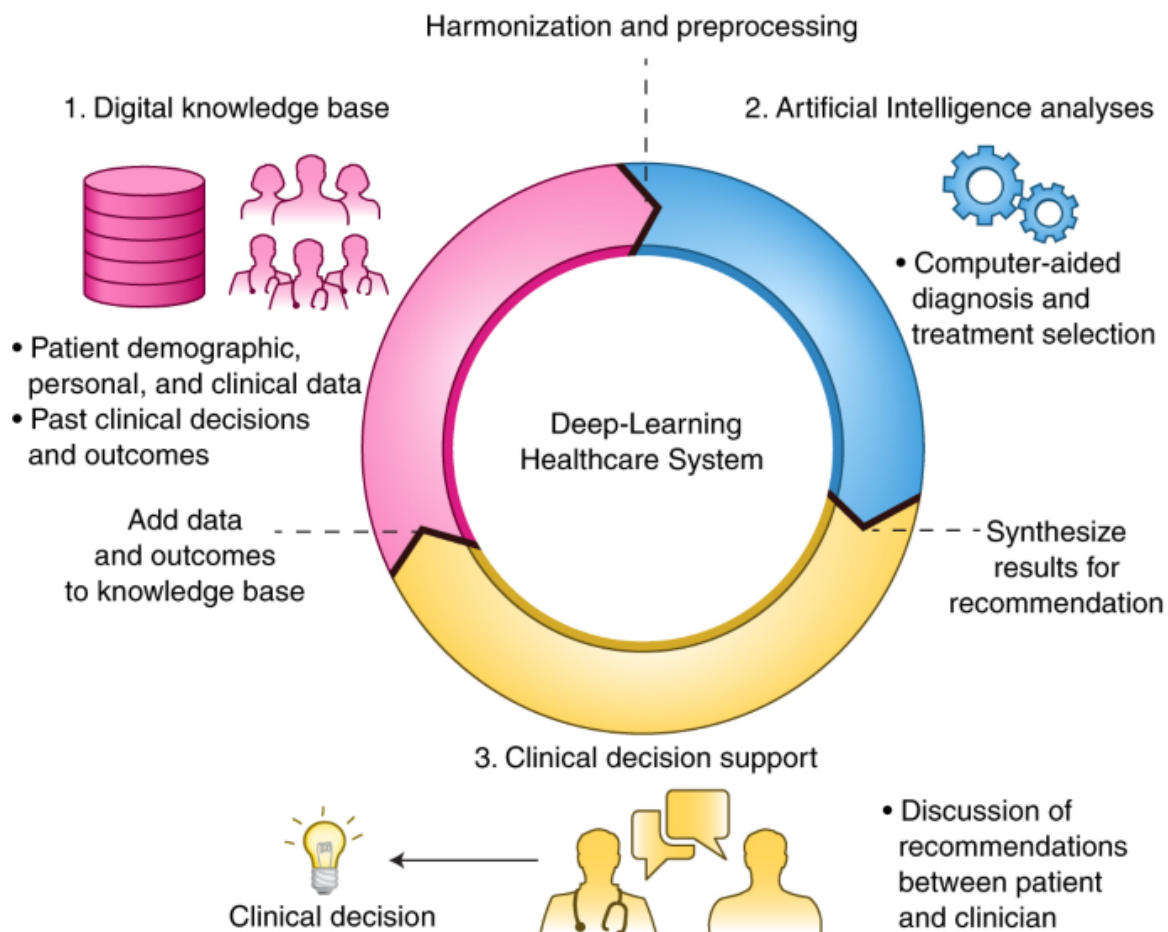


## D.    Entertainment

Examples of companies that offer appropriate cinema, music, and television recommendations to their users include Netflix, Amazon, YouTube, and Soundcloud is shown in Figure 9. Everything is the result of deep learning. To help users choose products and services, internet streaming companies generate personalized recommendations on a user's internet activity, hobbies, and behavior (Kavitha, 2010, John, 1993).

*Figure 9. Applications in Entertainment*
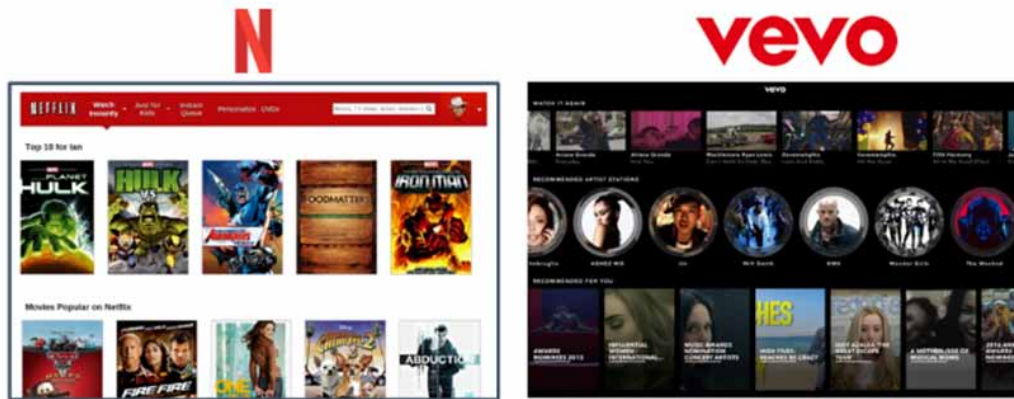


## E.    **Fake News Detection**

Utilizing deep learning, you may tailor news to the identities of your viewers. Influenced by social, regional, socioeconomic, and psychological inclinations of users, you can consolidate and analyze news content (Sumathi, 2021). The creation of classifications that can identify and exclude skewed and false news from the newsfeed is made possible with the use of neural nets. Additionally, they alert you to possible security breaches as like shown in Figure 10.

*Figure 10. Application in News Feed*
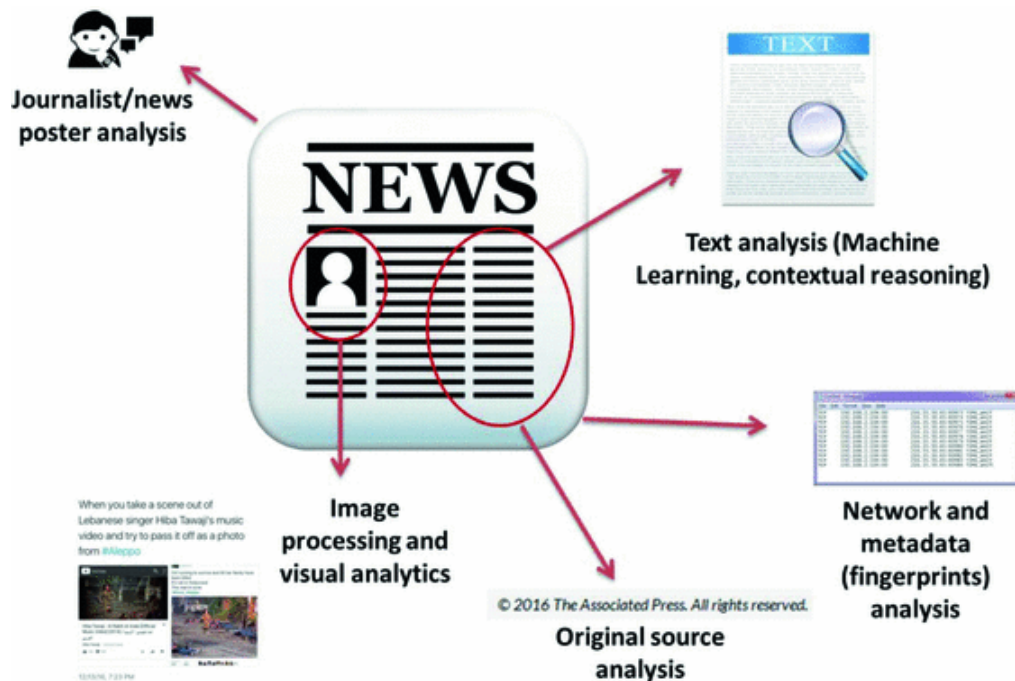
F.     **Transportation Prediction**

The Figure 11 shows that another use for deep learning is the anticipation of road transport. To forecast how the overcrowding in the transportation system would change as a result of the bottleneck in one area, (Ma, 2015) offer a deep learning system that relies on the RNN-RBM architecture.

*Figure 11. Application in Transportation*



G.     **Autonomous Vehicle**

Many major corporations and unicorns entrepreneurs, such as Google, Tesla, Aurora, and Uber, are working on self-driving automobile innovations. The minimal Deep learning model with convolution layers and one maximum particular thread level to extract feature representations (Samira, 2019, Alom, 2019, Kuutti, 2021, Gi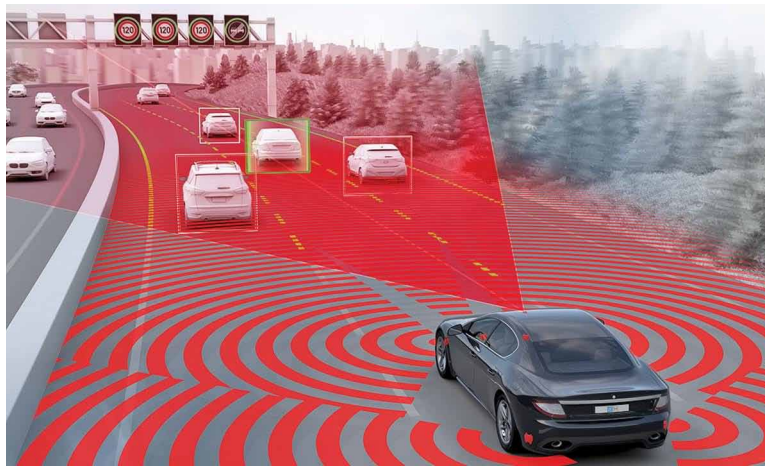dado, 2020). In order to create a classification to distinguish between extracted features in off setting for lengthy perception, they used a self-supervised process of learning. Recently, autonomous vehicle solutions have already been divided into two categories: robotic techniques for identifying drivers aspects and psychological replication techniques for acquiring a mapping function from sensory information to steering behavior is shown in Figure 12.

## OPEN CHALLENGES AND OPPORTUNITIES

We had already thoroughly reviewed the state-of-the-art for using deep learning in several areas in the above section. However, the relevant study remains in its early stages, and more work has to be done in this sector in the future. In this part, we first list four significant obstacles to integrating deep learning into Internet of Things applications. We immediately highlight two benefits that come from fusing IoT and deep learning solutions.

*Figure 12. Applications in Autonomous Driving*



## A.    Lack of Creativity in System Architecture

In the past, the majority of models were piled on simple models, making it harder to boost data application performance as a result. The creation of a brand-new depth of classification algorithm, either as the contemporary complexity of teaching approach or the other acceptable ways for successful implementation, is needed to deal with the problem, but the complexity of the benefits of learning technology continue to be attained.

## B.    An Enhancement of Training Models

The two training techniques for the present deep learning models are supervised learning and unsupervised learning. Using numerous training techniques, such as the limited Boltzmann engine, the automatic encoding as the modelling tool, and the usage of supervised training techniques. Unsupervised learning is the method they are also coupled with reinforcement methods to optimize training for learning. Training completely unsupervised makes no practical sense. Therefore, the focus of further research into the deep learning technique will be on how and where to accomplish fully unsupervised training. The following list of difficulties with parameterization estimation in deep neural systems

(i)    **Response rate:** A slow learning rate can become stuck in local optimal solution and require a long time to reach the optimal point. Large learning rates, to the contrary hand, could skip the optimal locations yet never convergence.

(ii) **Optimization:** A local optimum is a significant issue for many learning objectives using dimensions. The conjugate gradient solutions to those problems the elements based on the slope of the present position. The ultimate minima may be established for the idealized symmetrical issue because there is simply one lowest or maximal location. While there are numerous minima and maxima places in the case of local minima.

(iii) **Variability that disappears and explode:** One of the major issues encountered during the training of the massive neural networks is this. Deep neural networks have a little more than hidden layer, therefore in terms of implementing the attributes to the top layer, numerous affine translations are applied first, and then training algorithm. As a result, the gradient's value may occasionally grow extremely large or decrease dramatically.

C. **Cut back on training time**

The majority of deep learning model evaluation currently takes place in an ideal setting. The modern technology seems unable to produce the expected results in the complicated respective facilities. Additionally, either a basic model or a number of models make up the deep training algorithm. The quantity of knowledge received increases in proportion to the problem's complexities, necessitating an increase in the deep learning model's preparation time. Scientific investigations on intelligent systems will focus on how to modify the system while modifying the hardware in order to increase computational time and efficiency.

## CONCLUSION

A succession of asymmetric levels is used in reinforcement learning, a current hot area in computer vision, to learn multiple issues related to data interpretations. For years, machine learning scientists have been striving to infer structures and analytical models from unstructured data. Representation acquisition is the term used to describe this method. In contrast to conservative machine learning and data mining methods, deep learning can create enormously high data illustrations from vast measurements of original data. As an outcome, it takes suggested an alternative to a variety of issues encountered in the actual world. One of most recent deep learning approaches and strategies are investigated systematically. It starts with an introduction to artificial neural networks and their development since 1940, then continues on to contemporary artificial neural networks and significant achievements in numerous sectors. The main strategies and platforms in this area are then discussed, along with well-known machine learning methods. It starts with a brief explanation of conventional neural network models before moving on to numerous regulated deep learning models, including recurrence, cyclical, and multilayered neural networks, multi - layer perceptron, and Markov engines. The description of more sophisticated deep learning methods including uncontrolled and online activation follows. A variety of optimization algorithms have also been provided. Theano, Caffe, and TensorFlow were amongst of the most widely used technologies throughout this discipline. To solve issues with enormous data, decentralized deep learning algorithms are also briefly presented. The most effective deep learning techniques for several industries, including network analysis, speech and voice recognition, visualization tools handling, and computational linguistics, are then explored.

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# Edu - Preneurship
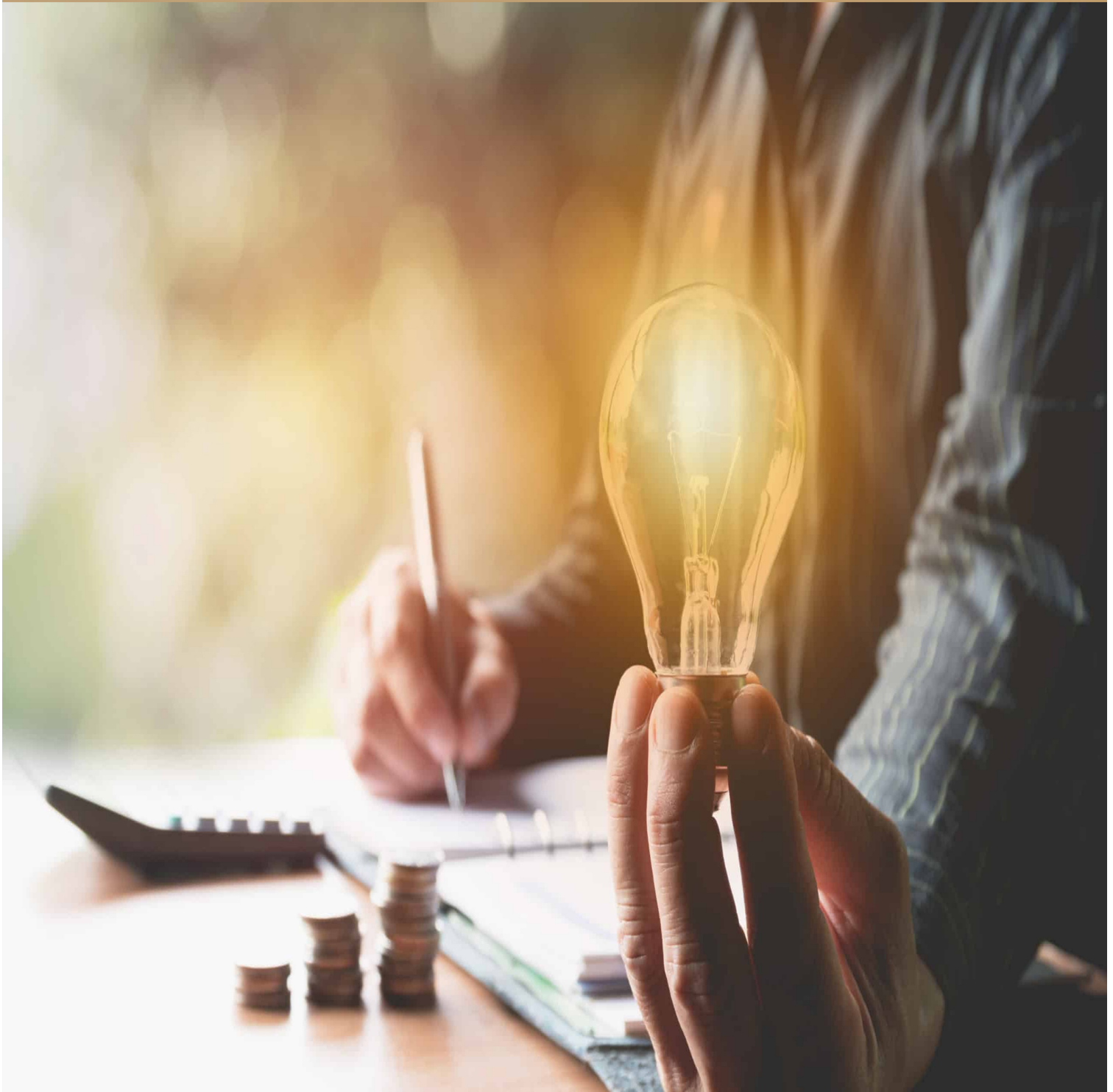
Sukriti Das | Dr. Shibabrata Choudhury |
Suman Roy | Jyoti Hatiboruah | Rituparna Baruah

# EDU - PRENEURSHIP

**First Volume**

**Editors**

Sukriti Das

Dr. Shibabrata Choudhury

Suman Roy

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# Preface

Entrepreneurial growth is what gives a country's economic life. They result in the creation of brand-new goods and services, innovative uses for already existing goods and services, and novel business models. The current economic system is shaken up by entrepreneurship, which also removes any dead branches. Established businesses that don't evolve with the times lose their ability to compete in the market and shut down.

In the broadest sense, entrepreneurs may be found in any industry of business since all company, no matter how big or little, needs some degree of entrepreneurial spirit in order to thrive. Starting and expanding independent new companies are the main topics of this book. It is based on entrepreneurship courses offered at universitiesand colleges all over the world.

Can entrepreneurship be taught? Is one of the most frequently asked questions of entrepreneurship instructors? Our response is that taking a course on how to launch and expand a new business can help anyone who aspires to become an entrepreneur succeeds. Since 1985, almost 30% of college students who took the new ventures course have eventually gone on to launch full-time firms. Many people have launched multiple ones.

This book is not just for aspiring entrepreneurs; even though it gives them the tools they need to launch and expand their businesses. Any pupil who reads this book will get knowledge of the entrepreneurial process and its significance to the economy.

*Sukriti Das*

*Dr. Shibabrata Choudhury*

*Suman Roy*

*Ms. Jyoti Hatiboruah*

*Ms. Rituparna Baruah*

*Guwahati, Assam*

# Acknowledgement

# Contents

# An Introductory Part of Micro and Small Scale Sector in India

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**Abstract**

In This chapter I study & focused on what the entrepreneur actually does to establish and run his/her enterprise. And understanding all about small-scale and micro enterprises.

Small and large-scale enterprises are two legs of industrialisation process of a country. Small and large-scale enterprises have been given an important place in the framework of Indian planning since beginning both for economic and ideological reasons.

**Keyterms:** Micro Enterprise, Small- scale Industries, Manufacturing & Service Enterprises

"If we could have an entrepreneur in every family, India's economy would skyrocket. We would then be able to take our rightful place as an economic superpower in the community of nations. Entrepreneurs Create job. They createwealth . They create products and services."-
**Rahul Bajaj, Chairman &Managing Director, BajaAuto.**

"Indefatigable energy, inextinguishable optimism, and unrelenting enthusiasm are the essential attributes that make one entrepreneur."-

**Capitan G.R.Gopinath, the Man who made flying cheap as "simply Fly"**

# I. Introduction

India is the land of innovation and creativity, every individual is born with different talents. India is the heritage for varied businesses and entrepreneurship is the beauty of our nation. Every large business starts with small ideas and grows larger. India is playing an important role in the global economy with its business beauty but by analysing the current global market scenario only beauty is not important but it should flourish with innovation and technological updating then only we will take a boom in the global market. To start the journey of thousand miles we must start with the first step and by adding steps by step by step we fix our journey in the same way start-up India is the most important step and by adding step of the industrial revolution has taken by our prime minister Shri Narendra Modi which has fixed the journey of India industrial leadership in the global market and inclusive growth of Indian economy.

The Programme for the development of small – scale industries has been given a high place in India. Micro, Small, and Medium Enterprises (MSMEs), including khadi and rural enterprises, are important sectors of the Indian economy in terms of their contribution to the country's industrial production, exports, employment, and industrial base formation. To encourage the spread of industrialization and for entrepreneurship in the country, small scale industries should be provided with a growth-oriented environment and adequate infrastructure. To ensure this objective. Over the past five decades, a number of strategic initiatives have been taken by the government and the financial system

# II. Objectives

1. To understand the small-scale Enterprises.
2. To study Overview on MSMEs Act, Classification of Enterprises.
3. To Discuss, Types & Features of Small- Scale Industries.
4. To Understand & Identify the Problems face by small scale industries.
5. To Highlight the importance & Remedial Measures of small scale industries in India.

## III. Research Methodology

In my study I have collected the relevant material from government publications, published and unpublished sources, books, journals and articles by eminent scholars.

## IV. Meaning and Definition - Small Business

'The use of small business separates the set of other industries. It is relatively small in terms of operations, employment, products, capital, technology, etc. Thus this small area shares unique problems compared to others. In the case of manufacturing units, small businesses are expected to face a unique dilemma in their 'small' relationship which is different from medium and large manufacturing units. At the same time, a small area has unique advantages. And, as such, the small is not only beautiful but also beneficial, efficient, and reliable.



The definition of small scale industry (SSI) depends on the pattern and stage of development of different countries from one country to another and from one country to another, depending on the government policy and administrative establishment of a particular country. As a result, there are at least 50 different definitions of SSI capital or employment or both or any other criteria. Let us explore the evolution of the legal concept of small business.

1. The Financial Commission, 150 (0 (GOII 150) 0) defined for the first time small business which is mainly used as labor, usually from 10 to labor.
2. Board in 1954-55 (SSIB) to promote small scale industries. The SSI Board in its first meeting held on January and 6th January defined small scale industries as having less than if0 employment, less than 100 jobs if using electricity, and not using electricity, and not having low capital assets. 5 lakhs.
3. As per the recommendations of the Abid Hussain Committee on Small Scale Industries, the investment limit was increased to Rs. 3 crore for small business and RSS. For small pieces of Units 50 lakhs. In March 1997.
4. The new strategic initiative for the small-scale sector from 1999 to 1999-2-2000 has lowered the investment limit to a small scale and the subsidiary activities have been reduced to Rs. 3crore to Rs. 1 crore.

An auxiliary unit is one that does not sell less than 50% of the product to one or more industrial components.

## V. Micro, Small and Medium Enterprises Development Act, 2006

There was a long-standing demand from entrepreneurs, small business associations, and concerned stakeholders for a single comprehensive law. The Micro, Small and Medium Enterprise Development (MSMED) Act, 200 "is the first law for micro, small and medium enterprises, which includes the establishment of a statutory national board for micro, small and medium enterprises, filing of reminders and measures. Advertising, development, and enhancement of provisions relating to micro, small and medium enterprises, credit facilitation, purchase preference, and payments to micro and small enterprises. The medium sector is defined for the first time in India and the micro sector is defined for the first time in this Act.

### 1. Features highlights
- Define 'enterprise' instead of 'industry' to give proper recognition to the service sector.
- Proud of 'Micro Enterprises'
- The investment limit for the creation of small scale industries is Rs. 5 cores
- Define 'medium enterprise' to achieve an economic scale.
- Provides a statutory basis for purchasing a priority policy for goods and services provided by micro and small enterprises.
- Strengthens legal provisions to check dues payable to micro and small enterprises.
- The cumbersome two-step registration process of SSI is filed by micro and small enterprises through an alternate statement.

### 2. Classification of enterprises
- Manufacturing/ Production Enterprises
- Service Enterprises

Under the MSMED Act 200 2006, the earlier, limited concept of the industry has been extended to the form of 'Enterprise'. Enterprises are broadly classified into two types, namely, enterprises engaged in the production of goods related to any industry; And the activities involved in providing/rendering services in terms of investment in industry and plant/machinery/equipment (excluding land and building) -

**Definition of MSMED**

(Micro, small and Medium development) Enterprises

| Manufacturing sector | |
|---|---|
| Micro enterprise | Does not exceed twenty five lakhs rupees |
| Small enterprise | More than twenty five lakhs rupees but does not exceed five crore rupees |
| Medium enterprise | More than five crore rupees but does not exceed ten crore rupees |
| **Service Sector** | |
| Micro enterprise | Does not exceed ten lakh rupees |
| Small enterprise | More than ten lakhs rupees but does not exceed two crore rupees |
| Medium enterprise | More than two crore rupees but does not exceed five crore rupees |

| Manufacturing sector | |
|---|---|
| Micro enterprise | Does not exceed twenty five lakhs rupees |
| Small enterprise | More than twenty five lakhs rupees but does not exceed five crore rupees |
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| **Service Sector** | |
| Micro enterprise | Does not exceed ten lakh rupees |
| Small enterprise | More than ten lakhs rupees but does not exceed two crore rupees |
| Medium enterprise | More than two crore rupees but does not exceed five crore |

1. **Manufacturing enterprises:** Industries engaged in the production or production of goods related to any of the industries mentioned in the First Schedule.(Development and Regulation) Act 1951 Manufacturing Enterprise is defined in terms of investment in plants and machinery.
2. **Service initiatives:** Activities and equipment involved in providing or delivering services are defined in terms of investment in equipment. Enterprise engagements in the manufacture or production, processing or protection of goods are specified as follows:

- A micro-enterprise is an enterprise where investments are made in plants and machinery
- (Excluding the original price of land and buildings and items specified by the Ministry of Small Industries, its price number S.O. 1722 (e) dated 5th October, 5,2006) shall not exceed. 25 lakhs.
- A small business is an enterprise where investments are made in plants and machinery
  (Excluding the original price of land and buildings and items specified by the Ministry of Small Industries, its price number S.O. 1722 (e) dated 5th October, 5,2006) shall not exceed. 2 lakhs but Rs. Not more than. 5 crores.
3. **Medium enterprise** is an enterprise where investment is made in plants and machinery. (Original price excluding land and buildings and original price excluding items specified by the Ministry of Small Industries, its notification number S.O. 1722 (e) dated 5,2006 October) is higher than. Crore crores but it's not much. 10 crores.

## VI. Objectives of Micro and Small Scale Enterprises

The main objectives behind developing micro-enterprises are as follows:

- To create quick and large scale employment opportunities with relatively low investment
- To solve the problem of unemployment in the country.
- Encouraging the expansion of industries across the country with small towns, villages, and economically remote areas.
- Backward to bring the backward classes into the mainstream of national development.
- Promoting balanced regional development throughout the country.
- Ensuring a more equitable distribution of national income.
- To promote effective integration of untapped resources in the country.
- To improve the living standards of the people of the country.

1. **Types of Small- Scale Industries:** Small –Scale Industries, the Planning Commission of India uses terms village and small- scale industries. These include modem small- scale industry and traditional cottage and household industries. This is depicted in the following Chart:
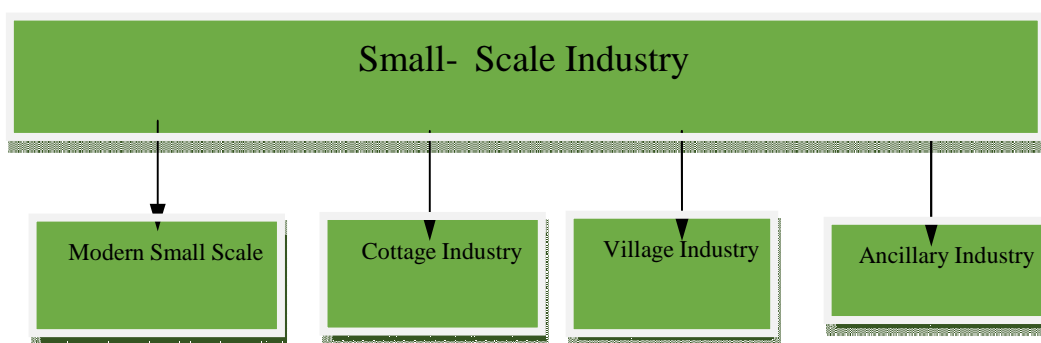
Small- Scale Industries can be classified into five main types as follows:
- Manufacturing Industries, i.e. Industries producing complete articles for direct consumption and also processing industries.
- Feeder Industries specializing in certain types of products and services, e.g. casting, electroplating, welding, etc.
- Serving industries covering light, repair, shops necessary to maintain mechanical equipment.
- Ancillary to large industries, producing parts and components, and rendering services.
- Mining or quarrying

2. **Features of small business/ Industries:** The following are the features of small scale industries:
   - **Ownership:** The small-unit is owned entirely by one person or it can be with some of the partners.
   - **Management and control:** The small scale unit usually shows one person and even in the case of a partnership the actions are mainly carried out by the active partner and the rest are usually sleep, partners. These units are managed in a personalized manner. The owner is actively involved in all business decisions.
   - **Growth period:** Growth period is the period after which the problem of tooth decay will end and return on investment will start. The development period of small-units is shorter than that of large-scale units.
   - **Area of operation:** The area of operation of a small unit is generally catering according to local or regional demand. The total resources for disposal of small and large units are limited and as a result, it is forced to limit its operations locally.
   - **Dispersion of units:** Smaller units use local resources and spread over a wider region. The development of small scale units in rural and backward areas promotes more balanced regional development and can curb the flow of job seekers from rural to urban areas.
   - **Elasticity:** Small-scale units as compared to large-scale units are more change susceptible and highly reactive and responsive to socio-economic conditions. They are more flexible to adopt changes in new methods of production, the introduction of new products, etc.
   - **Technology:** Small scale industries are more efficient with relatively small capital investment than large scale industries. These units are therefore more suitable for economies where capital is scarce and there is an abundant supply of workers.
   - **Property:** Small scale units use local or indigenous resources and Property can be anywhere subject to the availability of resources such as labor and raw materials.

3. **Problems of micro and small enterprises**
   - Problem of Raw Materials: The major problem facing micro and small scale industries is the procurement of raw materials. The size of the raw material problem has taken shape

➢ Absolute scarcity,
➢ Inferior quality of raw material, and
➢ High cost

Most of the micro and small enterprises produced goods based on local raw materials. Then, there was no serious problem in getting the required raw material. But the problem of raw materials has become a serious problem in their production efforts as many sophisticated goods have been produced since the emergence of each model small business. Smaller units using imported raw materials have difficulty in getting these raw materials due to a foreign exchange crisis or some other reasons.

Although micro and small enterprises that rely on local resources for raw material needs face other types of problems. An example of this is the handloom industry which depends on the local traders for their cotton needs. These traders often supply cotton weavers on the condition that they should sell their garments only to these traders. So, what happens is that traders sell cotton to them at a very high price. This is a clear example of how poor weavers are doubly exploited by traders.

- Problems of Finance: One of the major problems facing the micro and small enterprises in the country is finance. The problem of small sector economy is mainly due to the following reasons-
  ➢ This is entirely due to a lack of capital in the country.
  ➢ This is partly due to the creditworthiness of the micro and
  ➢ small enterprises in the country.

The weak financial base makes it difficult for them to get financial help from commercial banks and financial institutions. Accordingly, they are obliged to obtain credit from lenders at very low-interest rates and thus they are exploitative in character. It is a matter of great pleasure that the credit situation has further improved since the nationalization of banks in 1969. A positive change in the attitude of banks will make it clear that the amount of NPLs to small businesses (public sector banks) is only Rs. 2191 crore in June 1969. In, he came across the amazing statistics of RSS. 15,105 crore in March 1990.

- **Other problem:** Selection of sites for plant growth etc. SSI creates further problems. The choice of locations such as availability of infrastructure, cost, and duration of acquisition, availability of workers, and proximity to markets are generally controlled by different considerations. Small entrepreneurs are not properly trained to make decisions about the right space. They choose their place because of the idea of real, cheap land, family business, emotional attachment to traditional ancestral property, and so on.

- **Importance of small scale industries:** Small scale industries play an important role in the industrial development of a country. This is especially

important in the case of developing countries like India. The socio-economic transformation of India is not possible without the development of small scale industries. It is estimated that the share of small scale industries in the total value of the country's production is about 47 percent. Their importance can be underscored by the fact that SSI has provided almost five times more employment than a large area. SSI is an important sector of the economy with significant contributions in the form of production, employment, and exports.

- **The importance of this sector.**
  - ➢ **Employment generation:** Small scale industries are labour-intensive which means that the investment rate of the workers is very high in their case. The amount of capital invested in a small business provides more employment than the capital invested in a large scale industry. Due to a lack of capital and abundant labour in India, job creation is the only advantage that can be extended to support small scale industries in India. Moreover, these industries can stand at the very doorstep of the workers, and through them, the unemployed will get jobs, the unemployed will get more jobs and the seasonal unemployed workers will get supplementary jobs.

  - ➢ **Employment situation:** Small scale industries provide almost limitless opportunities for self-employment and are therefore particularly favourable for a developing country like India, which has a large problem of unemployment and underemployment.

  - ➢ **Low capital requirement:** Another advantage of small businesses is that they require less capital than large scale industries. Due to the scarcity of capital in a small country like India, it can be used in small and large areas.

  - ➢ **Capital mobility:** Small businesses not only create economies for the use of capital but also accumulate capital that would not have existed otherwise. While large scale industries cannot mobilize savings in rural areas, this can be done effectively by setting up a network of small scale industries in such areas.

  - ➢ **Acceleration of entrepreneurial skills:** Another advantage of small businesses is that skills and expertise are less required, which is also rare in a developing country like India. Further, the numerous entrepreneurs scattered in the small towns and villages of the country cannot use large scale industries. Small businesses, on the other hand, can effectively integrate such entrepreneurial skills.

  - ➢ **Fair distribution of income:** Small scale industries have a more equitable distribution of income and wealth. They are especially suitable for the purpose of social justice. This is ensured because the ownership of small-scale industries is more extensive and they provide longer employment opportunities as compared to large scale industries. Some people focus on a

large amount of income and wealth on the development of large scale industries.

➤ **Balanced regional development:** Small scale industries utilize local resources, expand industries, and promote balanced regional development. On the other hand, the growth of large scale industries tends to lead to a concentration of industries in some places which can lead to many adverse effects like overpopulation, pollution, slum building, etc. In some places the concentration of industries is undesirable. The approach to national defines also shows that, in times of war, the risk of destruction of different industries concentrated in one place is high.

➤ **Foreign exchange savings:** Another benefit of small businesses is the savings they make in the country's rare foreign exchange resources. First, small businesses do not need much foreign exchange resources for their 16 establishments, and second, these industries can contribute to the country's foreign exchange resources by increasing exports.

➤ **Quick investment:** In the case of small scale industries, the period of implementation of investment and commencement of production of goods is relatively short. These fast investment industries are especially suitable for developing countries like India.

➤ **Other importance:** These industries also get some other social and political benefits such as overcoming regional instability, reducing land pressure, reducing congestion in urban areas, self-employment, etc.

4. **Remedial measures:** SSI has an important place in the industrial system of the country. Thus appropriate measures must be taken to overcome these obstacles in the optimal operation of SSI. These therapeutic measures are as follows:
   - **Effective planning**: It is necessary to conduct a detailed survey of the current situation in small scale industries and to come up with productive programs for it. Studies have shown that very few entrepreneurs start their work on the basis of a careful plan. Small entrepreneurs need a detailed feasibility study or a detailed project report to start their unit. Without proper planning, they can be affected by inappropriate location, inexperienced consulting services, improper technology, cost estimates, and so on. That is why SSI needs to launch an effective action plan for their existence.

   - **Improvement in production and appropriate technology:** SSI should strive to improve their production techniques and adopt modern technology. Government consulting institutes and laboratories have an important role to play in this regard. They will have to arrange viable and modern techniques of production as they are unable to spend money on this calculation. In addition, SSI should approach the development of technology. They should try to take

the lead in research and development efforts if possible financially. They must constantly believe in innovation and then they can survive in their business.

- **Adequate credit system:** For SSI, traditional sources of financing do not have much scope for expansion and alternative avenues like venture capital have not yet been developed for them. SIDBI has formulated guidelines for venture capital and hopes to facilitate the economy for the sector. In addition, priority sector loan schemes should be made more comprehensive-based and credit limits should be increased. SSIs are more dependent on their own funds and funds borrowed from the non-banking sector as they are unable to get proper support from banks and other lending agencies. SIDBI is trying to make the 2626 facility available but the intermediaries involved in the system have created problems for them. Therefore, SIDBI should strive for transparency and efficiency in its operations.

- **Effective marketing arrangements:** SSI should focus on brand, product, and market development. They should try to stay in the market and place special faith in quality improvement programs. Low-cost products and consumer benefits will improve their marketing efficiency. Larger companies make decent profits by marketing smaller units of products at a higher price to customers. Because they have brands. So SSI should try to popularize its products in the market which will give them an independent product and brand recognition. This plan will benefit them in the long run. However, if efforts are made to maintain the quality and quality of the output, they will get positive support from their potential customers.

- **Training and development:** SSI should make a concerted effort to provide proper training and education to the workers involved in this field as they are a valuable asset to the industry. Expenditure on training and development activities should be treated as an investment. Small business associations should also be involved in providing them with the necessary knowledge and skills in a changing environment. Workers should be encouraged to innovate themselves in the manufacturing process as this will enable 25 SSIs to compete with their medium and large portions. An effective motivation and reward system for this purpose is highly desirable.

- **Provision of infrastructure:** Development finance, power supply, water supply, etc. for the smooth functioning of SSI. Is required. State Development Corporation, Small Industries Corporation, State Technical Consulting Institutions are involved in the provision of these facilities. But their support system needs to be further improved. The development of industrial estates has solved this problem to some extent but efforts are needed to develop more industrial estates to accommodate smaller units.

- **Regular supply of raw materials:** The SME Development Corporations and other pipeline agencies responsible for supplying raw materials to small scale

industries should take necessary action to ensure continuous but proper supply of raw materials to SSI. They should also ensure that bogus companies are excluded from this type of support. Interventions should be made from time to time for the cheap import of raw materials for them.

## VII.   Conclusion

The small scale sector plays an important role in the industrial structure of our country. In a country like India, where there is a severe problem of unemployment on the one hand and lack of capital on the other, this is the smallest area that is most suitable. Small scale enterprises play an important role in job creation, resource mobilization and utilization, income generation, and gradual and phased change. Small scale industries have immense potential but they have not been able to make satisfactory progress. Their performance is not good as they lack manpower, availability of raw materials, lack of credit facility, lack of machinery and equipment to fill the space required by a large number of units with obsolete technology, marketing facilities, etc. Appropriate measures must be taken to overcome these obstacles. In optimal operation of small-scale industries.

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# Predicting Index Price Movements Using an Artificial Neural Network – a New Approach for Investor's Education for Wealth Creation

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## Abstract

Investors educate themselves by past experiences and predict the direction of the price movement using several methods like fundamental analysis, technical analysis, statistical analysis and time series analysis. Thou it is widely used in practice it lacks consistency and has high degree of predictive errors as it ignores hidden patterns. An artificial neural network (ANN) helps to recognize unknown or hidden patterns in data which are optimum to predict the share market. The sample used for this analysis consists of five-year data of sectoral indices with a main focus on NIFTY Auto Index, NIFTY Bank Index, NIFTY Financial Services Index, NIFTY IT Index and NIFTY FMCG Index from 1st October 2014 to 1st October 2019. The network model was built on back propagation algorithm and the highest accuracy reported is in NIFTY FMCG Index with an error percentage of 1.24.

**Keywords:** Artificial Neural Network (ANN), Sectoral Indices, Back Propagation, hidden patterns

## I. Introduction

Investor education is key for regulators as it is imperative to understand the risk involved in the financial markets before indulging in trading and investment activities. Government and regulatory bodies across the world constantly thrive to strategies effective modes of educating investors and facilitating for better capital market participation. On the other hand brokers, wealth advisors and portfolio managers attempt to educate investors with new tools that enable them for understanding market conditions and build optimum portfolio. SEBI (Investor Protection and Education Fund) Regulations, 2009 stipulates promotion of investors awareness and protection of investors' interest. An investor education is imperative as only informed investors can sustain in the market. An investor enjoys investing only when he has knowledge on how to invest, feels safe in the market for his capital and there is a mechanism for grievance redressal. Investors should educate themselves on different tools and techniques for stock selection and portfolio construction. Knowledge on conventional

methos such as fundamental and technical analysis is essential and need to update on the latest models used for predicting.

Fundamental and technical analysis though attempts to provide information for stock price forecasting fails to embed all the market information. Despite its existence for a longer period, stock market prediction remains an empirical art. With better predictions, the investors will be able to prevent financial losses. With a better models, one can understand the direction in which the market moves and thereby returns can be optimised. There are multiple approaches available for traders to predict stock prices. Basically, one can use technical analysis, time series models, and machine learning methods. Econometrics models like ARIMA is widely used to predict the stock prices. New developments have reinvigorated the market like Neural Networks. Great deals of articles have been written over the last two decades and many different types of ANNs have been developed.

An artificial neural network (ANN) is widely discussed and practised in recent days as it is considered to be a better method to predict the prices. It incorporates trained historical data under technical analysis premises and using the weights for each of the data neurons predicts the prices (Trippi & Turban, 1992; Walczak, 2001; Shadbolt & Taylor, 2002). An artificial neural network (ANN) is a mathematical model or computational model inspired by the structure and/or functional component of biological neural networks. As an Artificial Intelligence tool, Neural Networks (NN) have become very important in making stock market forecasts, as it has proved to be more effective than the other approaches. Artificial Neural Networks (ANN) are fully-connected, multi-layer neural networks. It consists of one input layer, several hidden layers and one output layer. In the next layer, every node in one layer is connected to each other node. Increasing the number of hidden layers is making the network deeper.

## II. Review of Literature

**Daniel Millevik and Michael wang (2015)**, the paper focuses on the scope of Artificial Neural Networks (ANN) in forecasting of stock. The author adopted two-layer feedforward neural network (FFNN) method using MATLAB and its Neural Network Toolbox. It is carried out with historical data of five year from the Dow Jones Industrial Average (DJIA) stock index and using it for training the network. The conclusion made that ANNs had potential for stock forecasting and prediction of one day forward might not be useful in real scenario. It is essential to adopt a network for the problem and know the complexity of it and thus number of neurons chose should be according to the network adopted. One more thing is training data distribution to adapt and help in generalise the problem with the help of network**. Noraini Abdullah** (2015), the paper attempted to forecast the export price of Sabah Sawn timber using neural network. The study incorporates a mathematical approach for a more competitive industry, using Artificial Neural Network (ANN) to model the export price of sawn timber. Using the MATLAB version 7.11.0 R2010b Toolbox, ANN is solved with one dependent (export price) and two independent variables (quantity and

unit value).Sabah Department of Statistics from 1991 to 2009 collected data on the sawn timber export price of 228 observations. The best model in ANN is determined based on the eight selection criteria (8SC) with the maximum decision coefficient value (R2) and the minimum square error mean (MSE) and residual standard values. The mean average prediction error (MAPE) is essentially used to check the validity of the best model. Statistics show the best approximation using ANN is the fourth single layer with a polynomial of fifth degree. **Ola Johnsson (2018)**, The paper compares the performance of artificial neural networks (ANNs) and three different ARCH-type models to predict weekly volatility of major stock indices in Sweden (OMXS30), the UK (FTSE100) and Australia (S&P / ASX200). The study aims to investigate whether ANNs outperform the more traditional ARCH-type models in predicting volatility of weekly stock indexes. The out - of-sample validation technique is extended to the current 20 percent of data findings, which extend entirely from February 8, 2008 to December 29, 2017.The metrics used to evaluate the volatility-predicting performances of the different models are the RMSE, the MAE, the MAPE and the out-of-sample sample *R*. "The results show no evidence of ANN predicting superiority for any of the three stock indices. **Ayodeleariyoadebiyi (2014)**, this paper discusses ARIMA's predictive efficiency and development of artificial neural networks with existing market data obtained from the New York Stock Exchange. The empirical results obtained demonstrate the supremacy of model neural networks over model ARIMA. Furthermore, the findings resolve and clarify contradictory opinions reported in literature about the superiority of neural networks and model ARIMA and vice versa. **Panda, C. and Narasimhan, V**. used the artificial neural network to predict the daily return of the Sensitive Index (Sensex) of the Bombay Stock Exchange (BSE). They contrasted Neural Network performance with random walk performance and linear autoregressive models. They reported that, in both in-sample and out - of-sample forecasting of daily BSE Sensex returns, neural network outperforms linear autoregressive and random walk models by all performance measures. **Dutta,G. et.al.** studied the effectiveness of ANN in modelling the weekly closing values of the Bombay Stock Exchange (BSE) SENSEX. They built two networks with inputs as the weekly closing value, 52-week moving average of weekly closing SENSEX values,5-week moving average of the same, and 10-week Oscillator for one neural network over the past 200 weeks. And for the other network the inputs are the weekly closing value, the 52-week moving average of the SENSEX weekly closing values, the5-week moving average of the same and the 5-week variance of the past 200 weeks. **Zabir Haider Khan, et.al. (2011)** dddd Backpropagation with feed-forword NN using past ACI Pharmaceutical Company historical data reported in the Bangladesh Stock Exchange and expected values for the next 8 days during 2010. They used the General Index, Net Asset Value, P / E Ratio, Equity Earnings (EPS) and Stock Size as input data for network preparation. They found that the estimation error was high if the number of inputs was two. If the number of inputs was four, the estimation error was minimized. But if there were five sources, it will raise again. They used average errors to measure the performance of the networks. They reached an overall simulation error of 1.53 percent for five variables data.

## III. Motivation for the Study

Growing and leading companies, hospitals, educational institutions, textile and steel plants, chemical industries, pharmaceutical companies and so forth are making huge investments in the stock markets. Investors must be fully aware of the future market to avoid any risk that occurs at any time due to the market trend's chaotic behaviour. The ultimate goal of the investor is to make a profit from their investments in the shares related to their respective stock price index. Consequently, the potential stock market forecast becomes the method of warning for both short-term and long-term investors against unforeseen business scenario danger. As a result, various work is carried out to forecast correct stock price index on the called financial market databases and also because accurate stock market prediction is a difficult field for businesses to generate profits on financial markets.

## IV. Objectives and Methodology

This paper attempts to educate the investors about the predictive abilities of Artificial Neural Network (ANN) Model specifically for the sectoral indices price movements. For this purpose data for the last five-year has been collected from National Stock Exchange (NSE) website on five sectoral indices for the pre-pandemic period between 1-Oct-2014 to 1-Oct-2019. The sectoral indices taken are NIFTY Auto, NIFTY Bank, NIFTY FMCG, NIFTY Financial services, and NIFTY Information Technology. Technical indicators such as RSI, EMA and ROC are derived from closing price of the index through Excel.

ANN model consists of an input layer, a hidden layer, and an output layer, each linked to the other in the same sequence as described here. The ANN design is featured in Fig. The input layer is the same as the input variables. The hidden layer is used to capture all variables in the nonlinear relationships. The output layer in this study consists of only one neuron which reflects the expected position of the regular sectoral index.
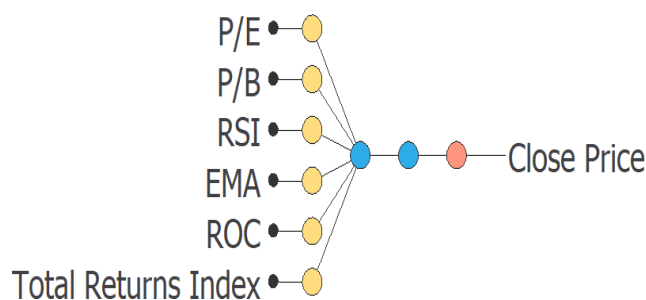


Figure 01

There's a training period in which certain parameters called weight from this segment are found and context algorithms are used for this training phase. In the predictive method, these weights are used using the same equations used during the exercise. The various parameters that were used as input to the network are given below:

1. Price-Earnings (P/E) ratio
2. Price to book (P/B) ratio
3. RSI (Relative Strength Index)
4. EMA (Exponential Moving Average)
5. ROC (Rate of Change)
6. Total returns Index

The closing price of the sectoral index is used as output for the network. The number of inputs is 6, and the number of outputs is 1. The complexity, represented by the number of hidden neurons, is 1.

## V. Empirical Results and Analysis

Table 01 and 02 shows the predicted index price is compared with the actual price of the five sectoral indices over a period of 10 days.

Table 1: Table showing Actual and Predicted Nifty Auto and Nifty Bank index returns with error %

| Nifty Auto Index | | | | Nifty Bank Index | | |
|---|---|---|---|---|---|---|
| DATE | Actual | Predicted | ERR (%) | Actual | Predicted | ERR (%) |
| 17-Sep-19 | 7012.1 | 7156.41 | 2.06 | 27172.65 | 27229.87 | 0.21 |
| 18-Sep-19 | 6920.6 | 7147.70 | 3.28 | 26757.65 | 27242.30 | 1.81 |
| 19-Sep-19 | 7605.85 | 7085.18 | 6.85 | 28981.55 | 26899.21 | 7.19 |
| 20-Sep-19 | 7802.65 | 7514.41 | 3.69 | 30566.2 | 28586.11 | 6.48 |
| 23-Sep-19 | 7773.25 | 7678.11 | 1.22 | 30183.1 | 29803.53 | 1.26 |
| 24-Sep-19 | 7470.45 | 7695.46 | 3.01 | 29586.05 | 29638.94 | 0.18 |
| 25-Sep-19 | 7659.75 | 7508.53 | 1.97 | 30002.6 | 29313.19 | 2.30 |
| 26-Sep-19 | 7554.25 | 7633.69 | 1.05 | 29876.65 | 29641.54 | 0.79 |
| 27-Sep-19 | 7493.15 | 7582.38 | 1.19 | 29103.15 | 29606.77 | 1.73 |

*Source: Author*

Table 2: Table showing Actual and Predicted Nifty FMCG and Nifty Financial Services, and Nifty IT index returns with error %

| *Nifty FMCG Index* | | | *Nifty Financial Services Index* | | | *Nifty IT Index* | | |
|---|---|---|---|---|---|---|---|---|
| *DATE* | *Actual* | *Predicted* | *ERR (%)* | *Actual* | *Predicted* | *ERR (%)* | *Actual* | *Predicted* | *ERR (%)* |
| *17-Sep-19* | *28752.15* | *28896.29* | *0.50* | *12116.2* | *12086.55* | *0.24* | *15702.3* | *15742.95* | *0.26* |
| *18-Sep-19* | *28575.6* | *28980.96* | *1.42* | *12001.25* | *12096.57* | *0.79* | *15522.45* | *15792.70* | *1.74* |
| *19-Sep-19* | *29835.35* | *28805.10* | *3.45* | *12859.85* | *11982.18* | *6.82* | *15491.05* | *15642.22* | *0.98* |
| *20-Sep-19* | *31120.1* | *30015.34* | *3.55* | *13560.25* | *12794.45* | *5.65* | *15040.65* | *15607.23* | *3.77* |
| *23-Sep-19* | *31312.4* | *31169.44* | *0.46* | *13398.35* | *13396.15* | *0.02* | *15338.65* | *15231.40* | *0.70* |
| *24-Sep-19* | *30925.95* | *31328.22* | *1.30* | *13141.3* | *13258.91* | *0.89* | *15379.9* | *15487.08* | *0.70* |
| *25-Sep-19* | *31027.7* | *31008.38* | *0.06* | *13288.25* | *13001.85* | *2.16* | *15312.9* | *15507.13* | *1.27* |
| *26-Sep-19* | *31026* | *31095.69* | *0.22* | *13282.65* | *13131.80* | *1.14* | *15236.4* | *15449.83* | *1.40* |
| *27-Sep-19* | *31134.5* | *31073.27* | *0.20* | *13017.3* | *13143.15* | *1.79* | *15540.15* | *15371.18* | *1.09* |

*Source: Author*

The highest accuracy noted is in the case of NIFTY FMCG followed by NIFTY IT Index with an error percentage of 1.24 and 1.32 respectively.

Table 3: Table showing the sectoral average error %

| SECTORAL INDEX | AVERAGE ERROR (%) |
|---|---|
| NIFTY AUTO | 2.70 |
| NIFTY BANK | 2.43 |
| NIFTY FMCG | 1.24 |
| NIFTY FS | 2.16 |
| NIFTY IT | 1.32 |

*Source: Author*

EMA and the Total returns index had a perfect correlation with the closing price for all the sectoral indices. ROC holds significance and has a positive perfect correlation for both NIFTY FMCG and NIFTY IT.P/B ratio did not hold much significance in the prediction of sectoral index price except for NIFTY Bank. The average error percentage of the Neural Network did not exceed 3, which is a pretty accurate model compared to other tools used for predictions. As the number of instances (input data) increases, the accuracy of the model also increased which shows the model has impacted by the volume of input data.

## VI. Conclusions

The ANN model has been trained with historical inventory data. Several functions, including RSI and ROC, are derived from historical stock knowledge, including exponential moving averages. The dataset is subsequently divided into training and test sets for the formation and accuracy testing of the ANN model. Nevertheless, price change forecasts are only guided regularly by the Sectoral Index. The precision reveals that it can be used as a scientific instrument to forecast price path. From the study, it can be concluded that the ANN model can be consistently successful in predicting price movements compared to other statistical and technical tools. The predicted sectoral index prices can help investors make smart investment decisions as well as help analysts to predict and study trends in sectoral indices and the model can be further applied to specified stocks.

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# Importance and Sustainability of Educational Entrepreneurship and Edupreneurship in Present Context of Entrepreneurial Surroundings

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## Abstract

There's involves outstanding deal of literature centered on the entrepreneurial ecosystem. but, it has disintegrated in phrases of knowledge the parameters that impact inside its additives. The motive of this study is to review and consolidate the literature by way of adopting a "funnel technique". that is executed by means of thinking about Entrepreneurial ecosystem's Mazzarol model - derived from Isenberg's work, narrowing it down to two additives - Universities as Catalysts and education & training. The main goal of this study is the two ends of these components: academic entrepreneurship and education. It changed into discovered that the published literature covers the idea of instructional entrepreneurship, independently, to a huge volume. However, the literature on Edupreneurship is confined. moreover, an opening was stated in the literature at the research of the motives or influencing elements that lead instructors, students, experts or entrepreneurs to pursue and hold the path of academic Entrepreneurship or Edupreneurship. The investigative attempt intends to provide existence to a new direction for each empirical and conceptual studies, highlighting the position of Edupreneurship and academic entrepreneurship as significance elements that contribute to the growth and sustainability of the entrepreneurial ecosystem.

**Keywords:** Education, Entrepreneurship, Edupreneurship.

## I. Introduction

Entrepreneurship as a concept has been described by various scholars differently. However, in general, entrepreneurship is an endeavour accompanied by risk and time and involving creativity or innovation not only in introducing newer products or services in the market, but also in the process of producing or delivering those products or services (Abreu and Grinevich, 2013). The two central features of entrepreneurship - creativity and innovation, have been described as vital tools which enable the initiation, sustainability and growth of firms (Shalley, Gilson and Blum, 2009; Gundry, Ofstein and Kickul, 2014). The importance of creativity & innovation that fosters changes for an entrepreneurship trade in order to achieve a comparative merit. Furthermore, Cha and Bae (2010), elucidate that entrepreneurship is a resourceful process which not only enables creation of new products and services, but

also facilitates generation of novel solutions to prevailing problems. Therefore, academic researchers regard entrepreneurship an important driver in an economy in not only of developed, but also in developing economies. Moreover, (Kuratko, 2005) accentuates that entrepreneurship necessitates five key characteristics – readiness to take measured risks, competence to form an entrepreneurial team, management skills to organize needed resources, professional skills to draft a business plan and finally capability to recognize opportunity quickly; on a whole termed as Entrepreneurial Perspective', which could be developed in individuals. The last two decades have witnessed concrete efforts, across the world, to disseminate entrepreneurship education and support individuals from various disciplines such as - medical, engineering, arts & sciences, to translate their ideas to businesses. However, there are many barriers in the pursuit for entrepreneurship and young entrepreneurs' primary barriers are lack of life experience and dearth of optimal resources (Bell and Blanchflower, 2011).

Moreover, Stamboulis and Barlas (2014) have categorized all the barriers faced by entrepreneurs into three types – individual, organizational and environmental; individual entrepreneurship barriers include personal factors such as educational level and family, organizational entrepreneurship barriers comprise of lack of support in creating and sustaining a firm - marketing, financing and physical resources, and environmental entrepreneurship barrier encompass policies, governing laws, markets and socio-cultural factors. All these factors, other influencing parameters, supporting entities and consumer market put together form an Entrepreneurial Ecosystem'. The following sections focus on entrepreneurial ecosystem, utilizing the model published by Mazzarol and connecting the two ends – academic entrepreneurship and Edupreneurship of two components involving education – Universties as Catalysts and Education & Training. Furthermore, literature focused on the parameters and concepts within the afore mentioned areas has been reviewed and presented; thereby adding value to the study of academic entrepreneurship and edupreneurship at micro level and their impact on the entrepreneurial system at the macro level.

## II. Entrepreneurial Ecosystem

People across the globe are gaining more interest in entrepreneurial ecosystem and to investigate the roe in the changing scenario. Nicotra et al., (2018), posit that the process of developing an enabling ecosystem for entrepreneurial events has received considerable attention from governments, agencies, venture capitalists, and business development consultants. Organizations such as the organization for Economic Co-operation and Development (OECD), the World Bank, and the World Economic Forum (WEF). The concept of entrepreneurial ecosystem has a diverse and rich lineage of intellectual investigation by scholars from various fields such as geography, finance, economics, management and business venturing. Furthermore, according to researchers the term Entrepreneurial

Ecosystem by breaking it down into two components. Firstly, entrepreneurial‖ derived from the general terminology, Entrepreneurship; a dynamic process which primarily includes clear vision and ability to bring about a change through creativity and or innovation (Kuratko, 2005). Secondly, ecosystem is drawn from the biological description of the term which figuratively relates to interaction and interdependence among entities in a geographic region. Moreover, it is evident that the definition of entrepreneurial ecosystem approach does not include the conventional statistical indicators of entrepreneurship, such as small business‘ and self-employment‘ (Stam, 2015). The entrepreneurial ecosystem approach pushes for _productive entrepreneurship‘, ultimately leading to entrepreneurial economy (Thurik, Stam and Audretsch, 2013; Stam, 2015). Productive entrepreneurship is described as an entrepreneurial pursuit which not only results in the introduction of new products or services, but also contributes to societal well-being (Lucas and Fuller, 2017). The entrepreneurial ecosystem approach is unlike the concepts such as regional clusters or industrial districts, because it considers entrepreneurial pursuits as creative or innovative ventures and their significance in economic and social contexts (Nicotra et al., 2018). This approach has resulted in enhancement of validity and generalizability of supporting entrepreneurial start-ups and other such initiatives across different regions or countries. However, Isenberg (2010) cautions the attempts to replicate silicon valley model in US to other regions without understanding and taking into consideration, the local factors and prevalent societal culture. Entrepreneurial Ecosystem, on a whole, is a conceptual framework which is drafted to indicate the key players and their roles in initiating, promoting and developing entrepreneurial ventures. This study categorically examines the framework for an entrepreneurial ecosystem proposed by which has been adapted primarily from the work of Isenberg (2010). The framework consists of interlinked, dynamic nine components which individually have the capacity to impact the ecosystem and collectively bring about a radical change in the society. The rationale for choosing these areas for investigation lies in the fact, the significant role education has played throughout the modern history by not only enlightening and creating awareness, but also solving major issues plaguing societies across the world. While the philosophical and historical significance of education is unquestionable, the need of the hour is to investigate the education sector through the lens of entrepreneurial ecosystem.

## III. Academic Entrepreneurship

Education sector in general and HEIs in particular, are being seen as sources of creative ideas and innovative thinking, thereby playing a key role in development of entrepreneurial ecosystem. Traditionally, institutions of higher education were not involved in the process research activity for bringing the results for the benefit of market. However, the role of educational institutions is changing as they, now, are not only focusing on education & research, but also investing heavily on value creation – value for business and society at large (Brunswicker, Wrigley and Bucolo, 2013). Most of the technological solutions and management ideas which drive entrepreneurial pursuits are a result of the research conducted on campuses (Wood, 2011). Instituitions of higher learning provide a platform for both the faculty and

students to work as a team or able to change them into a technical or non-technical background to develop ideas fot the startups. The changing nature of HEIs has garnered more research interests among academics and has resulted in qualitative & quantitative studies to be carried out, in order to better understand the shift in focus of HEIs and design even more effective models of academic entrepreneurship. Furthermore, Boh et al., (2016) have classified the HEIs into three categories: Higher Educational Institutions with Internal Focus, Institutions that develop entrepreneurial resources within their premises and strive to nurture start-ups. Higher Educational Institutions with external focus. Institutions that pursue to build collaborations and partnerships for resources to support entrepreneurial pursuits of its members. Higher Educational Institutions with dual Focus, Institutions that focus both externally and internally, establish network between various individuals and internal programs, and seek to derive resources from outside. Abreu & Grinevich (2013) posit that senior faculty in a HEI are more likely to involve in entrepreneurial activities as they have more time compared to the junior faculty who are occupied in teaching, administration and research activities. Also, the tacit knowledge acquired over the years of extensive experience also plays a vital role in the engagement. Academic Entrepreneurship is based on the premise that substantial commercial enterprise and scientific research activities taking place inside HEIs may be commercially viable, ensuing in constructing of commercial enterprise and generating sales to the HEIs. Researchers factor out that educational entrepreneurship is a ongoing method where all events are interconnected in series. There is a wide, diversified literature on academic entrepreneurship compassing not only macro/regional level analyses focusing on policies, frameworks, technology clusters etc., but also micro/individual analyses centering on behavior, competency and motivation of individuals within a HEI towards commercializing their research (Barbieri et al., 2018). Wood (2011) theorizes that the development of Academic Entrepreneurship in the USA traces back to the passage of the Bayh-Dole Act, 1980 by the federal government, which provided a means by which the university, and not the funding agency, would have the ownership of the intellectual property generated under federal research grants. Though few HEIs used to embark on commercialization pursuits before the passage of this act, it is obvious that the act has influenced mabig apple HEIs to initiate and support academic entrepreneurship (Markman et al., 2005). even as the literature indicates that the 1980 Bayh-Dole Act was deviceal in the increase in academic entrepreneurial pursuits in USA, it also indicates that European HEIs are not efficient in transferring their excessive variety of academic research outputs into commercial products – popularly known as European Paradox‖ (Conti and Gaule, 2011). But it can be seen from broad perspective, that entrepreneurship and research are conflict free. As concluded by Lundqvist and Middleton (2013) from their qualitative study on academic entrepreneurship, it is proposed that researchers should not be given the role to lead entrepreneurial ventures – but a more collaborative role should be entrusted on them with the support of other actors from within and outside the HEIs. Academic Entrepreneurship has been supported through various modes within a HEI and effectiveness of the research commercialization in a HEI is affected by various factors. The sections below investigate the two key units within a HEI, which support the entrepreneurial pursuits of researchers and connect them to the industry.

# IV. Edupreneurship

Education sector, in recent years, has witnessed a significant investment of financial and technical resources by venture capital investment firms, entrepreneurs and major technology companies. This has led to growing interest of entrepreneurship researchers to categorize and describe such type of entrepreneurs. (Lăcătuş and Stăiculescu, 2016) define Educational Entrepreneurs, simply called Edupreneurs, as entrepreneurs who take the risk of time and money to influence and bring about changes in the education system through their innovative characteristics and entrepreneurial initiatives. Edupreneurs act as change agents' who bring in innovative ideas and concepts into the educational sector. In most cases they have experience as an educator, possessing business acumen. This combination of expertise enables them to create or develop innovative product / service which would impact not only student learning, but society at large; hence, they are also known as Social Entrepreneurs' (Omer Attali and Yemini, 2017). Significantly, entrepreneurs based in Silicon Valley, US are increasingly utilizing their financial and technical power to create and prototype their own innovative educational and training institutions. These entities are designed in such a way that they could be scaled to technical platforms in future, supported strongly by software engineering know-how and managed by entrepreneurs and executives of successful IT companies and other start-ups. Another avenue with ever increasing presence, which is less of an alternative to the conventional public education and more of a supplement, is the private tutoring / coaching (Zhan et al., 2013). On the other hand, key foundations within the education sector have systematically moved away from supporting traditional educational institutions towards organizations that are a potential competition for education sector in the public domain (Reckhow and Snyder, 2014). Edupreneurship, in the US, is majorly through venture philanthropy wherein big corporations-backed charitable foundations and wealthy elites are active in charter school and education networks (Reckhow and Snyder, 2014). While in the UK, there has been an increased participation of private equity and foray of new philanthropic sources into the education sector, primarily – academy schools program. Venture Philanthropy is seen as a tool for the technology sector to enter the education space and this has resulted in schools manifesting private-style organizational culture and being competitively driven. This approach is seen as a radically disruptive' alternative to the conventional public education. Edupreneurs can be categorized into two types – first, owners / stakeholders of big businesses supporting educational initiatives or start-ups. This is evident from the huge concentration of significant resources in education by major IT companies and venture capitalists. Second, founders of educational institutions offering formal degrees or training programs. The founders of educational institutions could be further classified based on the educational or training level / category.

- School Education involves founding schools which cater to the needs from kindergarten until grade 12 (also known as K-12).
- Higher Education includes colleges/universities offering undergraduate and/postgraduate degree programs.

- Vocational Training encompasses centers or institutes which prepare candidates with job skills through their certified programs.
- Coaching /private tutoring encompasses academies /establishments which train students, online or in classrooms on various technical and management concepts.
- Research & Innovation comprises of centers /institutes provide a platform for academics or industry professionals to create new knowledge and products or further develop them.

## V. Conclusion

It is found from the literature that the schooling area performs a important position inside an ecosystem. The two ends of this area – academic entrepreneurship & edupreneurship have more and more attracted the eye of educational researchers as a complete place for similarly research and funding of teachers and marketers as viable, profitable routes with economic and social benefits. there is substantial literature posted on educational entrepreneurship proper via its initiation and evolution. it's far mentioned that creating ambidextrous systems amongst universities – ones which assist and inspire studies as well as commercialization could be notably useful. also, it's far vital that guidelines that promote successful scientists closer to commercialization in their findings want to make certain their overall improvement with the vital abilties to be successful. but, the literature is restricted to studies centered on the methods or entities. Moreover, there may be scant literature regarding person and their studies even as pursuing entrepreneurial routes inside academic establishments. Moreover, much less literature is to be had on Edupreneurship; mockingly, that is at a time while there's an extended interest amongst entrepreneurs to embark on investments in schooling sector and mushrooming of personal educational institutions at all ranges. Qualitative research centered on investigating the motives and influencing parameters for people to soak up instructional entrepreneurship course at one stop or edupreneurship route at the opposite quit might add sizable fee to current expertise and pave way for similarly research.

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# A Study on Edupreneurship Awareness among the University Students, with Special Reference to Guwahati City, Assam

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## Abstract

The educational sector became smarter for entrepreneurs and technological up gradation created the latest opportunities for those entrepreneurs. Traditionally, the teaching was confined to the walls of the classroom and lucid lecture delivery by the teachers to the students. But during Covid-19, online teaching came into trend. The individual who innovates teaching and learning is calan led edupreneur and that journey is called edupreneurship. This research is an attempt to get an insight on the awareness level of edupreneurship among the students of different universities in Guwahati city and it has been found that the major of students of the universities of Guwahati city are moderate about the term Edupreneur and Edupreneurship. It can be suggested that social media is the majority preferable tool to broaden the awareness of edupreneurship among the students and citizens in Guwahati city.

**Keywords:** Awareness; Educational sector; Edupreneur; Edupreneurship.

# I. Introduction

Education is a foundation for a better future"- Elizabeth Warren Most of the people in this generation believes that education is a purpose to live for a better future. Education is an ideology that nourishes a youth to seek knowledge, behavior, and skills for future utopia.

This concept of new innovation and creativity towards education formed by entrepreneurship is called edupreneurship. It is abundantly evident from the phrase "Edupreneurship" that it is a combination of the word Education and Entrepreneurship. Edupreneurs are entrepreneurs who take on risks to invest in education. An entrepreneur who works within the education sector is called an edupreneur. Mindset consist of our principles and our information . The educator who has that entrepreneurial mindset is known as edupreneur. That individual who innovates teaching and learning is called edupreneur and that journey is called edupreneurship. A new mode of teaching is the foremost plan of this term edupreneurship. Edupreneurship is the new dimension to entrepreneurship. An edupreneur has the capabilities of an entrepreneur such as Innovation, Risk Taking, Confidence so on and so forth.

In traditional learning, the teacher delivers knowledge to the students in classroom. No third party means is involved and hence the pace of learning is constant. But during Covid-19 pandemic, when all the countries were affected globally especially the education sector, the online teaching came into the trend. Online learning is the process of educating the public at large via the internet. Varied mode of teaching can be used such as one-on-one video calls, group video calls, and webinars at several apps such as Zoom, Google meet and so on. Online learning facilitates teaching from any location (our comfort zone i.e our home) and enroll students from various geographical areas. And hence this can be said that a shift has been witnessed from traditional learning to online learning and that's where Edupreneurship can be said to have a broad scope today.

It can't be denied that over the years there has been drastic development in the current education even though innovations and technologies are required. Today, for preparing various competitive examinations, there are education start-ups which cater to the needs of the people of different age groups such as: Gradeup; Byju"s; Unacademy.

In order to define innovative solutions to education models at different levels, new learning methods, multiskilling of the workforce, inclusive education, empowerment, and use of technology to meet the increasing challenges of maintaining India's growth, edupreneurship—or the entrepreneurial spirit—would be essential.

Scholars, academics, and thought leaders continue to be interested in the management of educational institutions and universities since it involves many different types of leadership styles, motivations, etc. There are so many positive developments taking place in the education, public, and business sectors today as well

as in non-governmental sector projects throughout the world. The many development projects undertaken by edupreneurs are both thrilling and difficult. The main ingredients that result in high-quality delivery are diligence and tenacity. Every institution or university should make an effort to be innovative in the services it develops, guarantee that it is appropriate for society, and work to slake the thirst for knowledge that draws people to educational institutions. The holy duty and obligation to manage and produce educational resources sustainably for the benefit of mankind in general and their development, in particular, falls to edupreneurs, who are the leaders of society. Edupreneurs are forces for positive change in the economy. As a social entrepreneurial group, edupreneurs have made amazingly positive changes to Indian society. For the sake of the economy, edupreneurship must be maintained and encouraged to expand. When supported, edupreneurs will show to be valuable resources for the economy, enhancing many different facets of it. Edupreneurs unquestionably are agents of change who strive for the betterment of society.

Therefore today"s education sector is connected between digital education, teacher training and entrepreneurship. The current education sector has opened larger prospect for aspiring businessman willing to flourish their life as an 'Edupreneur', or 'Education Entrepreneur'. Unfortunately, there are barely any studies or concepts on edupreneurship.

## II. Objectives

The main objective of this study is to identify the awareness level of edupreneur among the students of different universities in Guwahati and to suggest methods to spread edupreneurship among the universities students of Guwahati city.

## III. Literature Review

Various authors, academicians, research scholars have conducted research on different aspects of edupreneurship. A few relevant literatures relating to edupreneurship are:

Abreu & Grinevich (2013), this study reveals that as the junior faculty in the Higher Education System is involved more in teaching, research work and other administration activities, they remain packed all the time, so, the senior faculty gets more time to devote in entrepreneurial activities in comparison to the junior faculty. For a successful edupreneurship, experience and knowledge plays a vital role.

Friedman & Silberman (2003), study highlighted that Academic Entrepreneurship deals with detail study of micro and macro level of policies, behaviour, technology etc, so that, it becomes a bit easier in commercializing the academic entrepreneurship, that is, edupreneurship in Higher Education Institution.

Chaitra Ramanathan (2006), in the study identifies that self awareness and identity are the two basic things that are missing among the students in the Indian

education system, despite of this factors, distinction among the population based on the region, caste etc plays a vital role in the Indian education system which leads to decrease in its standard.

Roeles Henk, Samplonius Raut and Shilpa (2011), in the research paper tried to use entrepreneurship learning in such a way that will lead to change in the behavior of the population towards entrepreneurship in an edupreneurial environment.This pedagogic helps in adding value in the entrepreneurship learning.

Devasenathipathi, Duraipandian.R, In this paper, the authors tried to focus upon the innovations that could be made in the edupreneurship sector. According to the authors, thucational organizations can be divided into five categories and identified some points for improvement. By pursuing the suggested changes, educational institutions will be more respected and the edupreneurship market will flourish. Based on the current research, thture research work will also include e-learning as an option for edupreneurship with its opportunities and challenges.

Thus, this study shows that many studies have been conducted on edupreneurship, but, no such study has been conducted with respect to check the awareness level among the student of Guwahati, Assam. Therefore, this study has been conducted.

## IV. Research Methodology

The study is **descriptive and exploratory** in nature. The study has been conducted among the students of different universities of Guwahati city, Assam. The data has been collected by circulating the questionnaire among the students of different universities. Convenience sampling technique was used to collect the data from the students in Guwahati. Apart from this, the researcher has also taken the help of some secondary sources such as journals, magazines, books, websites etc. The total **sample size** of the study is 108. The collected data and information have been analyzed on the basis of **age, qualification, awareness regarding edupreneur** etc. of the respondents. Percentage methods have been used for analysis of collected information.

## V. Data Analysis and Interpretation and Findings

### 1. Age & Qualification of the Respondents

Table 1: age of respondents

| Age (years) & Qualification | No. of Respondents | Percentage (%) |
|---|---|---|
| 18-21 yrs & Graduation (UG) | 64 | 59 |
| 22-25 & Post-Graduation (PG) | 25 | 23 |
| 26 & Above & Pursuing Doctorate | 19 | 18 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** From the above, it can be analysed that majority of the respondents are between the age group of 18-25 years. From the above data, it is can be interpretated that the respondents are either pursuing Under Graduate course or Post Graduate course or Doctorate in Philosophy (PhD). And, the maximum number of respondents are either pursuing under graduation or post graduation

## 2. Awareness About Edupreneureurship

Table 2: the awareness about the term Edupreneurship by the respondents

| Awareness level | No of Respondents | Percentage (%) |
|---|---|---|
| Highly aware | 24 | 22 |
| Moderately aware | 58 | 54 |
| Aware | 0 | 0 |
| Moderately unaware | 14 | 13 |
| Highly unaware | 12 | 11 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** From the above analysis it is seen that out of 108 respondents, 24 respondents are highly aware about the term Edupreneurship, 58 respondents are moderately aware about the term Edupreneurship, 14 respondents are moderately unaware about the term Edupreneur and 12 respondents are highly unaware about the term Edupreneurship. From the above analysis it has been observed that 22% of the respondents are highly aware about the term Edupreneurship, 54% of the respondents are moderately aware about the term Edupreneurship, 13% of the respondents are moderately unaware about the term Edupreneurship and 11% of the respondents are highly unaware about the term Edupreneurship.

## 3. Awareness among the Citizen Regarding Edupreneurship is Poor.

Table 3: respondents view regarding whether the awareness on Edupreneurship among the citizen is poor

| Awareness level | No. of Respondents | Percentage (%) |
|---|---|---|
| Strongly agree | 30 | 28 |
| Agree | 52 | 48 |
| Neutral | 17 | 16 |
| Disagree | 9 | 8 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** As per the data collected, majority (48 %) of the respondents agree that the awareness regarding the upcoming entrepreneurship i.e. edupreneurship among the citizen of Guwahati is poor. At the same time, only a few respondents ( i.e. 8 %) thinks that the citizen of Guwahati are aware regarding edupreneurship.

**4. Source of Spreading Awareness on Edupreneurship**

Table 4: Showing the source of spreading awareness on Edupreneurship

| Source | No of Respondents | Percentage(%) |
|---|---|---|
| Social Media | 45 | 42 |
| Magazine | 16 | 15 |
| Newspaper | 31 | 28 |
| Television | 16 | 15 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** From the above, it can be interpretated that as per the respondents, social media is the most preferable media to spread the awareness among the citizens in guwahati city followed by newspaper, magazine and television.

The major findings of the study can be highlighted as below:

1. It has been found that majority of the respondents are between the age group of 18-26 years and they are either pursuing under graduation or post graduation course and the respondents are moderately aware about the term Edupreneur and Edupreneurship.

2. While interacting with the students of the universities of Guwahati city, it has been found that majority of the respondents agree that the awareness regarding the upcoming entrepreneurship i.e. edupreneurship among the citizens of Guwahati is poor. At the same time, only a few respondents thinks that the citizen of Guwahati are aware regarding edupreneurship.

3. Therefore, the respondents have suggested that social media is the most preferable mode to spread the awareness among the students as well as citizens in the city.

## VI. Suggestions

The study shows that the majority students of the universities of Guwahati city are moderately aware about Edupreneur and Edupreneurship. Moreover, it has been observed that the students express their views regarding the awareness on Edupreneur among the citizen as poor. The suggestions that can be put forwarded are as the following:

1. The first initiative that can be taken to spread the awareness level is by introducing few topics in the books in the education sector.
2. Holding seminars and webinars are a good initiative.
3. Advertisements in television, newspaper should be done to gain the attraction towards the topic.

4. Use of social media platform is a good idea. Various social media platforms are instagram, facebook, telegram and many more.
5. Awareness can be spread by speaking about the topic in the public gatherings by the renowned persons.
6. Journals and magazines are also one of the medium to increase the awareness level among the citizen of Guwahati.
7. Government should take some measures like giving loan to the edupreneurs.

# VII. Conclusion

An edupreneur is an individual who has the comprehension of an educator as well as an influence of an entrepreneur. With these two features, an edupreneur can create innovative things for society and especially for the students. As education and technology go hand in hand, an edupreneur creates online courses, videos, and webinars and can carry on selling them at a suitable price in the market. The scope of edupreneurship amongst the university students or the youths lies in the fact that this would allow them to make flaccid income.

After the analysis and interpretation of the collected data, it can be concluded that the awareness among the respondents is not satisfying. As edupreneurship is the upcoming new entrepreneurship in the current scenario and so, the citizens should be aware of the advantages, scope, and limitations of the edupreneurship and the various ways through which one can establish a startup as an edupreneur. Therefore, various measures should be adopted to increase the awareness level among the citizen of Guwahati as well as the government should take some initiatives and financial measures too.

With the help of this study, the user of this article will be able to have knowledge about the new concept that will help them in enhancing the education system with the use of the latest technology, gain the attraction of the students towards education through innovative teaching ideas, helps in improving classroom communication between students and teachers and also help in earning for a better livelihood. With the help of this study, the user can get the idea that the level of strength that will have to be put on in this area, so that , at one point of time everybody have the idea about edupreneurship in one or the other form. Through edupreneurship, one can become employed by oneself for full time and also can brighten the future generation and show a better path to Rise and Shine.

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# Edupreneurship – The Role of Marketing in Digital Education

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## Abstract

The use of the outdated methods and technologies that do not meet the requirements of the current demands is one of the most urgent problems of acclimatizing modern education. These days skills and knowledge of a person is valued more than years of experience and formal education. With the constant changes in the workplaces, everyone needs to stay up to speed and self-develop their skills. Technology is a boon that enables us to pursue distance, online and mobile learning opportunities through various devices giving a rise to a new wave of business entrepreneurs, that is advantageous to the intellectual thirst of our civilization. A result of our insatiable desire for personal growth and the abundance of online education resources provided by online courses is the advent of the edupreneur. A traditional teacher who uses cutting-edge technology in and out of the classroom, offering lessons as online courses, or a human resource manager who trains their team or provides corporate training to other companies with a learning management system or online courses platform is all examples of an edupreneur. Any top professional who shares her knowledge, abilities, and experiences has the potential to build a successful business. Edupreneurship is changing the educational scene and giving educators a new means of communication. The businessperson moves financial resources from a low-yielding area to one with higher production. Lifelong learning is not an advantage but rather a necessity. The purpose of the article is to understand about edupreneurship role of an edupreneur and how marketing contributes in building the foundations for the new emerging trends in edupreneurship.

**Keywords:** Education, Opportunities, Profitable, Skills, Technology.

# I. Introduction

1. **Edupreneur:** A person who earns a living by offering online courses or coaching services based on their knowledge is known as an edupreneur. In other words, they barter their expertise for cash online. The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield. **An edupreneur is a person who uses the particular economic resource of "learning" to produce a positive value shift.An Edupreneur** combines **Education with Entrepreneurship** (Education + Entrepreneur = Edupreneur) and strives to create education or training based company that functions just like any other company, i.e, it strives to generate more income than losses so it can survive, sustain and hopefully grow and scale. An Edupreneur realizes that the best way is to create a win-win situation both for himself and his students by working hard and creating a quality education business, herby the students get the best quality of education and the Edupreneur is further able to grow the business from the income he generates.

   A good edupreneur strives to:
   - Effect change in the education system
   - Develop new products or programs to deepen or improve the learning experience
   - Produce measurable results for academic standards

   An Edupreneur realises that there are two important points to pay attention to when it comes to setting up their education system:
   - Developing the ability to teach online via webinars and online courses so that the teaching is not geographically restricted and one has a global reach
   - Using tools that enable automation.

   There are a host of other opportunities for an edupreneur like:
   - Creating a Learning Management platform like Teachable, Thinkific, Spayee
   - Creating a Webinar software like Zoom
   - Creating a Marketing Agency that focuses on marketing only for education based companies
   - Creating an Online Course Marketplace like Udemy.
   - Creating a blog (content focused site) that deals with everything related to the Education industry.

2. **Edupreneur vs Entrepreneur**

   **The Shift from Entrepreneur to Edupreneur:** The business owners stubbornly sticking to old school sales and failing to educate their market, are already getting left behind and closing up shop forever. It's time to shift the way of thinking about obtaining and retaining business; time to shift how the information is provided to the markets - from self-promotion to people-development; it's time to shift how the products and services are sold and delivered to the customers, and shift how we

nurture marketplace relationships. Then people moved from the traditional entrepreneurial methods of sales and marketing, to using the platform of education as a way to nurture everyone and everything around at the same time as the bottom lines.

**Entrepreneur**
- Builds a business
- Delivers products and services
- Sells for business profit
- Exchange for immediate financial return
- Pays for business, exposure,leads and marketing
- Gets testimonials after a job
- Helps themselves first
- Has minimal impact on the world

**Edupreneur**
- Builds knowledge, skills and movements
- Gives value and experience that inspire informed action
- Educates for business profits
- Contributes the body of knowledge in an industry which generates a loyal following and industry rapport
- Gets paid whilst growing their exposure, lists and prospects
- Gets raving fans and testimonials before even doing business with their customers
- Helps others first which later helps them
- Leaves a legacy

## II. Need to Become an Edupreneur

1. **Personal transformation:** Education is transformational in its nature which enables the learner to move from one place to another. With edupreneurship people try to discover new methods that eases and as wellescalates the student's accessibility thereby exposing them to a new environment.

2. **Authority positioning:** Creating own learning programs, methods and products is the straight to the topway of positioning yourself as an authority in your field and contributes to the professional credentials.

3. **Positively change people's lives:** If a person shares what he knew with someone else then he is educating them and enabling to change who they are and what they can do, resulting in changing their lives.

4. **Earn passive income:** The online world enables us to automate so many traditionally time-consuming activities, to the point where entire businesses can now be run with the use of some smart apps, tools, and software, bringing income into our bank accounts without having to be sat near our computer at all.

5. **Gain a global client base:** The very nature of the internet allows anyone, from anywhere, to access a global market. It increases accessibility. With the right course titles and descriptions, your courses can be found without you even having to advertise them. Going online means going global.

6. **Leave a legacy:** Creating courses and other expertise-sharing products, are great ways to make a difference to people in a way that ensures you'll always be remembered for the way that you positively contributed to the world. By writing down your strategies for achieving a certain outcome, overcoming a particular situation or giving people an insight, you leave behind valuable information about life today, and an impact on people beyond the reach of your immediate physical presence.

## III. Key to be a Successful as an Edupreneur

1. **Invest in teaching and learning:** Successful edupreneurs often have deep subject matter expertise or access to others with deep expertise, but having expertise and knowing how to teach well are two different things. Successful edupreneurs invest time and effort in understanding adult learning principles, developing their teaching skills, and working hard to engage and retain their learners.

2. **Be strategic:** Edupreneurs have really unique content and follow diverse methods that no one else can offer. Successful edupreneurs embrace strategy and learn how top stand themselves out in an increasingly crowded market for education.

3. **Leverage technology:** Leveraging web-based technologies for creating, promoting, and supporting the offerings simply makes since. It increases efficiency, enables to scale, and if done correctly, can greatly enhance the experience you provide to your audience.

## IV.    Examples of Renowned Edupreneurs

1. **Paul fishman—Physical trainer to self-love coach:** Paul Fishman teaches his students to reach their full potential by doing what's most important—loving themselves unconditionally. Paul serves his clients with 1:1 coaching, online courses, and a "self-love" clothing brand.

2. **Mai-kee Tsang—Health coaching to podcast strategist:** Mai-kee wanted to build a platform for quiet women to help them beheard and amplified.Mai-Kee shares her mission with a mentorship program and 1:1 VIP program. She went from earning 7,00,000 a year to almost 79,00,000 a year.

3. **Kaye putnam—Corporate to brand strategist:** Kaye used her expertise in psychology and marketing to build a brand strategy biz. She went from building brand packages to online course creation.

**4. Stephanie Shaw—Health scares to wellness coach:** Stephanie shaw visited multiple doctors and health specialists to know what's wrong with her healthbut nobody could tell her what exactly happened. It wasn't until she found a Naturopath doctor that she finally identified the issue. This experience pushed Stephanie to become a wellness coach.

**5. Kelly trach—From tech start-Ups to business coach:** Kelly Trach's assisted people in going after what they truly desired, instarting digital businesses. She is a classic edupreneur who moved on to what she was made to do—business coaching and writing after starting and failing three start-ups.

## V. Edupreneurship

Edupreneurship is an income-generating education business activity that has been strategically intertwined with education for the purposes of sustainable change at a social and economic level. It is the modern day 'TOOL OF THE TRADE' in leveraging the organisation's impact, exposure, income and authority positioning..It is a platform where one can engage, retain, attract the audience in a way that builds trust and assists you in achieving the targets of the organisation. Entrepreneurship requires a lot of dedicated hard work to make a business successful which requires passion and drive to create the perfect program or product to see the final results. Edupreneurship is the connection between digital education and entrepreneurship. When teachers begin to develop their own educational practice with the mindset and techniques of an entrepreneur, new forms of teaching will emerge. These teaching innovations will leave the classroom and lead to new educational products or business models, because entrepreneurs want to sell and spread their ideas.

## VI.    Principles of Edupreneurship

1. Having an entrepreneurial mindset
2. Intra- and entrepreneurial knowledge, skills, abilities and competencies
3. Design thinking focused on creating stakeholder and beneficiary defined outcomes
4. A system's engineering approach to solving wicked problems, like how to fix outcomes disparities and their social determinants
5. A different business model
6. More respect for and attention to edupreneurial champions
7. Better teacher education and training
8. An incentive and reward system for not just tweaking a failed system , but rather, making it obsolete given the basic structural changes in the US economy
9. Eliminating unnecessary and burdensome bureaucracy, credentialing that does not add value and administrivia
10. Paying more attention to and measuring student defined outcomes
11. Better public-private integration
12. K-20 integration and alignment
13. Teaching students what they need to win the 4th industrial revolution
14. Embracing cradle to career integration
15. Creating a competent diverse and equitable talent pipeline

# VII.  Marketing in Edupreneurship

Marketing is the process of exploring, creating and delivering value to meet the needs of a target market by providing goods and services, potentially including selection of a target audience, selection of certain attributes or themes to emphasize in advertising, operation of advertising campaigns, attendance at trade shows and public events, design of products and packaging attractive to buyers, knowing the customers desires , the demand in the market. It is the primary components of business management and commerce. Marketers can direct their product to other businesses or directly to consumers regardless of who is being marketed to, several factors apply, including the perspective the marketers will use. Known as market orientations, they determine how marketers approach the planning stage of marketing. The term marketing, what is commonly known as attracting customers, incorporates knowledge gained by studying the management of exchange relationships and is the business process of identifying, anticipating and satisfying customer's needs and wants.

# VIII.  Role of Marketing in Edupreneurship

The most valuable thing in the development of an edupreneurship is marketing.

1. **Consumer need:** Marketing is identifying the particular wants and needs of customers and then going about satisfying those clients better than the competitors. Marketing is an opportunity for people with edupreneurial skill, insight and highest awareness of how to effectively reach potential customers, successfully promote their products and make it most appealing to a greater number of consumers. The most innovative ideas, the greatest products or superior services succeed only when they are marketed in the context of people's perceptions. People have their own unique perceptions of the world based on their belief system.

2. **Relate the consumer with the brand:** As social media has evolved and has become an important part of the consumer experience, successful companies have demonstrated a continuous involvement in social media, participating with timely campaigns aimed at their audiences.

3. **Getting product out:** Using marketing to promote your product, service and company provide your business to discover prospective customers. For a business to succeed, the product or service it provides must be known to potential buyers. Marketing strategies helps in creating product or service awareness. Without marketing, your potential customers may never be aware of your business products andservices and your business may not be given the opportunity to progress and succeed.

4. **Higher sales:** Once your product, service or company is advertised through marketing the customers get to know more about itand increases the chances that consumers will make a purchase. As awareness becomes a reality, it is also the

point where new customers start to spread the word, telling friends and family about this amazing new product or service that is discovered.

Marketing strategies encompass these activities

1. Determining the need for a product or service through consumer research and by observing and quantifying sales patterns of similar goods in the marketplace.
2. Modifying existing products or creating new products to match consumer wants and needs.
3. Determining how best to reach potential customers to make them aware of the products and to persuade them to buy them.
4. Creating marketing campaigns based on your determinations of the most effective way of reaching customers.
5. Confirming customer relationships via follow-up sales campaigns and loyalty programs.

The internet and many online course platforms offer the potential to sell knowledge in a number of ways such as:

- Online training workshops,
- Tutorial videos,
- Webinars,
- How-to-Guides,
- Ebooks

Examples of Companies Using Educational Marketing

- **Hubspot:** Building an inclusive academy: Through its Education Partner Program, HubSpot's academy offers educators and Higher Education professors the opportunity to access inbound marketing resources and sales education (guides, templates, ebooks, webinars).

- **Indium:** Launching a powerful blog: Indium Corporate has seen a 600 percent increase in their leads, which is remarkable. Their blog offers valuable content to their audience through articles and videos that give answers to many engineering topics while featuring a range of their products. Despite focusing on such a niche topic, the blog is successful at providing insightful information and initiating conversation.

- **Learn worlds:** Course Creators Academy: LearnWorlds' Academy educates edupreneurs on how to create and sell their online courses. It includes courses that teach their users and customers on how to use the software but also how to learn the basic skills they need as a course creator like: Creating an educational video, creating content and marketing

# IX. Conclusion

Entrepreneurship model is an economic model. Butnowadays as educational domain became more attractive for entrepreneurs as technological changes and customization created new opportunities in educational systems. The new forms of educationsuch as virtual schools or online courses that ameliorates easy access stimulated entrepreneurs to invest in education in the same mode as they would initiate businesses in domains more market oriented. They take risks to invest in education and are known as 'edupreneurs'. Instead of the traditional practices Edupreneurs find advanced methods to reach out to the students so that they can access their requirements from their comfort zone. Since the development of the edupreneurship there is a drastic shift from the traditional practices to modern procedures and this recorded a fall in the traditional sales. Marketing assists the organisations in advertising their product so that the people become aware of those. Marketing has a key role in edupreneurship as these are the onlines platforms and people may not get to know those. Markerting increases the profit in the long run and enhances the overall image of the organisation.

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# The Role of Edupreneurship: Its Prospsects and Challenges

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## Abstract

*"An edupreneur is someone who creates a positive value shift with the specific economic resource of "learning."*

*Jeff Cobb*

The term edupreneurship has gained significant value in the education sector which combines the two terms i.e education and entrepreneurship. Education plays a significant role which contributes to the society which in turns changes a person and the world. Edupreneur are change agents who bring in innovation in learning and understands the urgency to remodel the education system to focus on the talent and mentor young minds. They bring out a positive change in the era of education revolution leading to long term success and credibility to the society. It is rightly said that " Education without meaning is no education" where the edupreneurs have realized that abreast knowledge and activity based education will enhance knowledge which make education prospective. Edupreneurs should keep in mind, the right match between right purposes with right ways to make people accept education as a "medium of knowledge" which will make edupreneurs to go in the right way with full dedication and fruitful results. Edupreneurs are highly responsible for designing, creating and developing    programs, products or services in the education sector as well as providing hands on experience. The chapter focuses on the need and traits of edupreneurs, prospects and problems they face. At the end the ways to overcome the challenges will also be discussed.

**Keywords:** Change, Education, Innovation, Kowledge and Learning.

## I. Introduction

Education is transformational by nature which enables a learner to move from one place to another. Education is of paramount importance to anyone**. "Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime." Which signified that education brings about changes in society and the world. It is through an edupreneur** who works in the education sector to sell his

skills, expertise and knowledge to an audience using learning platforms or pay-to-access systems. Edupreneurship refers to education-based business providing educational products and services using the platform of education. Edupreneurship is an income-generating business activity that has been strategically intertwined with education for the purposes of sustainable change at a social and economic level.

Types of edupreneurs include:

1.  Coaches
2.  Online course creators
3.  YouTubers
4.  Bloggers
5.  Podcasters
6.  Strategists
7.  Affiliate marketers

According to the Ministry of Human Resource Development (MHRD) ,India has currently over 315 million students enrolled in 1.5 million schools and 39,000 higher education institutes making it one of the largest higher education systems in the world. Some of the prestigious institutions have been slow in adopting new pedagogy and innovative curriculums. All of this has changed in the last three decades with the emergence of new-age educational institutions run by thought leaders driven by fervour to re-imagine the concept of quality education which has been a real boon for the Indian education system.

## II. Need for Edupreneurs

1.  **Individual transformation:** Education creates value for oneself and helps to self actualize. Knowledge expand and also skills which changes lives of people.

2.  **Enhances knowledge:** In this a data-sharing world where data is quickly consumed, encoded, decoded and regurgitated in some way through the filters of translation, scaffolding, and synthesization of those who consumed it.

3.  **Positive change in individuals:** Education enhances skills and knowledge and sharing with others will bring about a change in their lives.

4.  **Increase revenue:** An online learning course attracts many individuals which enhance sales and revenues.

## III. Traits of an Edupreneur

1.  **Upgradation:** As technology changes in education system one needs to adopt and feels encouraged to give best education to all.

2.  **Goal is to earn revenue:** Every business needs revenue for survival and during initial establishment requires edupreneurs to sacrifice their income.

3. **Strategy:** A well planned strategy regarding planning , investment is required and blue print of the entire business should be ready in advance to go ahead.

4. **Identify the strengths of the players:** Currently India's higher education system is the largest in the world, enrolling over 70 million students while in less than two decades, India has managed to create additional capacity for over 40 million students which is very important to know what steps your competitor is taking and where one is lagging. Self-evaluation and self- awareness go hand in hand which is very important to keep an eye on your competitors' strength.

5. **Learning:** As an educator one must be learning continuously and keep up with the latest going on in your industry and look out for trends, technology integration, research and leadership.

6. **Creativity:** As an edupreneur one need to be creative and surround with inspiring people who will elicit new ideas in others.

## IV. Prospects of Edupreneurship

1. **No more selling:** Eduprenurship builds skills and knowledge which determines capability to prospective buyers in an educational way.

2. **Builds authority and credibility:** Training programs are the best way to add professional which develop expertise among all.

3. **Gain a global client base:** As an edupreneur one can build a scalable business model with a global customer base which increases exposure, and increased income.

## V.  Suggestive Measures

1. **Build network:** Many entrepreneurs focus on themselves and their own vision, but the biggest job is to inspire others, which won't happen in isolation n building network will be good.

2. **Be respectful toward others:** Treat others with respect and one will always be wealthy because your community is the real currency.

3. **Look at the world through the eyes of other people:** People get caught up in their own vision without carefully considering what might be the actual flaws in their plan. Best to take a step back and get fresh perspective. "

4. **Set up trends:** Trend setting requires unconventional thinking and one needs to understand to exploit the hidden opportunities.

5. **Emphasize teamwork over individualism:** Inspire people to work together, Fear, suspicion, distrust and resentment cannot rear its ugly head where there is an atmosphere of trust and partnership.

## VI. Problems of Edupreneurship

1. **Problem of trust:** Online edupreneurs face frauds and scams and it is difficult to trust such individuals and parents would like to go for well established educational institutions for future of their children.

2. **Unequal distribution of wealth:** Education business requires lot of investment to convert their idea into dream right from infrastructure to entire system flow/

3. **Demotivation:** An edupreneur needs constant motivation apart from hard work and perseverance as they come up with new idea they lack faith and confidence in such times.

4. **Requirement of additional capital:** Arranging initial financial resources is a difficult task for an edupreneur where financial institutions provide loans for carrying on the business.

5. **People underestimate idea:** With a unique idea in one's head to start a new educational venture, facing many criticisms from friends, family and society is very common. Believing in one's idea and taking the initiative of setting up institute is very important. This requires perseverance and dedication to achieve one's mission.

6. **Infrastructure:** Global education is developing at a rapid pace and education sector is developing but the pace of adaptation in education is very slow. This poses a huge barrier especially for those edupreneurs who start their venture online. Thus, this motivates them to invest in research to reach a solution.

## VII. Examples of Successful Edupreneurs

1. **Elna cain:** She is a freelance writer who uses her expertise to teach others how to start a freelance writing business. She's an edupreneur who uses the knowledge she's gathered herself over the years writing for clients to help others build freelance writing businesses of their own.

2. **Angela maiers:** She is the founder of Choose2Matter and has been leading change in the education sector for over three decades. Today, her business reaches over a million students in 50 countries, including the US, UK, Canada, Australia, and South Africa. . She is driven by a need to create, build, grow, and impact her audience to use their strengths and genius to make a difference in their space.

3. **Jacques hopkins:** Jacques is an edupreneur who teaches piano to aspiring pianists and has created a phenomenal 21-day course that lets regular people learn how to play their favorite songs in just three weeks.

## VIII. Conclusion

Edupreneurs are achieving the economic and social goals of the country by better educating young children. With the emergence of edupreneurs in the great Indian experiment, skill-based education and modern educational models have gotten a much-needed boost. Edupreneurs are now looking abroad, expanding and absorbing the best of global educational practices which will provide better education for their children.

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# ICT in Eduprenuer

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## Abstract

Developing countries can promote economic growth, raise the bar for education and training, and address gender issues in society by embracing technological innovation and Information Communication Technologies (ICTs). ICT is a broad term that refers to technologies used for gathering, storing, editing, and transmitting information in many different forms. These technologies include telephony, computers, the internet, broadcasting, social media, and broadcasting technologies etc. As one of the four pillars of modern society, information and communications technologies have given each and every one of us a virtual passport to the rest of the world. The rising usage of technology has also had an impact on the field of education. ICT is widely utilized by educators, including teachers, students, administrators, and everyone else involved in the field. It has been a tremendous asset in enhancing the teacher's job, facilitating teaching-learning and enhancing educational objectives. This chapter will give some background on how ICT is used by different educators or ecopreneur in the field of education.

**Keywords:** Computers, Information and Communication Technologies, Edupreneur.

## I. Introduction

The term "information communication technology" (ICT) refers to all methods for storing, processing, and transmitting data, as well as their use, particularly in the field of education. Desktop computers, cell phones, projector technologies, media recorders, software applications, multimedia materials, information management, laptops, etc. are a few examples, offer a tonne of opportunities as well as challenges for education in general, especially the teaching and learning activities. In order to create improvements that will significantly improve education, technological advancements are being used more and more (Lawrence, 2002). ICT, which has the power to change how learning and instruction are carried out in the classroom, is one area of technology that is being adopted and integrated into our everyday lives and educational system (Lawrence, 2013).A growing body of evidence suggests that ICT has significantly changed how teaching and learning are performed around the world.

(UNESCO, 2004Every aspect of human endeavor is impacted by ICT, which has a significant impact on society. The use of ICT in education and its incorporation into instructional materials are becoming more popular (Cocking, Bransford, & Brown, 2000). The introduction of Technology has opened up a wide range of possibilities for improving education, especially in teaching, where instruction and learning can take place whenever and wherever it is convenient (Cradler & Bridgforth, 2002).In order to increase and improve the standard of teaching and learning in the classroom, there is a great deal of opportunity for teachers and students to use ICT. ICT is bringing about a new revolution in the manner that education is delivered internationally, and it is changing the way that we view education. The effects of ICT can be seen in a variety of contexts, from heightened awareness brought on by better information and visuals to virtual communication enabled by mobile and online technology. Educators are increasingly emphasizing the use of ICT in teaching and learning as a means of enhancing classroom quality, promoting interactivity, and enabling flexible learning experiences that may be held wherever and whenever is most convenient for specific students. Learners have greater independence when they may choose what to study, when and how to learn it, as well as how to learn it (Cradler & Bridgforth, 2002; UNESCO, 2004). By using ICT, learners can connect and collaborate with students all around the world. Edupreneurship, a new force in education, offers a new channel for communication for educators. As our society moves toward digital, remote, and improved technologies, education follows through and takes on a leading role. Lifelong learning is a necessity rather than a perk. An edupreneur is a businessperson who operates in the educational sector. They advertise their abilities, information, and experience to a target audience using learning platforms or subscription programs. It also refers to entrepreneurial pursuits in the context of education. Edupreneurs are laying the model for the development of education.

## II. Need and Significance of the Study

The purpose of this chapter is to educate readers on how different edupreneurs use ICT for educational reasons. The classroom environment is evolving. The development of society and the classroom activities of the instructor are separated technologically. If we look at contemporary culture, we can observe that while technology has radically changed our world, school-level teaching and learning activities have remained largely unaffected by it. In our classroom, the teacher imparts knowledge in an antiquated, teacher-centric manner that is frequently monotonous and fails to pique the student's attention. Today's education, however, is focused on the individual student. Due to the fact that students receive their education from a variety of sources, ICT and multimedia use in the classroom are crucial, and ICT proficiency among teachers is also necessary. In light of the functions that ICT plays in edupreneurship, the present study is both highly necessary and significant.

## III. Research Methodology

This study is based on secondary information obtained from journals, books, and newspapers, as well as the internet. The investigation is qualitative and one-of-a-kind.

# IV. Results and Discussion

Each day, we witness how quickly technology is advancing and improving our lives. Every day, we witness how technology advances dramatically, improving and simplifying our lives. You can order your favourite meal, have a cab arrive at your door, pay bills, and much more right from home with just a few touches on your smartphone. Approximately 60% of people, out of a total population of 100, are eager to try online coaching, according to several surveys. And 2014 was only a couple of years prior. The percentage of persons who are willing to contact online coaching centers has climbed to 85% today. To reach a large number of students and teach them more effectively using tools and software that can improve teaching and learning, online coaching institutes can help tutors save a significant amount of money. This is because offline coaching requires tutors to invest in basic facilities like desks, electricity, good lighting, printing notes, etc. There are a plethora of methods to employ technology in the classroom to promote enhanced learning settings, including facilitating peer-to-peer and teacher-student contact, setting up curricular calendars, and improving presentations and lessons with video and visuals. Education has an impact on the perceived and actual success of educated people, hence edupreneurs view it as a resource. The value of education permeates most professional choices in today's culture. For instance, several companies have educational requirements for employees. ICT provides crucial tools for operating a firm and maintaining competitiveness. Time savings, overcoming distance, giving access to new information and markets, connection with people remotely, and lowering transaction costs are only a few advantages of adopting ICTs for business.

# V.  Factors Affecting Educational Entrepreneurs' Use of ICT in the Teaching and Learning Activities.

Information and communication technology (ICT) is becoming more and more important in both our daily lives and the educational system. ICT use in educational institutions is becoming more and more demanded in order to give students the knowledge and skills they need for the digital age. With the introduction and integration of ICT into the teaching and learning environment, teachers and students have a better opportunity to cooperate more effectively in the globalized digital age. Whether used in the classroom, for administration, for online learning, or in other settings, ICT has the potential to have a big impact on education. The power of ICT may be effectively used by teachers and students to raise the standard of instruction and learning in the classroom. According to a 2004 UNESCO report, information and communication technologies (ICT) have the potential to offer not only constant access to knowledge but also equal information and communication opportunities that foster involvement in learning and lifelong learning. As a result of ICT's ability to enhance teaching and learning, the majority of nations have prioritized its adoption, integration, and implementation in the sector. The following are some potential benefits of using ICT in ecopreneur generally and in enhancing teaching and learning activities in particular:

1. Encourage self-directed and student-centered learning.
2. Establish a stimulating learning environment.
3. Boost the calibre of instruction and learning.
4. Aid in teaching by making course content more accessible.
5. Encourage problem-solving and the development of high-order critical thinking abilities.
6. Develop communication abilities.
7. Encourage and involve students.
8. Learning that is cooperative and collaborative.
9. Adapting Instruction to the Learner

# VI. Conclusion

The findings of this study demonstrate that, when compared to traditional classroom settings, technology-based teaching and learning is more effective. This is due to the fact that utilizing ICT tools and equipment will create an active learning setting that is more engaging and productive for both teachers and students. The findings are consistent with a study by Macho (2005) that established how employing ICT in school will improve students' learning. However, most of the teachers in this study agree that ICT helps to improve classroom management as students are well-behaved and more focused. Moreover, this study proved that students learn more effectively with the use of ICT as lesson designs are more engaging and interesting. make use of it for teaching and learning. Finally, the integration of ICT in classroom needs serious consideration in order to increase the competency of the country's education system. This will help in increasing the world ranking of the national education and produce the better future work force. In order to enhance the use of ICT in classroom, the government needs to improve and change the teachers' belief about the integration of ICT in classroom. As the teachers' role is the key role in making any of the new policy to be implemented efficiently and successfully. The changes that is taking place is driven by advanced technology and communication devices that should be available to students wherever they are either at school or home. In addition , the needs for teachers to be literate and have good skills and knowledge in using ICT to improve their teaching methods and approach is desired to promote effective learning as well as to meet the demand of the 21st century teaching skills.

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# Livelihood Diversification and Micro Entrepreneurship Development: Social Capital as a Catalyst towards Sustainability of Rural People

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## Abstract

Social capital represents mutual understanding, collective action and social connections among common group of people towards a common objective or value. It is a potential instrument among rural people through which they can solve their issues, problems by making alliances, synergy and collaborative network among them. The main objective is to identify the role of social capital in clearing all the obstacles coming in the way of livelihood diversification and how does it acts as a support system by promoting micro entrepreneurship among rural communities. The paper is designed by reviewing around 34 high quality Scopus indexed journal papers in a systematic manner. The paper is solely based on the secondary informations and in some cases, authors' personal observations have also been considered. From the discussion, it observed that people in the rural areas are leaving farming activities due to loss in crop yield, climate uncertainty, loss in productivity etc. and approaching towards nonfarm activities like small business development, selling of handmade products, forest products, dairy farming, livestock farming, earning thorough up skilling etc. as these help them to get employed throughout the year and inflow of earning is continuous. But changing livelihood is not an easy task for people in rural areas as they are less educated, posses lack of awareness; so in this case, social capital act as a support system in subsequent phases of changing livelihood which is elaborated in the paper.

**Keywords:** Livelihood Diversification, Micro-enterprise, Social Capital, Sustainability, nonfarm activities

## I. Introduction

Social capital includes one's family, friends, relatives, association, social networks, business influencers that can be called upon to provide a support system for personal gain or collective gain during any difficult situations (Woolcock et al., 2001;

Sharma et al., 2014). According to Grootaert & Bastelaer (2001), social capital can be structural and cognitive in nature. The first can be understand in terms of qualities such as knowledge transfer, participatory gesture, committed in determination; and other qualities can be surcharges by ordinances, guidelines and mandates whereas the later one adds collective standards, principles, beliefs, behaviours, and hopefulness in its bracket. Anderson, Park & Jack (2007) represented social capital as unseen resources that can be invested by the entrepreneurs at any point of time while building the foundation an enterprise. An individual can only benefits from the social capital outcomes by simply being part of that network throughout the investment period. Social capital works as a facilitator in accessing market platform for the new enterprises, help in production growth through various skill based training, access to necessary information as well as financial access through bank linkages (Fornoni, Arribas, & Vila, 2012).

Micro, Small & Medium Enterprises Development (MSMED) Act, 2006 define micro enterprises are those in which investment is up to 25 lakh rupees in manufacturing sector whereas 10 lakh rupees in service sector, small enterprises are those in which investment are within the limit of 25 lakh to 5 crore in manufacturing unit whereas 10 lakh to 2 crore in service entity and medium enterprises are those where investment limits are 5 crore to 10 crore in case of manufacturing and 2 crore to 5 crore in service industry (MSME, 2020). Entrepreneurs are accountable in job creation to the collectives of a community but greater number of entrepreneurial activity sometimes incapable of developing a positive influence within the social network due to lacks in suitable training and lack in affordable access to finance (Fortunato & Alter, 2015). Organisations such as NGOs, Self Help Groups, Community Based Organisations and a number of government agencies are working collectively in bringing social platforms, developmental programmes for women entrepreneurs (Lenka & Agarwal, 2017).

Livelihood diversification is defined as the combination of all physical activities that have strong linkage towards income generation performed in the rural base by the villagers (Ajani and Igbokwe, 2013). It occurs due to failure in the farm sector and unable to meet the future need for themselves, so they transform their livelihood to earn some diversified income. Small and marginal land holders diverse their livelihood because of less or no land holdings (Abimbola and Oluwakemi, 2013; Saha & Bahal, 2014). Livelihood diversification consists of all the income generating activities except agriculture based activities that are carried out by the residents of rural areas and people living in urban areas doing farm based activities (Ellis, 2004). Livelihood diversification is a continuous process in which rural residents sets diversified portfolio towards their income advancement, increase in asset base etc. They learn new skills along with existing one, maintains different ways of livelihood by acquiring various nonfarm based activities (Ahmed et al., 2018). While performing nonfarm activities people able to control both external and internal variable that negatively impact their business (Kaur, Arora, & Singh, 2019).

## II. Objectives of the Study

This study is conducted to identify of the farm and nonfarm based activities and also to elaborate the role of social capital in promoting micro entrepreneurship among rural people towards livelihood diversification that can promote sustainable livelihood in the long run. It is a systematic conceptual review paper. High quality Scopus indexed journal articles is being reviewed to achieve the objectives of the study.

## III. Result and Discussion

1. **Self help groups (shgs) as a facilitator in livelihood diversification through entrepreneurship development:** Swain & Varghese (2011) observed that SHGs not only facilitate financial inclusion but also helps in developing skill based training to improve the human resources with the help of Self Help Group Promoting Institution (SHPI). SHPIs are any institution i.e. a NGOs or a community based organisations or any government agencies that helps in promoting better rural livelihood. Suprabha at el. (2014) remarked SHGs as successful contributor in promoting microenterprises and influencing the rural women towards employment, lifestyle changes etc.

   Entrepreneurship in the livestock sector have the substantial potential to gain monetary benefits during non-agriculture seasons when don't have anything to do (Jothilakshmi, Krishnaraj, & Sudeepkumar, 2009). Also involving with the various small activities like selling handmade products, forest based products and agricultural products help women to uplifting their standard of living (Sharma, Roy, & Chakravorty, 2012). According to the study of Ajani and Igbokwe (2014) on constraints to livelihood diversification among rural women in Anambra State, Nigeria, they observed 81 percent of the total sample population were practiced crops plantation, 79 percent of total were involved in marketing of farm produces, 42 percent were involved in goat and sheep farming, 40 percent performed poultry farming. This seems like women in villages performed mixed farming that help them to sustain their financial conditions. Diversification in livelihood not only helps in managing the uncertainty of income but also provides a sustainable way of growth and development. It also helps in increasing the employment base by moving from low productive employment such as agriculture to a high productive employment such as entrepreneurship development in the rural economy and hence promotes sustainable livelihood in the long term (World Bank, 2019).

2. **SHG Federations and Livelihood Diversification:** SHGs established into local level federations or termed as Village Organisation when they become economically strong. Formation of VOs advances unity and economics of scale in group activities and facilitates of developmental activities. VO brings all SHGs together in a locality and creates a greater space for members to contribute in socio-economic development as well as empowerment process (NRLM, 2016). The National Rural Livelihood Programme (NRLM) implemented under Ministry of Rural Development, Govt. of India is a flagship programme in entrepreneurship

development in various nonfarm areas for the rural women through self help group programme. The programme provides potential solution towards reducing poverty condition by facilitating all the supporting instruments such as access to finance, skill based training, motivation towards diversification that are necessary to entrepreneurship in rural areas (Dey et al., 2018).

Kirve & Kanitkar (1993) termed any livelihood supporting activities that fetch economic benefits to women households are termed as income generating activities. Women based enterprises are flourishing at a higher rate than the aggregation of economy growth in many OECD countries, allowing capitalisation of the skills of educated and trained women. The enlarged flexibility in owning one's business permits women to support their families in terms of monetary benefits (OECD, 1997). Udyamsakhi, a generic platform launched for women to encourage them in taking up entrepreneurship as a livelihood activity that supports and resolves the problem faced by them (MSME, 2020). Nearly 66 percent of women are engaged in various income generating activities worldwide and more than 50% world's foods are produced directly or indirectly with the help of women which indicates women's contributions in socio-economic growth of a nation (Osei & Zhuang, 2020).

Skill based business training shows better result than financial based training in promoting entrepreneurship among women (Yoonyoung & Maddalena, 2013). Personal factors such as awareness, business expertise, literacy, family supports, interpersonal relations and business influencers; and social factors such as government regulations, NGO support, financial institutional support, community based cultures and traditions collectively impact the progress of women based enterprises (Lenka & Agarwal, 2017). AWAKE, an institutions for women based entrepreneurs based in Karnataka of India that implements entrepreneurship based development programs in which women members exchanges their innovative business knowledge and stimulus offered the organisation and thereby advances women members to be a part of the entrepreneurship (Preethi et al., 2017). Kulgo Uttari Aajeevika Mahila Gram Sangathan, a Village organisation established under Jharkhand State Livelihood Promotion Society in 2015 that includes 32 women based SHGs. It is involved in promoting some empowering activities in the health sector, food and nutrition sector by mobilising locals in order to deliver hygienic services to children, pregnant women and lactating mothers; and encourage enterprise activities like stitching of uniforms for school children (NRLM, 2018).

3. **Role of NGOs in livelihood diversification:** Jakimow & Kilby (2006) evidenced that increase in capacity among women is not that sufficient to resolve the long term problems faced by them so in this case, NGOs act as a support system to facilitate these issues to get it resolved through inspiring initiatives, increased self-esteem, knowledge transfer and providing skill based training etc. It helps in developing potential various factors like women led entrepreneurship, single venturing, rural entrepreneurship, small-scale service production etc (Lindberg &

Lindgren, 2010). Its skill based training has positive impact on assets creation, enhances performances of activities in areas of agriculture, livestock, art & crafts and handloom business (Swain & Varghese, 2011).

The asset base of rural individuals is the most valuable cause in creating self developed ventures. Entrepreneurship based training programmes such as Development of Women and Children in Rural Areas for the rural poor have become institutionalised at the grassroots level through skill advancement, technology acquisition and improvement and effective resource management (Nair et al, 1996). Women's Development Project, popularly known as Mahalir Thittam in Tamil Nadu established with the assistance of NGOs to spread awareness on recent developments in dairy farming so as to make SHGs members experienced and learned (Jothilakshmi, Krishnaraj, & Sudeepkumar, 2009). Education is the key parameter in diversifying the livelihood from one occupation to other as it develops awareness on available potential employment opportunities. It also minimizes the entry barriers in developing nonfarm based entrepreneurship (Saha & Bahal, 2014).

4. **Community Based Organisations (CBOs) and livelihood diversification:** The primary occupation in the rural area are agriculture, livestock farming and other related activities that provide low return in income as compared to non farming activities due to loss in crop yield, mortality of livestock, seasonal uncertainty, water scarcity and lack in availability of modern farm equipments and increase in the cost of agricultural supplements (Ajani and Igbokwe, 2014). Community-based tourism entrepreneurship is a strong example of collective action of the community that contributes in rural entrepreneurship development as it benefits to the community as well as extends economic benefits to the local populations due to large number of footfall in the destination (Meera & Vinodan, 2019). Biz Sakhi, a community based mentors being promoted under UNDP Disha project, to train and mentor women entrepreneurs. A Biz Sakhi is a woman who gets associated entrepreneurial related activities and shares her advices of ups and down in entrepreneurship that helps community to avoid possible future risks and creates economically self sufficient women (UNDP, 2019).

Community-based development can provide households higher voice and participation in a wide range of social and economical activities (Grootaert & van Bastelaer, 2001). A community enterprise named Gram Mooligai Limited (GMCL) in India evidenced; community can represent a positive mechanism to promote local development. This encourages active involvement at the grassroots level and favours collective processes within the establishment (Torri et al, 2010). The Situational Analysis Study of Indian Farmers conducted by the According to the report of National Sample Survey Organization (NSSO) of Indian farmers it is observed that 27 percent of total farmers do not want to do farming as it is not profitable to them; if an opportunity given to them, then 40 percent of total respondents will choose nonfarm activities as their livelihood rather than farming (Kumar, Singh and Mathur, 2006). Adopting modern technologies is high profitable; as in the short span of time it increases the production level and

encourage farmers (Abimbola and Oluwakemi, 2013). Entrepreneurship projects that are based on community level promote a potential approach to alleviate extreme poverty by developing employment and capacity building. PRODECO, a World Bank sponsored project suggested more optimistic ventures are those that use accessible local and well-known technologies in rural areas (Gallardo & Raufflet, 2014).

## IV. Conclusion

Social capital and innovation together increases the growth performance of an enterprise through strong social network and impact positively on poverty alleviation. In order to increase the growth performance of a women based enterprise, it is necessary to maintain a well established relational network. Social capital acts as a facilitator in accessing market, improvement in production by efficient use of resources, accessing necessary information, financial support etc. Common services that women entrepreneurs requires are education, knowledge, regular mentorship, social networks, access to target markets and affordable financing in building a bridge between the business activities (UNDP, 2019). An effective community based entrepreneurship program should consider social capital as the primary resource in dealing with entrepreneurship. In addition, an entrepreneur needs to consider social and communal networks as much as it focuses on innovative technology access, novel ideas, market planning, fund arrangement etc. Government should create a favourable business environment for rural entrepreneurs by developing an accessible system of government mechanisms, enforcements, platforms and policies so that they can access and understand easily.

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# Proposal of Understanding Rural Consumer Behavior: A Study

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## I. Background and Objective

Corporate in our nation i.e India is a hopeful concerning enlargement of the rustic customer market of our state, which is predictable to be earlier than city customer market. The land in our nation consist of regarding 4, 00,000 rural community. These communities are populated by propos 650 million patrons construction up for on the subject of 60 per cent of inhabitants and causal just about partially of the society's Gross income which has mature at a multiple yearly escalation of 6.2 per cent since 2000, Business Standard (2011). The rustic section is rising at a fit pace of 7-9 per cent per annum and is predictable to add US$ 100 billion in expenditure insist by 2016, India Brand Equity Foundation (2017).

Even though there are additional educated populace in country India (49.3 crore) in comparison of township in our state (28.54 crore), the country education stage is only 67.8% in comparison of 75% in pashed region. The sector is divided on the basis of people's income, class, standard of living and geographical boundaries. The pastoral revenue regularly based on the farming in contrast to variety of works undertaken by urban clients. The pastoral consumer's attachment in get of any manufactured goods is elevated. Conventional principles, civilization and perception have a bold grasp on the rustic clients comparatively of city clientele. The country marketplace arrangement is based on many factor counting demographical surroundings, home investment prototype, and work-related prototype, promotion communications and use pattern. Socio-economical aspects of the state area of the kingdom are additional accountable for the country customer performance. particular its communications and dissimilar customer actions, pastoral marketplace is silence diverse as to its complement town one in deference of inhabitants, transportation, people construction, educational level  in abode amenities and of track life manner. For example, HUL derives 40% of its sales from rural areas. Total revenue as per March'17 is Rs 32,416 crore. Rural India is an incredible opportunity of potentially adding $1.8 trillion to our economy, equal to current GDP", Business Standard (2012).

Given this huge potential of Indian rural market, it is imperative to study rural consumer behavior, particularly:

1. How do rural consumers search for products or services related information?
2. Factors influencing rural consumer purchase of products or services.

3. How does social norm influence rural consumer behaviour?
4. The role of information technology and mobile usage in rural consumer behavior

The aforesaid objectives would be investigated from food and non-food consumptions perspectives. The results of this study would have theoretical contributions and managerial implications.

## II. Research Method

1. **Population and sample:** Population and sample will be decided based on the villages to be selected for the study.

2. **Data collection instrument:** A structured questionnaire will be developed and subsequently finalized based on exploratory study followed by pilot testing.

3. **Sampling and sample size:** Sampling will be area sampling or convenience. Sample size will be a proper representation of the population. The sample size determination would be done based on statistical formula/minimum requirement of statistical techniques.

## III. Data Collection/Field Work

Data will be collected from several villages of North India. MBA students of IIM Rohtak will be trained and deployed for data collection. They will visit each household following the sampling procedure and administer the questionnaire to the member who generally takes buying decision of food and non food items. The data collection may last for few days.

## IV. Expected Outcomes and Contributions

This study may provide several interesting insights of rural consumer behaviour – how do they shop, what are their shopping motivation, how their day-to-day scarcity (if any) influences their shopping behaviour. The results of this study are expected to contribute significantly to the present literature of rural marketing and consumer behaviour. Literature says rural consumer behaviour may differ from urban consumer due to several reasons such as different in socioeconomic status, lifestyle. Therefore, the results of this study may help rural marketing managers/retailers develop strategies to attract customers and thus enhance profitability.

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# Student's Psychology in Blended Learning

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## Abstract

The learning dynamic in a traditional lecture room has changed from being entirely face-to-face and teacher-focused to being integrated and mixed-mode. Understanding whether students' basic psychological needs are better satisfied and fulfilled with this adjustment in the educational situation is critical. This study used a mixed method to examine the extent to which relatedness, competence, and autonomy—the three core psychological requirements of students—are met by blended getting to know. That relatedness and competence, the first two need-constructs, had been met. However, due to college culture, evaluation, and the perhaps-habitual adherence to the conventional roles of professors and students, the need for autonomy wasn't being addressed. It also reveals that the three aforementioned psychological does closely tie to one another. Blended learning has given school and college students with different learning styles a new dimension of learning interactions and opportunities. Varied tutorial outputs encouraged other "self" expressions in numerous students, making the initial desire for relatedness satisfied. The results of blended learning should show a great spiral of increased social cognizance, meet competency later, lead to increased identity development, and ultimately lead back to relatedness.

**Keywords:** Blended learning, psychological requirements, students, and digital learning.

## I. Introduction

In the current digital era, using technology and web-based communication tools has given educators the chance to research the best learning environment that may adapt to the needs of varied learners. The lack of the hour is for modified learning environments that combine the advantages of both traditional and modern learning. Through their behaviour in and outside of class, teachers can understand their students' psychological states and provide them with psychological counselling to help

them do better in school. The talent training program's curriculum pairs well with one another. However, in practice, it is uncommon for various courses to share teaching materials, and there is only a cursory understanding of how the curriculum does organize into groups. As a result, there are often loose curriculum linkages. The ability of pupils to transmit knowledge is also subpar, making it unlikely that they will independently integrate their coursework or develop a solid three-dimensional cognitive framework. Integrating the curriculum requires gradually breaking through curricular barriers, creating a link between the once distinct courses, and employing more scientific teaching techniques.

## II. Blended Education

Many academics and researchers have defined the idea of blended learning. For instance, Singh and Reed (2001) described blended learning as a learning programme that uses multiple delivery modes to improve the learning outcome and programme delivery expense. Blended learning is a strategy for "meeting the challenges of tailoring learning and development to the needs of individuals by integrating the creative and technological advancements offered by online learning with the interaction and participation offered in the best of traditional learning," according to Thorne (2003).

According to the definitions above, blended learning can combine the benefits of traditional face-to-face and online learning while avoiding their disadvantages. Numerous research has established the usefulness of blended learning. For instance, a meta-analysis of the studies found that blended learning has a more significant beneficial influence on student learning than online and face-to-face learning (Batd, 2014).
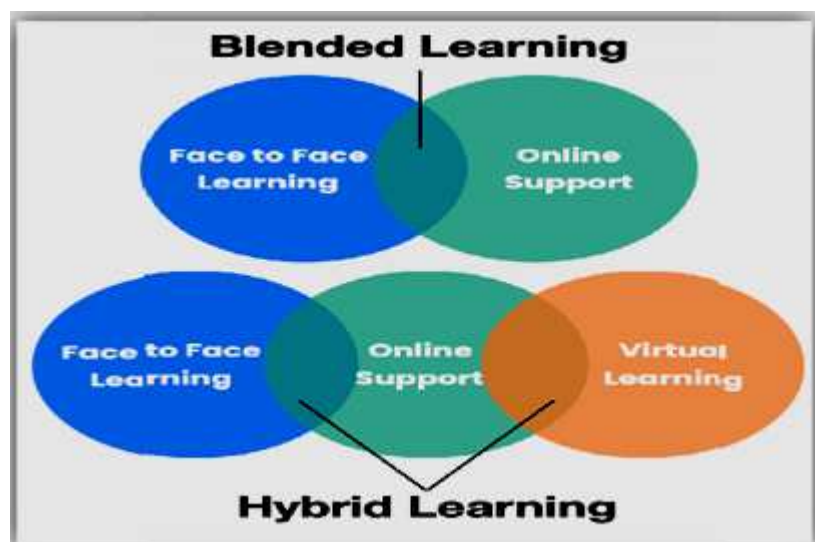


Blended and hybrid learning should not be confused. Compared to hybrid learning, blended learning was different. Despite the benefits of blended learning, the right design makes it effective. The success of the mixed learning environment depends on finding a balance between e-learning and face-to-face modes (Osguthorpe and Graham, 2003). The PST model created by Wang (2008) does use in this study as

the framework for the environment design. An educational system is a unique amalgamation of pedagogical, social, and technological elements. PST model thus consists of education, social interaction, and technology as its three main components.

Wang (2008) asserts that the social method entails creating a friendly environment where students can interact; the technical design provides students with a technological space that is readily available, easy to use, and appealing. The pedagogical method entails selecting appropriate activities, content, and resource usage. The three elements each have a unique role in a learning environment. The technical design provides a foundation for pedagogical and social structure, which does think to be the most significant element influencing how well learning does accomplish (Wang, 2008).

## III. Blended Learning Research

Garnham and Kaleta, 2002; Herloa, 2015; Lim and Morris, 2009; López-Pérez, Pérez-López, and Rodrguez-Ariza, 2011; O'Toole and Absalom, 2003; Twigg, 2003; Williams et al., 2008; Wang, Shen, Novak, and Pan, 2009; all the research on blended learning appears to focus on student learning. Compared to online and face-to-face learning, meta-analyses (Batd, 2014; Rak-Kurt, Yldrm, and Cücük, 2017; Means, Toyama, Murphy, Bakia, and Jones, 2009) amply illustrate the effectiveness of blended learning on student accomplishment.

Additionally, researchers are investigating the impacts of blended learning environments that have improved using various methods, such as gamification and 5E (Geçer, 2013; Kocaman-Karolu, Kiraz, and Yldrm, 2014; López-Pérez et al., 2011; Poon, 2012).

1. **Blended Learning Environment Examples:** In the literature, three types of blended learning have been recognized (Sharpe, Benfield, Roberts, and Francis 2006). Which are:

   - The provision of supplemental online resources for learning programmes run primarily along traditional lines in virtual learning environments with institutional support is part of the transmissive pedagogy approach (VLEs). The conventional face-to-face techniques of lectures and seminars use in teaching and learning, but lecture notes post online to provide students more support.

   - A radical course redesign supports the transformative paradigm, which enables the general use of ICT tools outside VLEs to improve and change students' engagement, study, and learning modes. It changes the learning and teaching environment such that students actively participate in creating knowledge through dynamic interactions, rather than simply being passive recipients. Without the assistance of technology, this kind of combination encourages intellectual engagement that is virtually impossible (Graham 2006). The transformative model, which is now gaining popularity in higher education,

was developed by applying the constructive alignment principles, which call for the constructive alignment of assessment methodologies with the course's learning objectives (Biggs 2003).

- This more current meaning of blended learning refers to a method of learning through technology and the fact that most students do not distinguish between learning with or without technology. To assist students' learning at any location and at any time, faculty members use the learners' technologies, such as mobile phones, online communities, and instant messaging (Sharpe, Benfield, Roberts, and Francis 2006).

It asserts that a blended learning environment would fulfil the learning goals of this varied set of learners and help them advance their skills and knowledge in the course by combining the most pleasing aspects of face-to-face instruction with online learning (Ryberg and Dirckinck-Holmfeld 2010).

2. **Psychology of Students - Blended learning techniques:** The problems of establishing blended learning for teachers and students include, among others:

- Creating a pedagogy for mixed learning
- technological difficulties
- educating, assisting, and transitioning students
- considerations for assessments
- Creativity and culture.

## IV. Conclusion

One of the areas of education that the speed of technological progress has impacted is teaching and learning. It describes a blended learning strategy in the teaching application of integration. Face-to-face instruction, exercised from textbooks and produced courseware used in the tutorial class and made available on the internet, make up the blended learning strategy used. According to data from a study using the blended learning (BL) strategy, students exhibit favourable attitudes toward learning. According to research, students are upbeat about integrating blended learning in higher education. Therefore, blended learning can be used as an alternate method of teaching and learning with the aid of technology to inspire pupils.

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# The Impact of ICT Development on the Global Economy

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## Abstract

Information and communication technology (ICT) has accelerated the growth of the global economy and improved the quality life of the world's inhabitants.ICT has brought new path of creating livelihood for us. The diffusion of ICT has also increased year by year and made it possible to reduce poverty. The opportunities created by ICT also may eventually decrease the "distance" between countries in many other ways, because access to ICT performing a key part in defining the global digital divide. It is important to study how the ICT gaps among countries have changed. From this observation examines global ICT development in the last decade, ICT has contributed a lot to change our life. Like market shopping to on- line shopping, In class room teaching and learning, letter to a mail This paper present's the effects of ICT as Home and in Domestic matter like activities, Education, marketing Banking and Employment etc. Many researches assess that knowledge, innovation and technological changes become important factor for economic growth.

**Keywords:** ICT, Impact, economy, technology, growth.

## I. Aims and Objectivies.

1. ICT have on the economy.
2. The impact of ICT on globalization
3. ICT in economic development
4. Role of ICT in Education.
5. Impacts of ICT in social life.

## II. Discussion

At the present time, ICT has become a serious part of economy. Almost all firms and consumers use computers and internet connection for economic purposes such as providing consumers with a more diversified and customized product, improving product quality, and selling goods and services. Information technology encompasses the study and application of computer and any form of telecommunication that store retrieve and send information. With information technology going mobile, thanks the development of faster and more reliable broadband networks, we are experiencing yet another technology driven transactions.

IT is used to automate simple, routine tasks such as world prosing and advanced process such as production, scheduling and logistics, In this manner, information technology enables businesses to operate efficiently and profitable. Technological advances in the past few decades have greatly increased the competitive nature of the economic business world companies have used soft were, computers and the Internet to transform their business from local places of business to national and global market competitors. Many companies have responded to these changes by automating their business processes and capturing industry- related information and using it to their advantage. Technology has also forced business to remain flexible, adapting their operations to newer and better technological advances.

## III. Impact of ICT on Economy

The impact of innovation and technology expansion on economic development has long been recognized. ICT increases the availability of information, forms new communication method, reformates productive processes and improves the efficiency of many different economic activities. At the percent time, ICT has become a serious part of economy. Almost all firms and consumers with a more diversified and customized product, improving product quality, and selling good and services. There is a widespread optimistic view that ICT can play a significant role in economic development, GDP growth, capacity development and employment, productivity and organizational restructuring poverty alleviation, and democratic participation of citizen.

1. **ICT Play a significant role in the Socio-economic development:** ICT has the potential to affect many aspect of of economic and social activities such as GDP growth, employment, productivity, poverty alleviation, quality of life, education and healthcare. While the literature provides a myriad of definition and elements of socioeconomic development. There is widespread belief that information and communication technology (ICT) can play a significant role in the socio—economic development of a developing country. ICT has the vital role to many aspect of economic and social activities such as GDP growth, employment, productivity, poverty alleviation, quality of life, education, and healthcare.

2. **ICT can have positive impacts on people:** Access to information possibly the greatest effect of ICT on individual is the huge increase in access to information and services that has accompanied the growth of the internet. ICT to information has brought new opportunities for leisure and entertainment, the facility to make contact and form relationship with people around the world.

Improved access to education eg. Distance learning and on-line tutorials. New ways of learning e.g interactive multi-media and virtual reality.

**New opportunities:** The second big effect of ICT is that it gives access to new tools that did not previously exist.

ICT can be used for process that had previously been out of the reach of most individuals ,eg photography, where digital cameras, photo editing software and high quality printers have enabled people to produce results that would previously required a photographic studio.

ICT can be used to help people overcome disabilities e.g., screen magnification or screen reading software less enables partially sighted or blind people to work with ordinary text rather than albralelie.

3.  **Negative impact of ICT:** Individual can improve their task performance by using information and communications technology (ICT). However, individuals who use ICT may also suffer from negative outcome, such as burnout and anxiety, which lead to poorer performance and well-being.

    **Job loss:** one of the largest negative effects of ICT can be the loss of person's job. This has both economic consequences, loss of income, and social consequences, loss of status and self esteem. Job losses may occur for several reasons, including Manual operations being replaced by automation e.g robots replacing people on an assembly line ,job export. e,g data processing work being sent to other countries where operating costs are lower. Multiple works being replaced by a smaller number who are able to do the same amount at work.

    Reduce personal interaction. Being able to work from home is usually ICT, but there can be negative aspects as well. Most people need some form of social interaction in their daily lives and if they do not get the chance to meet and talk with other people they may feel isolate and unhappy.

    **Reduce physical activity:** A third negative effect of ICT is that users may adopt a more sedentary lifestyle. This can lead disease, and diabetes. Many countries have workplace regulations to prevent problems such as repetitive strain injury or eyestrain, but lack of physical exercise is rarely is addressed as a specific health hazard.

    There can be some significant drawbacks to adopting new technology. We now have next to no downtime. We might find our self chained to our phone or tablet for most of the day. Perhaps you simply can't avoid looking at your phone and are unable to even enjoy a meal without the interruption of a text message or other notification.

    This isn't a problem only for adults either, because teenagers and children also live lives impacted by technology on a daily basis. Many of us suffer form a multitude of negative results of overexposure to tech. The attachment to our device can also leave us felling isolated. A significant lack of human contact can even cause depression.

When the majority of our interactions with others take place online friends are not really friends at all. In the end, electronic communication is a way from true human communication via text continues rising, this results in a greater distance between us and even those closest to us. This may be one of the biggest drawback of a device- filled world. Kids who play video games constantly and those who spend a great deal of their time online don't get as much physical exercise.

4. **ICT on Global economy:** The process of globalization that the world is experiencing begins in the 21st century a new phase that affects the world. The impact of ICT on economic and social activities is determined by the characteristic that make this technology capable of transforming society and the world economy: Emerging economies are countries or regions that are moving from developing to develop status, to a free market system and toward a knowledge based economy.

   The rapid expansion capacity of the possibilities associated with the use of ICT. The possibilities of using these technologies with low or decreasing coasts The versatility of ICT applications to different areas of economic and social activity.

   Emerging economics that resuited from the breakup of the Soviet Union or represented the Estern Block are called transition economics (veKowal&Roztocki, 2013) Emerging economics having typically standard of living, a weak industrial and commercial base, and a poor infrastructure. In contrast advance-developed economics have a high level of gross domestic product(GDP) per capita, as well as a very significant degree of industrialization, commercial base, high standards of living and a well developed infrastructure (Kowal & Roztocki,2013; Roztocki & Weistroffer,2016)

   The progress of information and communication technology (ICT) forces constant training and upgrading of profession qualifications, managing competencies and innovativeness in information system (IS) that leads to human capital (HC) and economic growth development.

5. **Roles of ICT in education:** ICT can play varied roles in developing an effective learning environment. It acts as a teacher and explains core content concepts and addresses misconceptions. It acts as a stimulant and fosters analytical thinking and interdisciplinary studies. It plays the role of a guide and mentor by providing tailor made instructions to meet individual needs. Online learning facilities learning through digital mode. With the help of multimedia, it enhances effectiveness of teaching-learning and hence proves crucial for early learners, slow learners and differently able learners. Modern ICT tools not only deliver the content but also replicate formal learning experience via virtual learning. The intention of virtual classrooms is to extend the structure and services that accompany formal education programs from the campus to learners. ICT also addresses the need of mobile learning. It offers independent space and flexibility that comes from working away

from the learning institute or tutor. It makes education accessible to all, irrespective of geographical barriers or resource constrains. Learners from remote areas, working people who want to learn further and update their knowledge and differently able students who find traveling an issue of concern- benefit from the mobile learning mose.

Information technology (IT) encompasses the study and application of computer and form of telecommunications that store, retrieve and send information. With information technology going mobile, thanks Information technology encompasses the study and application of computers and any form of telecommunications that store, retrieve and send information. With information technology going mobile, thanks the deployment of faster and more reliable broadband networks, we are experiencing yet another technology driven transactions. IT is used to automatic simple, routine tasks such as word processing and advanced processes such as production, scheduling and logistics. In this manner, information technology enables businesses to operate efficiently and profitably. Technological advances in the past few decades have greatly increased the competitive nature of the economic business world. Companies have used software, computers and the Internet to transform their businesses from local places of business to national and global market competitors. Many companies have responded to these changes by automating their businesses processes and capturing industry-related information and using it to their advantage. Technology has also forced businesses to remain flexible, adapting their operations to newer and better technological advances.

## IV. Observation

At this level, ICT goods import greatly help the inter mediate input to capital goods. Information and communication technologies (ICT) decade ICT sector plays an important role, notable by contributing to rapid technological progress productivity growth. Internet a strong influence on economic growth rates. Computer have several economic benefits, such as saving paper companies and individuals can save paper by working electronically on computers. People can now send letters (emails), magazines and read books electronically instead of having to print out hard copies. This also saves money and time in the long run. Technology affects almost every aspect of21ist century life, from transport efficiently and safety, to access to food and healthcare, socialization and productivity. The power of the internet has enabled global communities to form and ideas. ICT has the potential to affect many aspects of economic and social activities such as GDP growth, employment, productivity, poverty alleviation, quality of life, education, and healthcare. Computer has great role that new designs of vehicles and other transportation were made; entertainment become more entertaining, medical science made more cures for diseases. So the computers impacted our lives in many ways. Civic competences and social outcomes by helping individuals make informed and competent decisions by providing information, improving cognitive skills and strengthening socio- emotional capabilities, such as consciousness, self efficacy and social skills.

# V.  Evaluation

Economic growth is the most important factor of human development (HD) (Kowal & Roztocki,2013; Yakunina,& Bychkov,2015). HD is defined as a measurement of achievements by humans through advancement of knowledge, biological changes, habit formation, or other criteria that display changes over time. Understanding HD can help a company to manage personnel, market and sell products, or negotiate international trade (Kowal & Roztochi, 2013; Business Dictionary, 2017). It can be measured by the Human Development Index (HDI).

The level of ICT development can be assessed by the ICT Development can be assessed by the ICT Development can be assessed by the ICT Development Index ICTDI (scores 0-10 ) that compares the level of ICT use and access across the various countries around the world (ITU,2017). The concept of ICTDI comprises 11 ICT indicators, grouped into three factors access use, and skills.

It should be noted that the research body concerning ICT management in emerging economics, in relation to economic,culture, and social innovations for HC is scarce (Roztocki& eistroffer, 2016). We would like to narrow this gap by presenting this collection of manuscripts. However, before we move on to the presentation of the papers we would like to shed more light on different types we would like to shed more light on different types of economics in relation to indexes presented above. Then we will introduce studies included in this special issue.

# VI. Methodology

This paper basically based on secondary data like as magazines, journals, internet etc. important production factor by reason of knowledge driven (new) economy. Many researches assess that.

# VII. Conclusion

In the modern economic perspective information and communication technology is seen as a knowledge, innovation and technological changes become important factor for economic growth. Further more modern growth theory highlights the important of knowledge for economic growth. The main purpose of this paper is to put forth the impact of information and communication technology (ICT) on main sectors that effects growth. Impact of information and communication technology (ICT) on main sectors that effects growth is aimed to be examined. This will provide a better understanding of impacts of information and communication technology on economic growth.

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# Trends in Services Sector

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## I. Introduction

The emerging services sector in India consists of sophisticated and technology-driven services like IT and telecommunications, infrastructural services like ports and railways, business services like consultancy and professional services, traditional services like barbers and plumbers and many other varieties of service. The rapid growth of India's services sector in the post-reform era (1991 onwards) has contributed to the country's recent emergence as one of the fastest-growing economies in the world. India's services sector not only remained resilient during and after the global financial crisis but also provided significant support to overall GDP growth. As a result, India was ranked 10th and 12th in the world in terms of overall gross domestic product (GDP) and services GDP respectively in 2012. The compound annual growth rate (CAGR) of services for the period 2001-14 in India was 8.5 per cent, second in the world only to China. Given its growth performance, the contribution of the services sector (including construction) to overall GDP has increased sharply, from 41 per cent in 1990-91 to 64.8 per cent in 2013- 14.

## II. Indian Service Sector

In alignment with the global trends, Indian service sector has witnessed a major boom and is one of the major contributors to both employment and national income in recent times. The activities under the purview of the service sector are quite diverse. Trading, transportation and communication, financial, real estate and business services, community, social and personal services come within the gambit of the service industry. One of the key service industries in India would be health and education. They are vital for the country's economic stability. A robust healthcare system helps to create a strong and diligent human capital, who in turn can contribute productively to the nation's growth. The service industry forms a backbone of social and economic development of a region. It has emerged as the largest and fastest-growing sectors in the world economy, making higher contributions to the global output and employment. Its growth rate has been higher than that of agriculture and manufacturing sectors. It is a large and most dynamic part of the Indian economy both in terms of employment potential and contribution to national income.

## III. Growth of Indian Service Sector

Among the world's top 15 countries in terms of GDP, India ranked 10th in terms of overall GDP and 12th in terms of services GDP in 2012, it said, adding that

services share in world GDP was 65.9 per cent but its share in employment was only 44 per cent in 2012.

As per the survey, in India, the growth of services-sector GDP has been higher than that of overall GDP between the period FY2001- FY2014. Services constitute a major portion of India's GDP with a 57 per cent share in GDP at factor cost (at current prices) in 2013-14, an increase of 6 percentage points over 2000-01. "Despite deceleration, services GDP growth at 6.8 per cent was above the 4.7 per cent overall GDP growth in 2013-14,".

In fact the growth rate of 6.8 per cent for the sector is marginally lower than in 2012-13. "This is due to deceleration in the growth rate of the combined category of trade, hotels, and restaurants and transport, storage, and communications to 3 per cent from 5.1 per cent in 2012-13," the survey said. On the other hand, robust growth was seen in financing, insurance, real estate, and business services at 12.9 per cent.FDI inflows to the services sector (top five sectors including construction) declined sharply by 37.6 per cent to USD 6.4 billion compared to an overall growth in FDI inflows at 6.1 per cent.

India's share in world services exports, which increased from 0.6 per cent in 1990 to 1.1 per cent in 2000 and further to 3.3 per cent in 2013, has been increasing faster than its share in world merchandise exports, according to the survey.

While exports of software services, accounting for 46 per cent of India's total services exports, decelerated to 5.4 per cent in 2013-14 from 5.9 per cent in 2012-13, travel, accounting for a nearly 12 per cent share, witnessed negative growth of 0.4 per cent.However, moving in tandem with global exports of financial services, India's exports of financial services registered a high growth of 34.4 per cent in 2013-14.

The survey highlighted that some services like software and telecom were big ticket items that gave India a brand image in services. While further focus on these services is needed to retain and further our lead, the time has come to focus on some other high potential big ticket items (such as Tourism and hospitality sector, Ports services and Railways) that have high manufacturing-sector and employment linkages.

Commenting on the outlook of services sector, which was growing at a steady rate of over 10 per cent since 2005-06, has shown subdued performance in the last three years, the survey said the year 2014-15 seems to augur well for the services sector with expansion in business activity in India.There are also signs of revival in growth of the aviation sector with the announcement of new players like Air Asia and Tata-SIA Airline after a turbulent period of withdrawals and losses by some airlines. There are also indications of revival in world GDP that could help in revival of the tourism and shipping sectors.

## IV. Service Sector Growth and Development Sustainability

The service sector produces —intangible‖ goods, such as health, education and some quite new services such as modern communications, information, and business services. Producing services tends to require relatively less natural capital and more human capital than producing agricultural or industrial goods. As a result demand has grown for more educated workers, prompting countries to invest more in education—an overall benefit to their people. Another benefit of the growing service sector is that by using fewer natural resources than agriculture or industry, it puts less pressure on the local, regional, and global environment. Service sector plays a complimentary role and accelerates the process of development through quality improvement and enhancement with efficiency of productivity and developmental activities. Healthcare services enable a country to improve the quality of human capital thereby increases the productive efficiency of human resources.

Sen., Amartya. (1999) in his writings on welfare economics, specifically said —social choice, distribution, and poverty, constitute the analytical foundation and building blocks of economy. Development as Freedom draws together a lifetime of scholarship spanning the disciplines of ethics, economics, sociology, politics, demography, and moral philosophy into a grand synthesis: social choice underpinned by substantive freedoms of individuals promotes the development of economies and societies in their broadest sense. At the same time, he states —development should be seen as the expansion of real freedoms that people enjoy, requiring, among other things, the removal of major sources of "unfreedom," including poverty, tyranny, poor economic opportunities, neglect of public facilities, and intolerance".

## V. Indian Medical Tourism

As healthcare turns costlier in developed countries, India's medical tourism market is expected to more than double in size from USD 3 billion at present to around USD 8 billion

According to a CII - Grant Thornton white paper, cost is a major driver for nearly 80 per cent of medical tourists across the globe. The cost-consciousness factor and availability of accredited facilities have led to emergence of several global medical tourism corridors - Singapore, Thailand, India, Malaysia, Taiwan, Mexico and Costa Rica,

The countries where medical tourism is being actively promoted include Greece, South Africa, Jordan, India, Malaysia, Philippines and Singapore. India is a recent entrant into medical tourism. According to a study by McKinsey and the Confederation of Indian Industry, medical tourism in India could become a $1 billion business by 2012. The report predicts that: "By 2012, if medical tourism were to reach 25 per cent of revenues of private up-market players, up to Rs 10,000 crore will be added to the revenues of these players". The Indian government predicts that India's $17-billion-a-year health-care industry could grow 13 per cent in each of the next six

years, boosted by medical tourism, which industry watchers say is growing at 30 per cent annually.

In India, the Apollo group alone has so far treated 95,000 international patients, many of whom are of Indian origin. Apollo has been a forerunner in medical tourism in India and attracts patients from Southeast Asia, Africa, and the Middle East. The group has tied up with hospitals in Mauritius, Tanzania, Bangladesh and Yemen besides running a hospital in Sri Lanka, and managing a hospital in Dubai.

Another corporate group running a chain of hospitals, Escorts, claims it has doubled its number of overseas patients - from 675 in 2000 to nearly 1,200 this year. Recently, the Ruby Hospital in Kolkata signed a contract with the British insurance company, BUPA. The management hopes to get British patients from the queue in the National Health Services soon. Some estimates say that foreigners account for 10 to 12 per cent of all patients in top Mumbai hospitals despite roadblocks like poor aviation connectivity, poor road infrastructure and absence of uniform quality standards.

Analysts say that as many as 150,000 medical tourists came to India last year. However, the current market for medical tourism in India is mainly limited to patients from the Middle East and South Asian economies. Some claim that the industry would flourish even without Western medical tourists. Afro-Asian people spend as much as $20 billion a year on health care outside their countries - Nigerians alone spend an estimated $1 billion a year. Most of this money would be spent in Europe and America, but it is hoped that this would now be increasingly directed to developing countries with advanced facilities.

## VI. Shipping and Port Services

Shipping is an important indicator of both commodity and services trade of any country. Around 95 per cent of India's trade by volume and 68 per cent in terms of value is transported by sea. As on 30 November 2015, India had a fleet strength of 1246 ships with gross tonnage (GT) of 10.45 million, with the public-sector Shipping Corporation of India (SCI) having the largest share of around 36 per cent. Of this, around 369 ships with 8.94 million GT cater to India's overseas trade and the rest to coastal trade. Despite having one of the largest merchant shipping fleets among developing countries, India's share in total world deadweight tonnage (DWT) is only 0.9 per cent as on 1 July 2015. As per UNCTAD, India with 11.7 million twenty-foot equivalent units of container (TEUs) and a world share of 1.7 per cent ranked 9 th among developing countries in terms of container ship operations. The shipping sector has been plagued by economic hardships since 2008. In 2014, all segments of shipping saw intermittent spikes but there was no secular uptrend in any of them. There could be further dampening of shipping freight rates as deliveries of new ships are slated in 2016.

The cargo traffic of Indian ports increased by 4.5 per cent in 2013-14 and by 6.8 per cent in (April-December) 2014-15. The traffic handled in major ports grew by 4.1 per cent to 299.6 million tonnes in April-September 2015 from 287.7 million tonnes in April-September 2014 (Table 5). Capacity addition has been increasing since 2011-12, but capacity utilisation has been falling

# VII.  IT Sector Services

The cross sectoral impact of the IT sector has never been so critical for India's growth and development agenda. The government recognizes its potential, and the Information Technology sector is undoubtedly a key pillar in various flagship initiatives like Digital India, Make in India, Skill India and Start-up India. The 'Digital India' programme with the vision to transform India into a digitally empowered society and knowledge economy was launched on 1 July 2015. Digital India is an umbrella programme that covers multiple government ministries and departments. The vision of Digital India is centred on three key areas, viz., (i) Infrastructure as a utility to every citizen (ii) Governance and services on demand and (iii) Digital empowerment of citizens. Digital India aims to provide the much needed thrust to the following nine pillars of growth areas which include broadband highways, universal access to mobile connectivity, public internet access programme, e-Governance – reforming government through technology, e-Kranti (NeGP 2.0) – electronic delivery of services, information for all, electronics manufacturing with net zero Imports target, IT for jobs and early harvest programmes.

1. **Competitiveness issue of Indian software:** There is the issue of Indian Software sector losing out in competitiveness from emerging competitors. There is a need to focus on high-end software products. Even in the BPO sector, China, and Philippines have become major competitors. India is facing competition from these countries, besides Malaysia, East European and Latin American countries.

2. **Comprehensive approach to start-ups and entrepreneurship ecosystem:** The technology led start-ups today account for majority of startups in India and globally. In fact with the government leveraging technology for India's development needs, the country would need many of these entities to develop innovative solutions. There are several issues that hamper the growth of start-ups ranging from complex compliance, high incidence of tax and difficulties faced by investors. Policy Priorities for a flourishing start-up ecosystem would require simplified compliances and exemption from tax liabilities for the initial years, encouraging investors not only by simplifying compliances, but also by ensuring time bound processes. Realizing the importance of start-ups, the government has recently unveiled the Start-up Action Plan.

Consultancy services are emerging as one of the fastest growing service segments in India, cutting across different sectors with some overlapping. A large number of consultancy firms and individual consultants are operating in India at various levels across the sectors. Though there are huge opportunities for the growth

of the Indian consulting industry, there are some key inhibitors like low brand equity, inadequate international experience of Indian consultants working abroad, lack of local presence, lack of strategic tie-ups, low competency image, lack of market intelligence on consulting opportunities abroad and lack of a strong competency framework of consultants that improves quality in delivery of consulting assignments. Addressing these issues may help in increasing the global market share of the Indian consultancy Industry.

## VIII. Media and Entertainment Services

The Indian Media and Entertainment Industry is one of the most vibrant and exciting industries in the world, and has a tremendous impact on the lives of Indians as well as the Indian economy. It plays a critical role in creating awareness on issues affecting, channelling the energy of and building aspirations among India's millions. The media and entertainment industry has been a catalyst for the growth of large parts of the Indian economy. The media plays a significant role in our lives and influences us by televisions, newspapers, films, radio, etc. With the addition of new media such as social networking services, animation and VFX, online gaming and applications running on mobile devices, a new dimension has been added to the world of media that was dominated by traditional media.

The growth of the industry is attributed to the increasing digitisation and higher internet usage over the last decade. Internet has almost become a mainstream media for entertainment for most of the people. According to Internet and Mobile Association of India (IAMAI), there were 354 million internet users in India by the end of June 2015. India has more internet users than the population of the US and become the second largest country by the number of internet users after China. Approximately, 19.2% of the population has access to internet either via smartphones or computers. This has led to further growth in the digital media and entertainment industry.

**Television:** Digitisation of cable saw the television industry still on the path of progress, with the mandatory Digital Access System (DAS) rollout almost complete in Phase II cities. DTH operators continued improved realisations by increasing penetration of HD channels, premium channels and value added services. The Ministry of Information and Broadcasting extended the deadlines for phase IV of Digital Addressable System implementation to 31 December 2016. Overall, the sector saw a healthy advertising growth on the back of the boost from the emergence of ecommerce as a significant spender across media in 2014.

**Print media:** The structure of print media in India still continues to be highly fragmented at national and regional levels. Advertisement and circulation revenues were the major drivers of the revenue for the print media. The print media industry grew at 8.3% from INR 243 billion in 2013 to INR 263 in 2014. The industry is expected to grow further in coming years because of higher disposable income and literacy rate in tier II and III cities.

**Digital media:** Digital media showed a stupendous growth in year 2014 attributed mainly to adoption of smart-phones, healthy growth in 3G users, continued adoption of 2G, and implementation of Digital India programme. The digital advertising industry grew at 44.5% from INR 30.1 billion to 43.5 billion in 2014 majorly driven by a steady growth in ad spends across most digital platforms.

**Radio:** Among the traditional media forms, radio industry showed the highest growth rates. Government has started proceedings on the auctions of 135 channels in 69 cities and this move will further enhance the growth of the radio segment. However, the segment also faces some major challenges. Smaller and standalone stations feel the pressure of rising cost structures. And another major challenge faced by the industry is the rise and the emergence of digital media and people shifting to digital music.

## IX. FDI in India's Services Sector

There has been a significant growth in FDI inflows in 2014-15 and 2015-16 (Apr-Oct) in general and to the services sector in particular. Though there is ambiguity in the classification of FDI in services, the combined FDI share of the top 10 service sectors such as financial and non-financial services under services sector, telecommunications, trading, computer hardware and software, construction, hotels and tourism, hospital and diagnostic centres, consultancy services, sea transport, information and broadcasting can be taken as the best estimate of services FDI, though it could include some non-service elements. This share is 53.3 per cent of the cumulative FDI equity inflows during the period April 2000-October 2015 and 53 per cent during 2014-15. If the shares of some other services or service-related sectors like retail trading, ports, agriculture services, education, and air transport are included, then the total share of cumulative FDI inflows to the services sector would increase to 55.6 per cent and 54.5 per cent respectively for the above two periods In 2014-15, while total FDI equity inflows grew by 27.3 per cent to US$ 30.9 billion, FDI equity inflows to the services sector (top 10 services including construction) grew by a whopping 70.4 per cent to US$16.4 billion. This rising trend is continuing in the first seven months of 2015- 16 with the FDI equity inflows in the services sector growing by 74.7 per cent to US$14.8 billion, while total FDI equity inflows grew by 26.1 per cent to US$27.1 billion. The high growth in services FDI inflows is mainly due to higher growth of three major categories, namely computer software and hardware; services sector category which itself consists of a basket of items like financial, banking, insurance, non-financial, outsourcing and R&D; and trading. This was in spite of the high negative growth at - 61.6 per cent in FDI equity inflows in telecommunications.

## X.  Issues in Service Sector by Industry

1. **Tourism:** Need for improvements in the e-tourist visa and ordinary visa which includes the need to extend eTV visa window to 180 days instead of 30 days before the tour at present; need for multiple entry eTV instead of single entry eTV at present; extension of duration of stay to 60 days under eTV instead of the 30

days at present; making available biometric facility in major ports to help cruise passengers get eTV; need for proper display at eTV counters; increasing the counters for eTV tourists to avoid delays; extending eTV facility for medical tourists; and streamlining the biometric process in overseas missions by having more biometric locations.

Tax Issues which include issues like the place of provision clause in service tax resulting in tourism services not being treated as export of service and being taxed; need for lower GST for tourism related services as in many OECD countries; and import duty exemption for equipment and accessories for adventure tourism.

2. **Shipping and port services:** Need for cheaper finance and longer tenure for funds in the light of the fact that Indian ships are ageing and need to be replaced and asset prices are serendipitously low. Atleast the issue of longer tenure for loans to shipping sector could be addressed urgently. An institutional mechanism can also help shipping sector in acquiring assets at the right time.

3. **IT services:** Issues in this sector include visa issues like the impact of Grassley-Durbin Reform Bill (if passed in US Congress) on H1B visas and even L1 visas and the visa fee hikes in US; need to be competitive and focus on high end software products; need to promote our own domestic 'Apps'; comprehensive approach to start-ups and innovation which is now being done with Start-up Action Plan and Atal Innovation Mission; clarity under proposed GST given the dual levies of VAT and service tax; e- commerce taxation issue; difficulty in the getting payments for government work which is outstanding to the extent of Rs.3,000 crores and above; extending the 200 per cent weighted deduction on R&D expenditure in IT industry on the lines of R&D incentives to IT sector in UK and many other countries; extending Services Exports from India Scheme (SEIS) to IT sector in the light of proposed phasing out of SEZ benefits and phased out STPI exemptions; uniformity in exchange rate calculations for different tax calculations; addressing pending issues related to transfer pricing; streamlining exit route for STPs and need for providing relief and rehabilitation for both workers and firms in Chennai by considering measures like waiver of customs duty, tax relief etc with sunset clauses.

# XI. Conclusion

The services sector is like an unchartered sea with plenty of opportunities. While an attempt has been made here to see the performance and problems in some important services, the other services are equally important. A targeted policy of quickly addressing the issues in major and potential services can result in higher dividends in the form of higher services growth and services exports which in turn can help in pulling the economy to higher growth levels.

The services sector is like an unchartered sea with plenty of opportunities. While an attempt has been made here to see the performance and problems in some important services, the other services are equally important. A targeted policy of quickly addressing the issues in major and potential services can result in higher dividends in the form of higher services growth and services exports which in turn can help in pulling the economy to higher growth levels. The services sector is like an unchartered sea with plenty of opportunities. While an attempt has been made here to see the performance and problems in some important services, the other services are equally important. A targeted policy of quickly addressing the issues in major and potential services can result in higher dividends in the form of higher services growth and services exports which in turn can help in pulling the economy to higher growth levels.

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# Edupreneurs – Revolutionizing Edutech in India

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## Abstract

One of the key factors influencing the state of the economy is entrepreneurship education, according to experts. Therefore, despite debates about whether it is possible to teach entrepreneurship or not, the majority of India's top business schools provide entrepreneurship education through specially created elective courses to impart a wide variety of skills embracing a variety of fields. Among experienced management students, a multidisciplinary approach. However, in light of the fundamental overlaps between key management topics like marketing and entrepreneurship, both of which present a chance to create original solutions to delight customers. Studying entrepreneurial topics as a pre-requisite for management education is necessary. And when it comes to particularly addressing the rising entrepreneurial desire in developing nations, research becomes crucial. An effective ecosystem for integrating and promoting entrepreneurship education as basic to mainstream business education in India is proposed in the current study, which intends to qualitatively examine the current entrepreneurship education regime in India.

**Keywords:** Edupreneurship, Entrepreneurship development, India, Edupreneur, Importance

## I. Introduction

The topic of whether entrepreneurship can be taught has never had a conclusive response (Harrison, 2014). Despite claims to the contrary, excellent entrepreneurship education is crucial to developing the correct entrepreneurial mindset attitude combined with the necessary training is advancing (Trivedi, 2014; Drucker, 1985). The acceptance of entrepreneurship as a legitimate tool for economic advancement has had a substantial impact on the concept of entrepreneurship becoming a subject of study in business courses (2012) Arthur and others The growth of corporate entrepreneurship, which is an essential prerequisite for business renewal and increased performance, especially in established markets, increases its value (Bhardwaj & Sushil, 2012). In spite of this, the efficiency of the type and design of such education, as determined by the resources and delivery methods for the programmes, have major influences on entrepreneurship education (Arthur et al., 2012).

Nowadays, there is a lot of discussion on how to link education to societal demands. The finest course to offer to both men and women is entrepreneurship. Planning for regulated growth, awareness, and education are essential for the

systematic and orderly development of a tourism area. The host communities' and government's concern, thorough observation of acts, education, and understanding the host's and the guests' rights and obligations. Level education programmes are offered by private schools, colleges, universities, and governmental organisations. Many travel-related businesses ultimately hired alumni from these colleges.

## II. What is Edupreneurship

What it means to be an edupreneur depends on who you ask or whose writing you read, according to Medium. Edupreneurship, to put it simply, is the process of developing or enhancing one's capacity for learning as well as initiating change and reform. Building original learning programmes, creating e-learning software and apps, or even being involved in the gamification of studying a specific curriculum area are all examples of edupreneurship.

The demand for edupreneurs' services is expanding quickly. To begin with, there is more potential than ever for advancements in "edtech" (educational technology) and a society that is ready for change. Education professionals are now more empowered to improve how teachers instruct and how students learn as a result of their rising understanding of the importance of their experiences and insights. Being an edupreneur, according to Medium, "really just means to enable people to be hopeful about the idea that they can [and will] experience change" throughout their life. For example, even if you are unfamiliar with the phrase "edupreneurship," chances are good that you have previously come across them in a classroom through everything from the gamification of platforms for learning created to assist students, teachers, and parents in tracking student development in real-time.

Giving a guy a fish will only feed him for a day; teaching him to fish will provide for him for the rest of his life.

This well-known quotation highlights the importance of education to society. How a person can change as a result of education, as well as how educated people can alter the world. Learning and education are therefore of the utmost importance in everyone's life.

But as everything is remodelling due to the time revolution, we also need to rebuild education. The study, acquisition, and evaluation of knowledge have been the conventional methods of education for a sizable period of time. We therefore require a modern strategy for the education industry. Now is the time when the need for people who want to alter society arises. We require "Edupreneurs." The phrase "edupreneur" is a combination of the words "entrepreneur" and "education." Thus, an entrepreneur who uses unorthodox thinking to address a challenge in the education sector and who also innovates learning is known as a "Edupreneur," and their process is known as "Edupreneurship."

The fate of a student and the future of the nation are among the many obligations that fall on the shoulders of edupreneurs. They enable students to reach their full potential. They are aware that changing the educational system is important in order to bring forth brilliance and mentor and lead young minds. They want to create ethically, socially, physically, and psychologically independent thinkers in their students. They force pupils to change with the times.

Being an edupreneur may or may not be financially rewarding, but it undoubtedly comes with it the satisfaction of shaping the nation's future.

## III. Literature Review

**Ramanathan, C. (2006)** has proposed a paradigm that could transform Indian education by connecting it to academic fields and student reality. She stresses the need of identity and self-awareness for pupils, saying that our students are deficient in these areas. In addition to these, caste and class divisions, urban and rural population differences, and other variables affect the quality of education in India. Finally, she used Freirean pedagogy to analyse how dependent India's educational system is on the culture of the textbook.

Rahimnia,F., Polychronakis, Y., Sharp, J. (2009) Iranian higher education has made an effort to build a framework to examine the impact elements of plan execution. He conducted semi-structured interviews with the university's manager and top academic staff members. Planning implications, organisational, individual, management, and environmental effect aspects were identified as the major contributors. The study presented a framework that provides comprehensive information on the impact factors.

**Henk Roelofs; Shilpa Samplonius-Raut.(2011).** discussed in order to learn entrepreneurship, the study proposed an entrepreneurial pedagogic approach that offered risk and value-added experience in a pull system. In order to modify behaviour toward entrepreneurship in an entrepreneurial environment, the authors employed the Lego game of entrepreneurship as a method for experiential learning.

**Waks, L. J. (2007).** concentrated on the reconceptualization aspect for the fundamental shift in education. He contends that institutional change, not organisational change, is where true educational transformation takes place. He has made an effort to support this claim with a conceptual argument.

## IV. Need for Entrepreneurial Education for Development

1. **Comparison and analysis:** To give "would-be" entrepreneurs greater opportunities to learn the skills necessary to launch new business units, entrepreneurial development institutes must be established, either at the District level or the local level. Conducting management activities would help entrepreneurs' managerial skills. With the aid of the Institute of Management

Studies, training programmes. The establishment of small-scale manufacturing units could enhance the growth of entrepreneurship notably in the developing areas. Graduates who are currently unemployed will receive training on how to create small businesses that employ local labour and resources. The federal government must make sure that there is expected to be a steady foreign exchange rate and controlled inflation.

Finance shouldn't be a barrier for aspiring business owners. Venture capital companies must be established at different locations so that business owners might obtain both financial resources and rich venture-related experiences capital companies.

2. **Process of entrepreneurship development:** It starts with choosing the most qualified and promising applicants, aligning each one with the ideal project, strengthening managerial and entrepreneurial abilities, giving the entrepreneur advise and encouragement, and providing the essential aftercare to help the entrepreneur in starting a business [7]. The following tasks are involved in developing entrepreneurs:
   - Locating and carefully choosing people who could receive entrepreneurial training.
   - Increasing their capacity for entrepreneurship.
   - Making sure each prospective business owner has a workable industrial project.
   - Providing the business owners with fundamental managerial knowledge.
   - Assist them by safely providing the required financial, infrastructural, and other support.

3. **Need for identification:** Natural resources are in great abundance in India, a huge nation. India has a high rate of poverty and unemployment due to underuse of its natural and human resources. Through established five-year programmes, the government seeks to achieve full employment and quicker economic growth. A balanced socioeconomic development is another goal. The government continuously develops new projects and initiatives, including "Prime Ministers Rozkar Yojana" and others. This calls for investments of millions of crores of rupees, followed by the selection of qualified plan participants.

   In addition, many workers, supervisors, merchants, and salespeople in business and industry, as well as some young engineers and graduates, possessed latent entrepreneurial abilities and the desire or ability to work for themselves. Many lacked the confidence to publicly announce their endeavours.

4. **Identification & selection:** According to the requirements and demands of the community and the goals established by the cooperating agencies, the identification and selection inputs must be properly and thoroughly mixed. Development strategy Entrepreneurial identification and selection involve an integrated methodology. Several functions at various stages include:

Stage 1
- Contacts with regional organizations
- Outlining the target region, resources, target audience, etc.
- Development of a database of applications and media planning.

Stage 2
- Written Test
- Group Test
- Interview

5. **Designing training and stratifying it:** This multi-stage identification procedure aids in differentiating between potential candidates and non-potential candidates at various stages. Following are the complete actions that will be used in this integrated approach:
   - Who will be the potential entrepreneur in Stage 1 I of the definition of the target area? What are their educational backgrounds, how much money do they make, etc.?
   - Research on the most common skills: what are people's traditional skills, hereditary professions, and technological backgrounds?
   - Analyzing Current Resources: What kind of raw materials, institutional backing, and infrastructure support are offered in that area? Can they help with the follow-up training and entrepreneurship in that state or region?

## V. Importance of Entrepreneurship Education in India

Our economy is mostly driven by entrepreneurship. Wealth and a significant number of employment are produced. By individuals with an entrepreneurial spirit who start modest firms, many of whom go on to found large corporations. People who have experienced entrepreneurship usually report having more opportunities to use their creative freedoms, stronger levels of self-esteem, and an all-around improved sense of control over their lives. Growing a strong entrepreneurial culture, according to many seasoned businesspeople. politicians, economists, and teachers will enhance social and economic prosperity for individuals and groups on a local, national, and international scale. New technologies and processes are introduced and spread more widely thanks to entrepreneurship.

## VI. Challenges of Edupreneurs in India

Since the Indian government permitted 100% FDI in the education sector, some outstanding individuals have teamed up to make India an educated nation, which ultimately opens up a world of limitless opportunities for every citizen. These "edupreneurs," or the businesses they run, have improved everyone's access to and convenience with education.

According to the education stalwarts, edupreneurs have a fantastic opportunity to launch their own educational institutions and impart knowledge and education to all

people. Nevertheless, despite the opportunities; a lot of people see education as a "money-making industry," which makes them appear untrustworthy. As a result, there is a lack of acceptance of the objective, which creates enormous hurdles for edupreneurs.

**A few difficulties that entrepreneurs in education confront;**

1. **Less funding sources:** Edupreneurs can only establish schools and/or colleges under a non-profit entity, which limits the funding sources. For instance, they are unable to obtain investments through equity investors, shares, or debentures. However, non-profit organisations are qualified for DONATIONS, which partially but not entirely relieves them. Due of the limited funds available, edupreneurs take their time growing their schools by adding to the facilities already in place.

    That's not all, either. Government regulations mandate that the edupreneur or his trust fund their own assets, such as land and buildings, which again calls for significant financial resources.

2. **Lack of trust:** People in India view education as a "business," which prevents rising but deserving individuals from having the chance to inspire faith in them. Parents would rather spend their hard-earned money at well-known institutions than search for schools that offer the right kind of education. In institutes of higher learning, this paradigm is frequently observed.

3. **Employing the incorrect people:** Entrepreneurs in the education sector occasionally neglect to evaluate the human resources being used in their project. This encourages these individuals to view edupreneurs as taking them for granted, which ultimately causes edupreneurs' intentions to be derailed.

4. **Inadequate research:** Entrepreneurs frequently lack the necessary analysis and research, which leads to money being wasted on unneeded items. A good plan often necessitates years of research and takes time to develop. The variables that shouldn't be messed with include choosing the correct audience to target, structuring the educational process, partnering with the relevant universities, receiving government approval, etc.

5. **Human contact:** There is a tremendous gap between people looking for real mentors and how education entrepreneurs are able to integrate technology and human touch. Education is becoming more digital.

    The study of entrepreneurship at the university level is still in its infancy as a distinct endeavor .Nowadays, many colleges and universities offer courses in entrepreneurship, but many academics and administrators still view the topic with suspicion.

There have been notable developments in the area of entrepreneurship education. At numerous universities. Over 1,600 entrepreneurship-related courses were offered in 2005, up from a low number in the 1970s. There is still disagreement on the overall legality of education for entrepreneurship in this huge development. Since it is able to determine that a number of legally have been attained in the state of this schooling.

## VII. Conclusion

It appears that the increased reliance on entrepreneurship as a prerequisite to long-term economic success in emerging countries has stood the test of time. History has shown that encouraging the spirit of entrepreneurship alone is just insufficient because there are much more examples of failure than success in regards to the practice of entrepreneurship around the world. The possibility that we will hear more positive business initiative success stories in this intensely competitive sector is increased by solid business acumen combined utilising the proper viewpoints on the application of innovation and cutting-edge.

The development and promotion of effective indigenous entrepreneurship education is urgently required programmes in growing economies like India. Even if entrepreneurship is a course that emphasizes practice, it is crucial to supplement it with current theoretical knowledge. Additionally, given the connections between the study of entrepreneurship and other crucial business management courses, such as marketing, a framework for developing entrepreneurship as a foundational subject for business management students is required to provide an integrated learning platform. The process of entrepreneurship development varies depending on the economic system of the country. All developing nations, including India, have a mixed economic system in place. The future of entrepreneurial education in India will involve experimentation with various agendas and track characteristics, greater research on pedagogy with respect to the volume of educational outcomes. It helped the development of this early-stage project into entrepreneurship education and the hiring of entrepreneurship Ph.D.s. Finally, it must be concluded that entrepreneurship should be taught in schools in India at the plus two level as well as in a variety of professional, vocational, and other advanced courses at various levels.

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# Role of Marketing in Eduprenuership

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**Abstract**

Marketing is an integral aspect of any business organization since marketing activities support the products and services. When bringing a new product or service to the public, marketing is critical. Various marketing firms assist in the promotion of the items. Almost all enterprises use various marketing firms to sell their products. It is a deliberate attempt to promote a specific venture or goal on behalf of the organization, a specific brand, or any individual. These aid in attracting customers' attention in a variety of ways, including television, print advertising, social media, and email marketing. Because of marketing, Edtech companies such as Byjus, Upgrade, Vedantu, Unacademy, etc have enjoyed tremendous development. Marketing plays an essential role in increasing the number and quality of interactions between a service/product and its clients while lowering transaction and production costs. The main goal of this chapter is to explore the role of marketing in edupreneurship.

**Keywords:** Eduprenuership, Edtech, Marketing

## I. Introduction

Marketing is described as the action of creating, communicating, distributing, and trading goods and services for the benefit of consumers, users, business associates, and the general public (Dann,2008). Marketing, according to (Kotler and Armstrong, 2008), is the activity through which firms provide worth to their customers and cultivate strong customer ties in order to obtain traded value. It can also be defined as "a socially responsible organizational effort to create and maintain profitable consumers through good connection development between the firm and its internal and external customers." The marketing notion has become a method of thinking to create and maintain lucrative consumers, with the customer at the center of the firm. . The definition of "market" has changed over time, moving from one concept to another. Consumer involvement in product creation was modest in the early stages of the marketing idea until later developments when the customer was given priority in decisions regarding product development. Different company philosophies aiming at solving customer or client requirements at various times have manifested themselves in the shifting marketing concepts that have arisen over the years (Kotler and Armstrong, 2008). Creating and keeping happy, profitable

consumers is the fundamental premise of all concepts, regardless of the market era in which they were prevalent (Ulin, 1954), however different times call for different business philosophies.

An edupreneur is an educator with an entrepreneurial mindset. The term "educational entrepreneur" or "edupreneur" refers a person who spent time, energy, and money creating, marketing, and promoting a programme, product, service, or technology to enhance learning and who previously worked as an educator before launching a business in the education sector ( Donald E. Leise and C. W. MS Lavaroni, 2016). They may be responsible for creating or editing educational resources, offering tutoring services, consulting on educational issues, creating educational software, starting independent schools, running stores that sell educational supplies, and so forth. Educational entrepreneurs are innovators who, as a result of their traits and pursuits, have the potential to bring about improvements in the public education system. They have a vision for how things may be, which is the most significant quality they possess. Eduprenuer or edupreneurship used various marketing tools to promote their business. In this 21st century The way that nations conduct business has also changed as a result of these changes. Now electronic marketing is used instead of traditional marketing. Because compared to traditional modern marketing reach masses of people and electronic marketing will continue to develop in a highly dramatic and dynamic manner as new marketing phenomena and philosophy. Every type of enterprise is significant to the global economy and is recognized as a driving force behind the expansion of the economy. On the other hand, interpersonal communication has evolved in the age of globalization and technology. Electronic marketing has the potential to grow in a highly dramatic and dynamic fashion as a result of the growing number of Eduprenuer, also known as education technology or edtech, employing the internet and other electronic media in their marketing efforts. Education technology or edtech is a massive industry that is rapidly growing due to technology. From 2021 to 2028, the global edtech industry, which was estimated to be worth $89.49 billion in 2020, is expected to increase at a rate of 19.9% CAGR ("Education & Training Sector in India, Education Index of India - IBEF", 2022). This book's chapter is focused on the function of marketing in education entrepreneurship.

## II. Motivation

The integration of digital education, teacher preparation, and entrepreneurship is known as edupreneurship. New approaches to teaching will surface when educators start to create their educational practices using an entrepreneurial mindset and set of techniques. Due to the desire of businesspeople to market and spread their ideas, these innovations in teaching will move beyond the classroom and result in new educational products or business models. From within, the educational system is being renewed. Furthermore, it is one of the global regions with the fastest growth rates, drawing more attention due to its capacity to bridge academic theory and contemporary business practices. Increased research interest in the subject has coincided with the increased teaching emphasis on entrepreneurship education.

# III. Research Methods

This study's technique was exploratory, with extensive reviews of the relevant literature. This study is based on secondary data from several journal papers, government reports, and other sources in the relevant field.

# IV. Finding and Discussion

1. **Role of marketing in eduprenuership:** Connecting the company with its target market is the function of marketing. The primary connection between a company and its clients is marketing. The company must be aware of and comprehend its target market as the market evolves and gets more competitive in order to better serve its clients. Customers' needs must first be determined in order to design prices, promote, and distribute the goods and services necessary to meet their wants. In this approach, the company's objectives of higher market share and more profit can be accomplished. There are various marketing strategies available today, but not all of them will be effective for your organization, particularly if it deals with educational technology. Regardless of the kind of service you offer, you will always need to have a plan in place. In order to successfully achieve their objectives of obtaining excellent leads, marketing professionals must first understand their audience. Outbound marketing is a tactic that has persisted throughout the course of marketing ("Great Business Marketing Strategies for EdTech," 2022). In order to reach your target, this type of marketing uses various platforms, such as radio, print, television, and phone calls. In practise, this might be effective for some companies that stand out from the competition, but in the education technology sector, one need continuously explore outbound marketing while concentrating on another marketing strategy. Inbound marketing is the name of that other marketing strategy. The marketing strategy used by InBound is appropriate for any sector of the education technology market since you are giving your customers and readers content that they find valuable. This strategy explains how the service can save the day while educating the audience on solutions that can meet their need or want. This strategy will assist in naturally attracting website visitors. It can turn those visitors into qualified leads, then close those leads to turn them into paying customers. After they make a purchase, the final task is to maintain high customer retention rates by satisfying the customers so they will recommend company to their friends and colleagues. The newest and most effective method of marketing is through offering your audience high-quality content. In addition to what was previously mentioned, one should also think about the customers' needs. By continuously studying consumers and keeping an eye on the business environment, marketing gives businesses the knowledge they need to improve their strategies, introduce new products, or modify old ones.

2. **Some of the uses of marketing:** Marketing creates revenue options: Many companies rely on marketing to create income. It is the employment of diverse marketing tactics by various industries in order to increase firm revenues. One technique for increasing profit is to reduce product expenses. This will lead to a

significant number of consumers buying the product. Cutting the cost of the goods attracts more potential customers, which boosts sales. It is preferable to have lower earnings but constant sales. Media marketing and promotions are yet another technique to boost profits. It is the simplest way to let people know about their business.

**Improve ones business's objectives:** An organization's aims and objectives determine its success. A company's aims might be helped through marketing. Their brand will develop more quickly if they use these marketing techniques. The company will be inspired to uphold its reputation as a result. Since their staff need to understand their ambitions, they will now define specific goals and objectives. These objectives will also be achieved by the intended audience.

**Develop a brand's reputation:** Another benefit of adopting marketing strategies is the capacity to build a reputation for your brand. However, it is vital to guarantee that your target market obtains goods that are of excellent quality and worth. By doing this, you'll build a solid reputation for both your brand and your product.

3. **Improves decision-making:** When a company hires a market professional, they will do all the essential preparations to boost sales of your products through successful marketing campaigns. When engaging in these activities, identifying the target customers should come first. When a company has a complete understanding of its target market, it can decide what arguments and details to utilize to convince customers to buy its products. In order to give clients a wide selection, the company will amass numerous taglines. Marketing will support them as they make decisions.

## V. Conclusion

Knowing the latest developments in marketing enables us to appreciate how diligently new age marketers have strived to integrate marketing into daily life, and how quickly the gap is closing. Marketing professionals use technology as a crucial element and tool to communicate with the general public and their target audience. Industries like Edtech have garnered stunning rewards thanks to the marriage of technology and marketing that would have never been possible. In the previous few decades, no one had ever considered the possibility of any other form of marketing besides print media. The emergence of technology as a new branch is certainly the biggest factor influencing how marketing and its concepts are evolving and will continue to change.

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# Edupreneurship Growth Opportunities in India

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India has important place in the Global Education industry. One of the largest network of higher education institutions in the world is recognised in this country. Still there is a lot of potential for further improvements and development in the system of education.

In the history of country education was provided in Oral form where chanting Veda's and mantra the shishya were made to receive exact lessons by chanting. Then Bhojpatra and subsequently paper were used to pass on lessons. With technology development computers and IT resources were brought and utilized and now we can see online delivery of courses and teaching materials. Earlier as technology was available OHP with transparent sheets, floppy disks, CDs, drives and clouds spaces were utilised in different phases. Technology has made things so fast that the limitations of time, geography, background etc. are being irrelevant.

Indian Online education market was set to grow US $1.96 billion and around 9.6 million users in 2021 from US $ 247 million and 1.6 million users.

There are two important thing to note here is if somebody want to start teaching today and be in education using technology, they have to be having Knowledge of

- Their field and
- Technology as how to use so that their contents are delivered in exactly the same style as they are physically delivered.

With the spread of internet in present world society, the information is Available, Affordable and Accessible on demand. The persons interested to get into entrepreneurship, they will get the information what they aspire for and want. In fact they are people who know the art of "Connecting Dots" and on doing so they create something useful for society solving a problem and making life easy for all. As per studies of Human Psychology, the cognition shows that three factors

1. active search,
2. alertness and
3. prior experience

Combine to help entrepreneurs connect the dots and see the potential in seemingly unrelated events or trends. Means the prominent trait for an entrepreneur is readiness to take Risk and set new standards of life style.

While it is widely agreed that entrepreneurs play a major role in fostering economic growth and job creation in their communities, it is important to analyse and understand how they do it. Before we proceed let us first understand what the meaning of "Connecting Dots" is.

For this, it is also important to analyse how some individuals are able to recognise possibilities of links and connections between objects and events more readily than the rest of people in masses who are also exposed to the same events or trends for long time in the past and present. It is interesting to note that how "Cronuts" (a hybrid of doughnuts and croissants ) was invented and rapidly became so popular that it was named one of TIME magazine's "Best inventions of 2013". Today it is sold in China, Japan and Australia in a big quantity.

The Cognitive framework is made of two components - Pototype of existing and Paradigm. Cognitive is the basic unit of the cognitive framework and it can be defined as the act of looking at and knowing an item of information. As we proceed further in this framework, cognitions precede behaviour and constitute input into the person's thinking, perception, problem solving, and information processing.

Chester Carlson, who invented the modern day photocopy machine has attributes as discussed above. There were many attempts earlier to create an effective functional machine. However, Carlson worked on his idea and led the way creating a long line of successful Xerox copiers which are used till today. He was having the cognitive frameworks to combine different technological advances and changes in the basic nature of business. This has resulted in a product that revolutionised offices, education and other fields.

It can also be argued that a person has better cognitive framework in areas where they have exposed to or worked earlier. But this argument is also not purely acceptable. In today's world it is the ability of entrepreneurs to manage the resources get things in place and run the show. The profit is outcome of activities and processes. Equations and understanding the basics of business matter. Once the systems are in place and working with stability then scaling up the same end up in giving very large profit.

An entrepreneur tries to create his special niche in that little space for him in the existing market. An entrepreneur is driven by passion, commitment and dream.

We have seen that Technology has played an important role in Education development and reaching mass. This has brought wide spread improvement in school level education. Government has also been supportive and put its emphasis on Education Technology by bringing adequate changes in its national education policy.

Till 2019 the development and growth of was not very much as there were issues of raising funds. This situation was changed due to COVID-19 and it was found that companies which has existed for about two decades started getting investments. It is now very strongly believed that Edtech companies can bring prosperity for millions of people in Asian countries. Education sector was slow to accept the Technology from both ways – providers and receiver. But everybody realised that it is important to use technology in education. Institutions have started taking advantages of digital technology.

## 1. What are Edtech companies?

The word "Edtech" is an amalgamation of two words i.e. "Education" and "Technology". This means and aims at changing the way of learning by using IT in the learning of students. The objective of Edtech companies are to enhance the learning of students by making them learn through various fun activities and improve their education outcomes. It is interesting to note that more than 4500 active Edtech companies are active in India by April 2022 and about 500 of them have been founded in past 2 years. The concept and features on these companies are more or less similar if not the same.

## 2. What these Edtech companies are providing in Learning?

Important thing to notice here is all these companies are aiming at the same thing- they have in their offers the possibility to learn from anywhere, anytime, in any rhythm, with any means by means of common the ability to use a computer connected to a network and providing streamlined experience in different forms of modern day learning. Various modes of Modern day learning are –
* online learning,
* open learning,
* web- based learning,
* computer-mediated learning,
* blended learning,
* m-learning and
* Online or Virtual learning environment.

There are five categories defined for this market and each has its own story of origin and growth in year 2021 as under –
* Reskilling and Online Certification – Largest to the size of US $ 93 million.
* This market was growing at 38% CAGR
* Primary and Secondary supplemental education – it was of size US $ 773 million. This market was growing at 60% CAGR
* Test preparation – Online programmes aimed at coaching students for preparing for competitive examination. This market was growing at 64% CAGR
* Higher Education – Provide alternative to traditional Higher Education. This market was growing at 41% CAGR and

- Language and Casual Learning – Learning of non-academic subjects such as spoken language and guitar etc.

These Edtech companies might have been in existence earlier too but since COVID-19 period authentic teaching-learning environment and on time delivery were necessities that had made people realize the need and value of Edtech in mass.

We have seen many large global companies taking interest and making big amount of investment. Some of them are –
- Bill and Melinda Gates Foundation,
- Google,
- Reed Hastings - founder of Netflix,
- Chan Zuckerberg Initiative,
- Bertelsmann India and
- Kaizen Management Advisors.

Thus, we can say that the future of the online education market in India appears to be very bright. At the same time, there are many challenges in this sector some of them are like the absence of proper digital infrastructure and lack of standardisation of online programmes etc.

## I. Growth Drivers

Present government has always been supportive for growth of Edtech in country. While talking about the factors of interest that has fuelled start and growth of Edtech on country. Government has brought and formulated favourable policies related to technology adoption and online education delivery. It has also brought policies for development of infrastructure to extensively incorporate digital literacy in India.

Digital India and Skill India programmes of Government of India has seen surge in momentum for growth of online education. At the same time growth of e-commerce has also supported this in parallel.

There are few factors that has supported and drove the Edtech in country.

These are listed as under –
1. Low education coverage,
2. growing mobile and internet penetration,
3. increasing government participation,
4. the growing need to re-skill professional fields and
5. convenience

Are some of the key factors that makes opportunity for growth of Edtech in country.

This has been a critical point and has drawn investors from across the globe. We can understand the sentiments of investors abroad by example of one company only i.e. e-learning start-up BYJU has received investment of USD 240 million.

## II. Challenges for Edtech

There are many challenges in implementation and running of Edtech companies in India despite the wide acceptance

1. Lack of access to internet infrastructure- A study carried by World Economic Forum revealed data like majority of India lacks required Bandwidth. Every 15th out of 100 households in India have access to internet and 5.5 subscribers are present in every 100 persons population. Rural areas has very less broadband access.
2. Frequent Power cuts and Voltage fluctuations causing network issues in Rural and Semi Urban areas is another problem for deep penetration of e-learning.
3. The other challenge is there is lack of standardisation, credibility and quality of e-learning programmes and a wide range of curriculum available. As there are many courses offered by many national and international players the situation becomes more complex to choose for the learners. There are players who follow aggressive marketing and the users have to plan budget. There is not guideline from Government in this area. Therefore, online courses are either not considered credible or are not recognised in the traditional educational ecosystem. There is a need felt to make technology available to schools, colleges and institutions of higher learning for development of a full-fledged curriculum on online learning.
4. Cloud based development for learning is yet to be explored in India as a whole.
5. Language of the online courses is another problem. Most of the courses are in English medium. This makes non-urban students difficult to grasp the courses completely.
6. A Big challenge is reluctance of a section of teachers to be trained in using online teaching tools. They are apprehensive that these online course may completely replace them.
7. The other problem is people in general are habituated for classroom teaching and learning. Online learning lacks face-to-face interactions and there is very poor student-teacher and peer-to-peer engagement. This does not motivate learners and leads to low completion rate for curriculum.

## III. The Future of online Education in India

Education Technology is going to be and ready to prove itself as the next Sunrise Industry in India. Government is creating a system where multilateral private and public sector are playing a reliable tech-enabled platform and involving Experts from all the fields to create Pedagogy for rolling out solution for the mass. A Hybrid model is on discussion keeping convenience and flexibility in the system for making the Remote learning an easy task where barriers will be lost.

Edtech in India can be categorised in three heads so far –

1. Education Delivery for School level courses and skills development
2. Institutional Management and
3. Supplementary Resources Learning - Career Advancement, Test Preparation and Gamified Learning in STEAM (Science, Technology, Engineering, Arts and Mathematics) area.

There are many companies participating in these are. Some of these are listed below-

1. Byju's
2. Brainly
3. Classplus
4. CollegeDunia
5. CueMath
6. Culturealley – Hello English
7. Dost Education
8. Doubtnut
9. Edukart
10. Ekeeda
11. Embibe
12. Entri Learning App
13. Extra Mark
14. Flipclass
15. Fyraway

The king of Edtech companies is BYJUS. It is the market leader.

## IV. Hot Business of Edtech in India

In the present situation, India is at a very important place in the global education industry. It has one of the largest networks of higher education institutions as compared with the world. There is a very big potential for further development and improvement in the education system.

As India has 27% of its population in the age group of people below 14 years, there is a huge potential for Education potential in the country.

Government is putting all its effort to encourage and bring changes in favour of incorporating technology in education in all the areas. The size of education sector was estimated to be worth US$ 117 billion in FY 2020 which is expected to be US$ 225 billion by FY 2025.

There are 981 universities in May 2021 and 42,383 colleges in India in 2020. AICTE has approved 8997 institutions in February 2022. In this there were 3,994 diploma institutions, 3627 undergraduate and 4790 Post Graduate institutions. There

was an enrolment of 38.5 million students in higher education. In year Gross Enrolments Ratio for higher education was 27.1%. This states that there is huge potential for Edupreneurs to play here.

Looking at the Edtech Funding to tap this market, following graph shows the potentials –



https://transfin.in/



https://transfin.in/
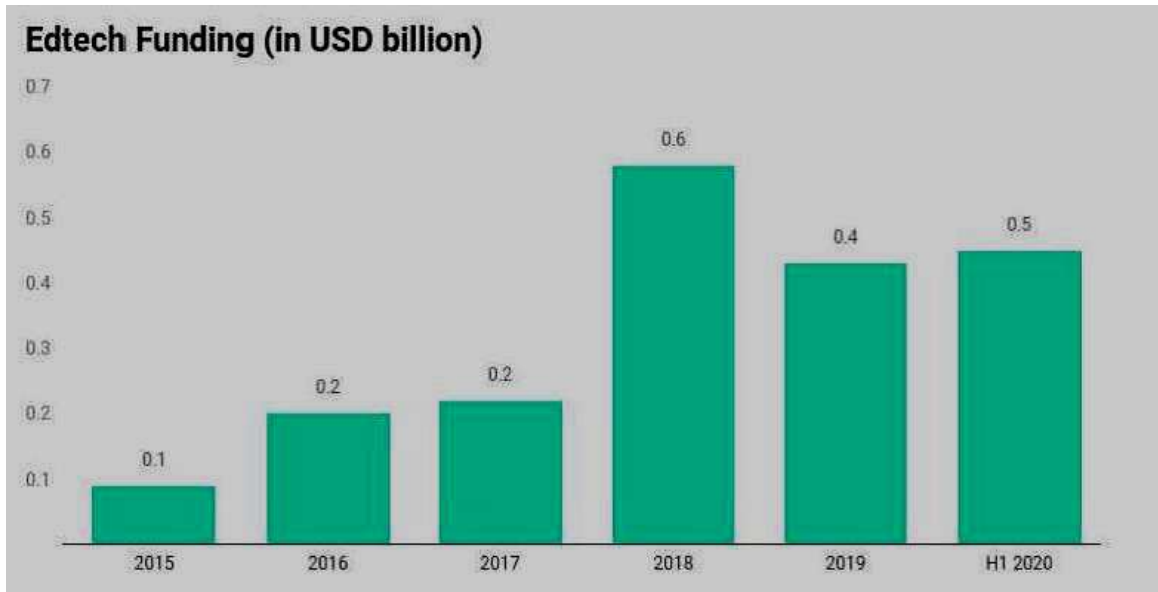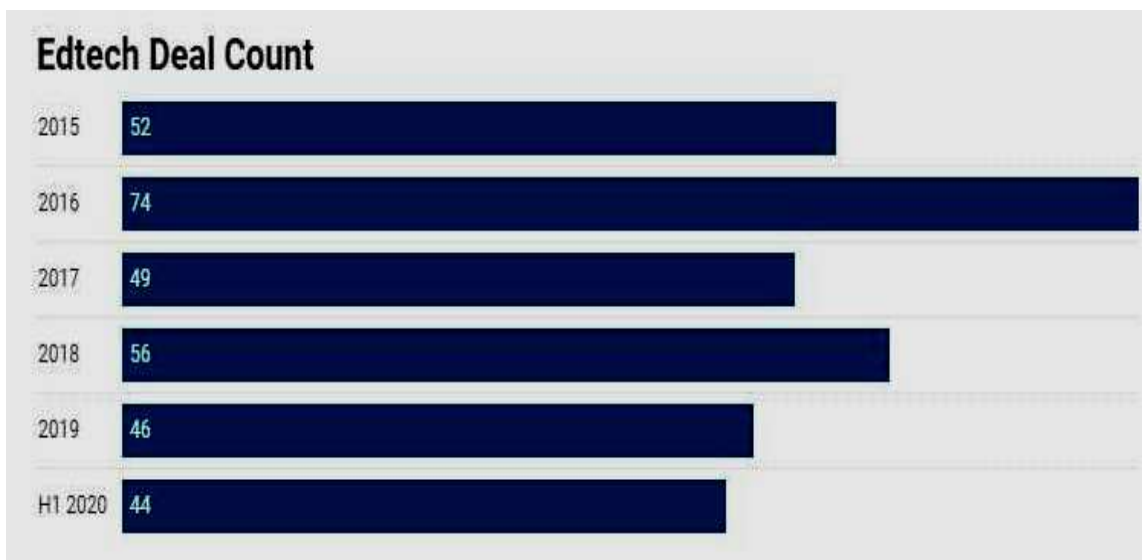
**India Edutech Market** was valued at USD 775.50 Mn in 2019 and is expected 17,374.73 Mn by 2027 at a CAGR of 47.5% over forecast period 20 0-2027.

India Edutech Market, by Type 2019- 2027
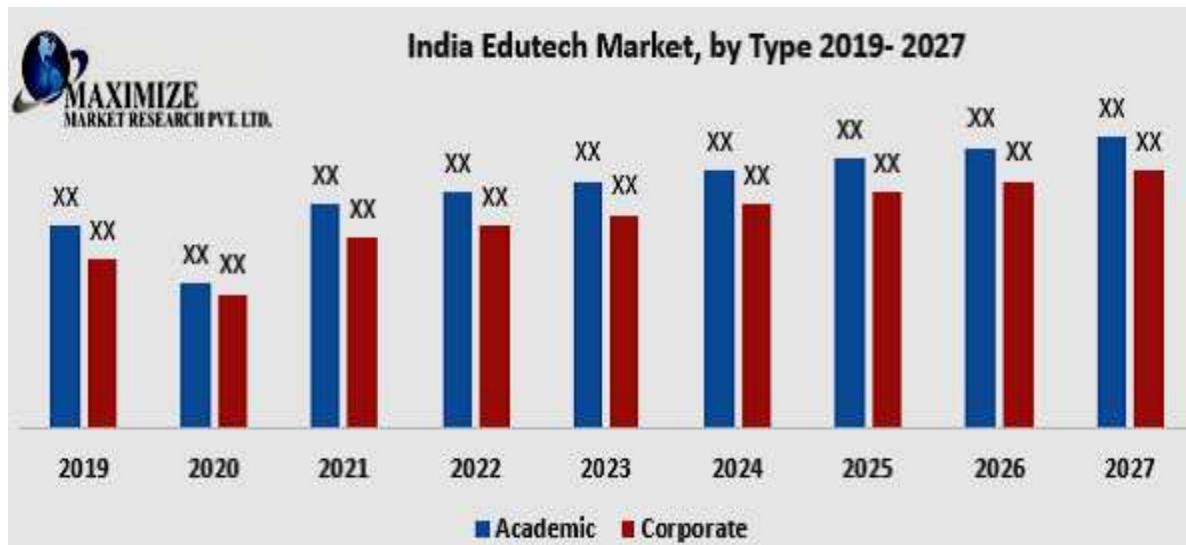
We have seen almost every aspect of our lives are being dominated by computers and online channels. Education has slowly shifted to the domain of digital platform. Education is included in fundamental right in India under articles of Indian constitution.

Edutech is poised to leverage learning by using, creating, and managing technological innovation and resources. Edtech is leading the life by bringing a phenomenal change in traditional system of education and it is being interactive in all the form by including Graphics, Video lessons and Online dynamic quizzes with instant results for the learners. This is a big change.

## V.  Drivers of Edtech Market

There are two major drivers in India for growth of Edtech

1. Low cost of online education:   We have seen from discussion above that India has one of the largest education systems in the world.   There are 1.4 million schools over 227 million students enrolment. There are more than 36,000 higher education institutes. On top of it, cost of offline education has increased more than 125 % from 2010 to 2018. Whereas, online courses are roughly 50 percent cheaper than the offline alternative. There is lower infrastructure and a larger student base to attain the economies of scale. Thus there is reduction in price per user. For example, graduating from an engineering college in India costs around 1.2 to 1.5 lakh per annum. When the same course is delivered online its costs comes down to 15000 - 20000.

2. Increasing internet and Smartphone Penetration There is highest number of internet users in world in India. As per records, internet penetration is reached 31%. The penetration of internet in tier II, tier III cities and rural areas is increasing. This provides high potential for the growth of e-learning. There are 300 million smart phone users and this is going to rise to 500 million as per forecast of

telecom companies in 2021. The data shows e-learning user base to reach 725 million in 2021. Online educational contents providers are designing the platform to be accessible in smartphones and also in the low end phones to reach the maximum learners. Government is also ready with Swayam and E-Basta etc. for the same.

Thus we can say the market is potentials are very huge for edupreneurs and there are tremendous opportunities of growth in this market.

# Role of Marketing in Edupreneurship

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## Abstract

The character cannot be obtained so easily, it is prompt but requires time with the custom of academic habits to become a fundamental and ultimately to get entrepreneurial skills. The purpose of identifying students' entrepreneurial skills in supporting the nation's public. Over time, marketing has become a pitch factor in any field of human activity. Being also a predominant tool in achieving the goals of an organization. Identifying the main strategies in correlation with the marketing mix and its application on easy terms is a premise for each organization to achieve their targets.

**Keywords:** Education, Strategy, Marketing mix, Marketing.

## I. Introduction

Edupreneurship offers a choice to those who are in the need of a small community setting with personalized education that revitalizes students' natural interests through a thematic study approach, economic-based curriculum with real world products & character development. The various institutes offers experiences in various learning styles so students can shine in areas of their own strength. The word **"edupreneur"** is the mixture of the more common words **"educator"** and **"entrepreneur."** In many simple words we can easily define "educator" as someone who educates or plays a key role in educating others, and "entrepreneurship" is little trickier to define. The word `**Edupreneur**` means Educational Entrepreneur, the person who ventures into educational sector and starts an educational institute of his/ her own.

**According to Jeff Cobb,** "An edupreneur is someone who creates a positive value shift with the specific economic resource of learning."

## II. Review of Literature

**Leff (1978)** opined that development of banking institution that allows firms to obtain formal finance promoting entrepreneurship. Also the improvement in the flow of communication among firms, reduced cost of gathering information and facilitating the diffusion of technological and managerial expertise promote entrepreneurship.

**King and Levine (1993)** found that financial system affect the entrepreneurial activity that affects in four ways (a) financial system choose the most promising projects after evaluating (b) financial system help in mobilizing of funds (c) financial system allow investor to diversify the risk associated with uncertain innovative activities (d) financial system reward to engage in innovation relative to confirmation of existing knowledge. Better financial system stimulates foster productivity growth and growth per capita output. They suggest that government policies toward financial system may have an important causal effect on long term growth.

**Smallbone and Welter (2001)** emphasized that entrepreneurs contribute to economic development in terms of job creation, innovation and external income generation depending upon priorities and different stage of market reform. The authors suggested direct support to SMEs to overcome immediate difficulties to strengthen their potential for development and growth.

**Liu, Burridge, and Sinclair (2002)** investigated that the causal links between trade, economic growth and inward foreign direct investment in china. With quarterly data long run relationship found between growth, export, import and FDI. The author finds bidirectional causality between economic growth, FDI and export which reinforce open door policy.

## III. Objectives of the Study

1. To present the main functions and role of marketing in education.
2. To highlight the main fundamentals of edupreneurship.
3. To present the main strategies used by educational institutions.

## IV. Edupreneurship

How can one attract the need for a person to buy your product and services? The answer is **Education.** Education is applied anywhere, at any time and comes in multiple forms, but when it is combined with the marketing the outcomes are astonishing. While educational marketing doesn't only links a product or service, it imparts customers with information that relates to what they expect to learn regarding a certain topic, industry or product. It's a technique that's worked for decades, and many organizations have taken the full advantage of it.

**Educational marketing** is a marketing strategy which educates prospects on the value of the results they can get by having an access to our products or services. It describes the procedure of teaching our leads about a certain topic or industry that can guide them to their purchasing decision. It is a way of reaching out our content marketing strategy, more specifically it is through the creation of content that will help guide leads further down your sales, focusing on educating about our service rather than pushing towards a sale. Education system in India is undergoing a rapid expansion. There can never be a better period than this for the Edupreneurs to jump on the line and make their presence felt.

1. **Use of Edupreneurship**



Figure 1

- **Helps to build trust:** Educational marketing allows us to share knowledge that has the power to nurture our relationship with our target audience and enables us to build more trust. According to Demand Metric, 78% of audience perceive relationship among themselves and an organization.
- **Creates the need to buy:** It fosters the need among the audience to buy product. This happens due to educational messages which can dramatically increase the likelihood of people to make a purchase.
- **Generates organic traffic:** Blogs offers informational content which helps us more leads and to drive more organic traffic to our website resulting in more lead and subscriptions to our email list, and ultimately an increase in our sales.
- **Costs less:** We can effortlessly produce and can reduce the money that marketers spend in advertising, and can start by simply building a website by picking a domain and hosting services, adding in content pages The CMI (content marketing institutes) says that educational-based mrketing resonates better with consumers and costs 62 percent less than traditional marketing.
- **Converts people to customers:** The more people get educated and entertained, the more **they don't mind being sold to.** Providing useful content with no strings attached makes selling much easier and encourages prospective customers to become recurring customers. An important rule in marketing is provide value first, then promote your products.

2. **Role of Marketing in Edupreneurship:** Philip Kotler, who is known as, "the father of modern marketing", trusts that, in general terms, marketing is a "human activity orientated in the direction of satisfy the needs and wishes through exchange processes." The term, "marketing" means a amalgamation of methods, techniques and tools which analyze the market, explores the market's factors in order to adapt supply and it can represents a new optic regarding the reality of life, the practice, is more smack- dab a new way of life. The educational marketing sights "the marketing application service" and enjoys the attention of regarding the individual training objectives. Edupreneurs has become fashion from profession.

Some of the roles of edupreneurship is listed as below:



Figure 2

- **Investigate a market:** The one main role of edupreneurship is to investigate a market to define, investigate and identify the potential consumers of goods and services so that the companies earn more profits.
- **Provide appropriate product and service:** The next role of edupreneurship is to provide appropriate product and service to the target audience at the right place, right time and right price. A good market investigation leads to supply appropriate product and service.
- **Provide educational services:** Edupreneurship's another role is to provide optimal, quality and reputational educational services to the clientage so that they can get the quality education.
- **Attract additional customers:** The another role of edupreneurship is to attract consumer by targeting their needs and aspirations intuitions so that the companies can earn high profits in this cut throat competition.

3. **Functions of Eduprenurship**



Figure 3

- **Hunting for main customers:** The main function of edupreneurship is to find or hunt for the main customers which are associated with the products of the company by doing an appropriate and quality market research.

- **Adapting educational services:** The second function of edupreneurship is adapting educational services to the particular needs, expectations and demands of consumers for products and services.
- **Policies linking main requirements:** Edupreneurship links the main marketing policies with the main requirements of the educational services.
- **Promoting optimal efficient management:** The optimal efficient management can be promoted by the usage of materials and information resources in order to achieve the main objectives of the organization.

## 4. Fundamentals of Eduprenurship



1. Must have an entrepreneurial mindset.
2. Better public and ptivate integration.
3. Intra - entrepreneurial competencies, skills nd knowledge.

4. A different business model.
5. Better teacher education and training.
6. Paying more attention to students defined outcomes.
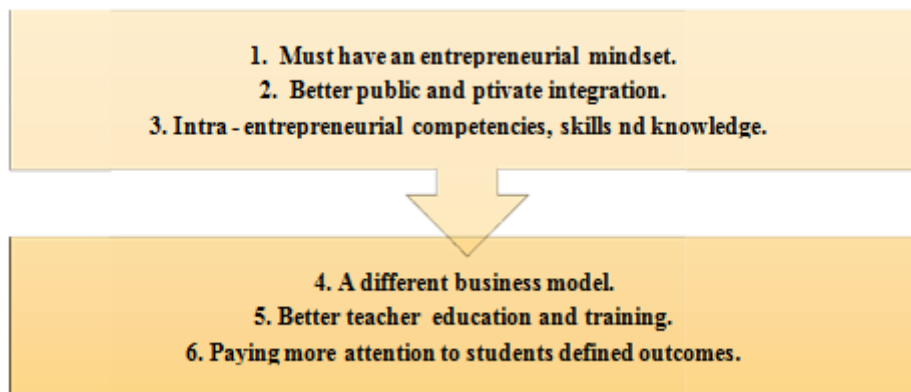
Figure4

## 5. Strategies Used By Educational Institutions



1. Comes up with customer persona.
2. Puts customer first.
3. Chooses the correct delivery option.
4. Connects audience effectively.
5. Build content marketing team.
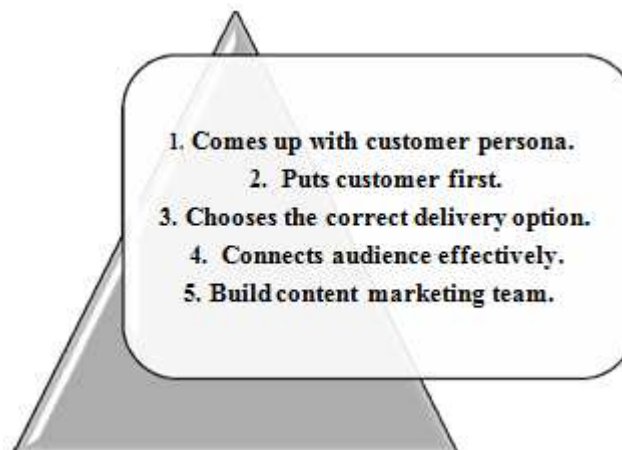
Figure 5

- **Comes up with the customer persona:** Getting to know our customers better not only helps to deliver a stellar customer experience, but it also helps to engage with them effectively. Coming up with a customer persona can help us to create content that is relevant and useful to them.
- **Create content that put customers first:** The key with educational marketing is to issue value at every stage. To do this we need research into our customers need and create content that can match them.

- **Choose the right content delivery option:** Depending upon the audience the company is targeting, we need to decide the format of option of content delivery. The most well liked types of content delivery includes:-
  Blog posts, Long form articles, Newsletters, Case studies, Press releases, Whiteboards, E-books, Videos, Templates etc.
- **Connects audience effectively:** Apart from word of mouth, traditional marketing approaches are not much liked and this calls for modern solutions that will allow you to communicate with your audience better.
- **Builds conten marketing team:** One can build their own content marketing team or hire a marketing agency we can start  building  your  own  content marketing team. While the end results may take time to show, spending time and money on content marketing and forming a content marketing team with experienced members, will allow us to expand our reach and get all the associated benefits that come with it.

## 6. Popular Examples of companies Using Edupreneurship



Figure 6

## 7. Are There Different Kinds of Edupreneurs?

Yes, there are some kinds of edupreneurship as mentioned in the fig 7. Not all edupreneurs are the same, and   number of differences can be noticed between them. So we can recognize 3 kinds of edupremeurs, based on their area of interest and what they focus on the most.
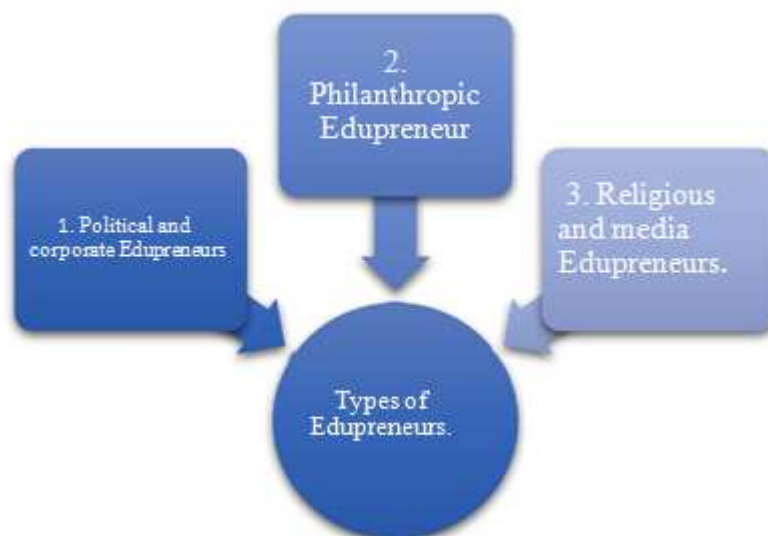


Figure 7

**8. How to Become an Edupreneur?:**

There are a couple of things everyone with a desire to get into edupreneurship needs if they want to become successful. Some of them are s follows:-
- Paying attention to students wishes and desires.
- Rewarding them appropriately.
- Minimizing unneeded bureaucracy and administration from the educational system.

**9. Is Edupreneurship the Future?**

If we're still wondering whether edupreneurship really is the way into the future or not stop doubting it already. This isn't just a way to create new learning capacities for the new generations, but also a way to transform the concepts of education and entrepreneurship for the better. It always and only focuses on a positive change in life and accentuates the things that make you think, react, and act better, for the sake of ourself and those around you. Introducing change is a slow process, so start small, and gradually move onto inspiring a larger number of people.

## V. Conclusion

Edupreneurship is altering the landscape of education and provides a new way for educators to interact. As our society leans towards digital, distance and enhanced technologies, education follows through and takes a leading role. Lifelong learning is not an advantage, rather a necessity. An entrepreneur recognizes a problem and offers a solution, and solution to this root problem is edupreneurship.

Education marketing is a branch of marketing that combines methods, strategies, and tools to analyze the market, adapt a school's services to the needs and expectations of their potential clientele, and promote their value propos.

Above mentioned are some of the uses , role of marketing in edupreneurhip , functions of edupreneurship , many companies using edupreneurship and some stragtegies used by the companies and last but not the least is types of edupreneurs and how can an individual become an edupreneur.

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# An Overview of Entrepreurnership in the Fisheries Sector in the Northeastern Region of India

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**Astract**

Northeast India is blessed with vast aquatic fishery recourses due to its unique climatic condition but it has not been able to utilize its resources rationally and efficiently for the generation of employment and revenue. Unexplored aquatic fishery resources along with the current demand for aqua products have made this region suitable for entrepreneurship development in this sector. Women entrepreneurs can play a pivotal role in development in the fisheries sector especially in ornamental fishery sector. This paper highlights several aspects of entrepreneurship and key areas for entrepreunership development in this region considering both conventional and new technological aspects. Conglomeration of new technology, management practice and creative endeavour in fisheries can help northeast India to climb the economic ladder.

**Keywords: Entrepreunership, ornamental fish, Conglomeration, Technology**

## I. Introduction

It is a popular belief among common populace that there is more economic growth if the common man is aware about Entreupreurnership. The more common man is aware about entrepreneurship, the more the development without taking into consideration about the capital involved. In fact, Entrepreneurs are the Human capital and their contribution is more in economic progress rather than the human capital involved. When there is more investment in human resources all over the world, it has brought benefits in every aspect in the form of promoting knowledge and application of science and technology in the production system training all workers technically, development of innovations, research in every fields, inculcating values, right type of attitude which leads to higher outputs. Thus by creating awareness among society, sustainable utilization of minimum resources with maximum output can take place. Entrepreneurship in fish farming sector is a neglected issue from the perspective of entrepreneurship development efforts. Government of India at present is giving importance to this sector considering the potentiality of aquaculture in achieving economic growth. North-eastern part of India has been witnessing significant growth in freshwater aquaculture in recent years. Entrepreneurial interest coupled with

support from the Government is the main reason for this development. Entrepreneurial attributes like innovativeness, achievement motivation, risk taking and leadership abilities influenced the behavioural dynamics of fish farmers. The paper focuses on various avenue of entrepreneurship development in the fisheries sector of northeast India.

1. **Foundation of entrepreurnership:** An entrepreneur is actually a person who is a dynamic agent of change. It is he who acts as a catalyst and transforms everything like human resources, physical and natural resources as a production possibility. He is he person who organizes and also is involved in the management system of a business. Again on the other hand, entrepreneurship refers to identifying innovating ideas, products and services, mobilizing resources, organizing production services and finally marketing them dealing with all the risks involved with a constant drive for excellence. "An entrepreneur is one who organizes and manages a business undertaking, assuming the risk, for the sake of profit. In other words the entrepreneur evaluates, perceived opportunities and strives to make the decisions that will enable the firm to realize sustained growth."Pickle & Abrahamson (1990)

## II. Entrepreunership Development Process

A lot of studies have been made in the previous years and scientists have come to the conclusion that entrepreneurship development process generally includes the following stages

- **Stimulatory phase:** This is actually the initial phase of entrepreneurship development.it includes such activities that stimulate entrepreneurship in a society or a community. These activities ranging from generating entrepreneurial awareness to the public recognition of entrepreneurial excellence, stimulate the emergence of entrepreneurs in the society. At this stage ,people are motivated ,they are helped to perceive incentives and are offered relevant information and skills.

- **Support phase:** At this stage activities are undertaken that help entrepreneurs in establishing and running any enterprise. Entrepreneurs are helped to move ahead in achieving his immediate goal of setting up and running their enterprise. Attention is also paid to remove hurdles in running the enterprise.

- **Sustaining phase:** At this stage efforts are focussed on helping entrepreneurs to continuously, efficiently and profitability run their enterprise. Help is provided to deal with unforeseen problems in running the enterprise.

Two major factors play a major role in the development of entrepreneurship. One of them is the development of human factor- the entrepreuner himself, another important is developing an environment where entreupreunerial activities can flourish and grow rapidly at consistent phase. The human factor refers to the attitude,desire

and motivation of an individual, his capability to perceive the environmental changes, the opportunities involved as well as his ability to solve the problems which he is likely to face.The training is effective in developing all these aspects. Training plays crucial role for all such strategeies in iniating

## III. Importance of Entreupreunership

There are several importance of entrepreneurship.

- **Creation of employment:** Entrepreneurship creates employment. It provides an entry-level job, required for gaining experience and training for unskilled persons.

- **Innovation:** It is the hub of innovation that provides new product ventures, market, technology and quality of goods, etc., and increases the standard of living of people.

- **Impact on society and community development:** A society becomes greater if the employment base is large and diversified. It brings about changes in society and promotes facilities like higher expenditure on education, better sanitation, fewer slums, a higher level of homeownership. Therefore, entrepreneurship assists the organisation towards a more stable and high quality of community life.

- **Increase standard of living:** Entrepreneurship helps to improve the standard of living of a person by increasing the income. The standard of living means, increase in the consumption of various goods and services by a household for a particular period.

- **Supports research and development:** New products and services need to be researched and tested before launching in the market. Therefore, an entrepreneur also dispenses finance for research and development with research institutions and universities. This promotes research, general construction, and development in the economy.

1. **Training in entrepreunership:** Training in entrepreneurship provides an opportunity to entrepreneurs to acquire a new identity about himself/ herself. This may be thought of as an approach towards transforming people which serves the purpose of making people aware about their own identity, helping them accept the new identity for entrepreneurial task. In order to take such task of transformation, we can find entreupreunership training, serving the purpose of stimulation, orientation, preparation, implementation, support and sustaining the entrepreneurial activities sequentially.Training merely should not be taken in a broader perspective and not in a restricted sense of giving information in a particular subject. Training should be target oriented, location specific and product and process

## IV. Entrepreunership in Fisheries Sector of Northeastern Region Scope and Constraints

North-eastern region of India with its vast untapped fishery resources and with a good literacy rate offers immense scope for entrepreneurship development particularly in the ornamental fish culture and trade. The region harbours 189 fish species having ornamental value. Since 65% of the unemployed population is below 35 years of age, there is large potential for transformation of ornamental fish trade into a major industry in the region.Entrepreunership can be developed among unemployed youths in rearing, breeding and culture of aquarium fishes. Besides ample scope for entrepreneurship development exists in fish seed production in hatchery and selling for stocking in culture ponds or reservoir, fish feed formulation and integrated fish farming enterprises.

However, this vast potential for promoting entrepreneurship is at present cannot be utilized because of some reasons like

1. Lack of awareness among the villagers/tribal /educated youths about the opportunities available in the fisheries sector
2. Propagation and culture of ornamental fishes has not been able to take off because of the absence of a breeding technology and package practices for important species and also non-availability of standardized procedures or technology for the most popular ornamental fishes
3. Weak fishery extension system and inadequate efforts by concerned stakeholders to promote entrepreneurship in fisheries

## V. Entrepreunership in the Fishery Sector

Fishery is a thriving industry in the northeastern region. Other sections of the state receive a   large supply of fisheries. This business is suited to the environment and demographic factors. There are several rivulets in the region, and practically every villager has a pond in their garden. As a result, anybody may contribute to this industry by beginning their own fisheries. They may further improve their economic possibilities by selling dried and roasted fish, which is in high demand in neighbouring states such as Manipur and Arunachal Pradesh

## VI. Ornamental Fishery

Ornamental fish sector is one of the promising sector to create employment and revenues in minimal space and investment. India is endowed with vast ornamental resources ranging from several fish and plant species to variety of accessories suitable for ornamental fish industry. The Indian potential in ornamental industry is estimated to be around 30 billion USD. Ornamental fishery provides the opportunity to setup small sca le to export oriented large setups. Separate business facilities can be setup for ornamental fishes, aquarium, accessories, feed, etc. Moreover, servicing of large

aquarium tanks as well as household aquarium may also provide several employment opportunities.

The northeastern region of India is well known for rich area of wild ornamental fish species. So far 266 species belonging to 114 genera under 38 families and 10 orders have been recorded from here. (Sen, 2000).This is approximately 33% of the 806 native freshwater fishes of India. However, Sufficient studies have not been done on culture, food and feeding habits, biology and conservation status of some of the potential ornamental fish species with the possible exception of Bleher (1988) .

Assam harbors 189 fish species having ornamental value (CAMP, 1988). Since there are a lot of unemployed youths in the region, there is huge potential for transformation of the ornamental fish trade into a major industry in the region. Unemployed youths can be encouraged in promoting rearing, breeding and culture of aquarium fishes. There is also ample scope in fish seed production in hatchery and selling them for stocking in culture ponds or reservoir. They can also be encouraged in feed formulation and fish farming enterprises. Entrepreneurship in fisheries sector is still infant due to lack of awareness among rural population about vast avenues present in this sector. Many of the breeding technologies and package practices for important species are yet to be known or standardized. The extension system in fisheries is still in the formative stage and efforts are still inadequate by concerned agencies to promote entrepreneurship in fisheries. Entrepreneurs in ornamental fish trade urgently need to shift focus from part-time household income generation to full-time commercial primary employment generation.   Substantial input in ornamental fish culture by different agencies like NEDFi , NABARD, Lead Banks will encourage the entrepreneurs Ornamental fish keeping was a hobby but has gradually become a commodity of international trade. Now it has grown as a multimillion-dollar industry (Das and Biswas, 2016). The economic activities of ornamental fish culture involve a complete chain of stakeholders i.e. fish collectors from natural water bodies,local traders, exporters, manufacturers of the aquarium, fish breeders, ornamental fish farmers, vendors, etc. (Swain et al., 2008). The collection entirely depends on wild catch. Entrepreneurship development through sustainable collection and selling of native ornamental fish as well as the rearing of exotic fish species is a feasible way of generating revenue (Mandal et al., 2007). The ornamental fish production in the NE region has been seen to be financially as well as economically viable and incentives provided by governmental agencies such as NFDB to establish ornamental fish production units can help interested entrepreneurs to exploit this opportunity. Apart from breeding of ornamental fishes, other business options are associated with this industry such as aquarium fabrication, selling of aquarium accessories and fish specimens. With the increase in income and urbanization, the habit of keeping ornamental fishes has been increasing at the rapid pace and demand of personals having the art of aquarium fabrication and local suppliers of accessories is also increasing considerably

# VII.  Value Added & Imitation Products

There are some industrial setup carrying out value addition to the fishery products and producing ready to eat fish products. Such value added products are finding its demand in the market of the northeastern region. Moreover, many imitation fish products are prepared from low cost fish products. Development in the value added and imitation fish product industry will also give rise to substantial jobs and employments and hence enhance entrepreunership development.

1. **Fish feed:** Intensification and diversification of aquaculture systems has paved ways for development and flourishing of fish feed industry. Fish feed industry is still in infant stage in northeastern states with huge prospective owing to country's vast resources and potential for aquaculture. There is huge demand for feed in aquaculture sector for different culture fish species. Feed is served to fishery sector in wide variety ranging from simple agro-residues to complexly enhanced and nutritiously balanced diets. The development and manufacture of feed will produce huge number of employment and revenue opportunities

2. **Medicenes<chemicals & probiotics:** Development, diversification and improvement in aquaculture, ornamental and other fishery sector will increase the demand for different medicines, chemicals and probiotics. This increased demand will generate many employment and revenue opportunities in the northeastern states.

3. **Net fabrication:** Fishing nets are integral part in almost all fishery activities such as culture and capture of shellfishes, finfishes as well as other aquatic organisms. Nets or fishing gears are evolved from being simple pointed wooden projectile to advanced and complex nets over past centuries. The fabrication and manufacture of these nets and gear is carried out by small artisan to large scale industrial ventures. There is continuous demand for different types, shapes and amount of nets and gears used in fishery activities. Many of the Indian net fabricating industry are exporting quality of fishing nets, traps, cages and other fishing gears to majority of the countries of the world. Some of the industry have gained expertise in design and manufacture of culture cages and other units which has huge worldwide demand. This sector has potential of huge employment and revenues. Fishermen community living around the fringe areas of Deepor Beel,a Ramsar wetland site in Assam are reported to be making nets by themselves with parts purchased from Hajo, a small town located about 45 Km from Guwahati.In this way the fishermen are self-made small scale entrepreneurs.

4. **Craft fabrication:** Fishing boats and crafts are essential mainly in capture fishery. There is huge demand for different types of fishing crafts ranging from simple dugout canoe to large industrial fishing ships. The fabrication, construction and maintenance of fishing crafts provides huge employments to fishermen of the northeastern region. Some of the fishing ships requires hundreds of workers for its

regular operations. Moreover, regular maintenance, repair, navigation, harbouring, etc, generates substantial employment opportunities.

5. **Dry fish marketing:** Assembling and marketing are the most important processes in the dry fish value chain in the Northeast. The marketing involves a range of activities like supply of packaging material to the processors, procurement and storage of processed products, and transportation to distant markets. In some cases, traders finance the small-scale dry fish processors for procurement of raw fish, hiring of labour, transportation, etc. The traders are well informed about the demand and prices of dry fishes in different wholesale markets of distant places. They also provide links between processors and wholesalers and disseminate information on the required quantity and quality of processed products in different markets and about the prevailing prices for different types of processed fishes. In this way Entrepreneurship develops in NE region.

6. **Allied sectors:** Growth and development of fishery will attribute the employment and entrepreneurship opportunities in many allied sectors such as transportation, cold chain, freezing, navigation, packaging, pharmaceuticals, leather, jewellery,etc. Fishery sector needs to focus on areas which will improve fish production as well as the economic condition of fishermen Sustainable and judicious utilization of fishery resources and their conservation. Optimizing production through modern technologies

## VIII. Avenues of Entrepreunership in Northeast

1. **Recirculatory Aquaculture System (RAS):** In recent years, the RAS system is becoming popular among the aquaculturist due to several advantages. It allows a high degree of environmental control thus possible to get year-round production of fish (Masser, 1999). Most importantly it can be installed near the proximity to the target market. RAS also provide opportunities to improve waste management and nutrient recycling (Martins, 2010). The use of antibiotics or chemicals to combat disease can be avoided through the RAS system. Production of a few species such as Tilapia, Pangasius and Clarias gariepinus has been a massive success in RAS system. This closed aquaculture system along with the allied counter parts presents a new and expanding opportunity in entrepreunership development and it can be efficiently utilized by the hill states of northeast India for their uninterrupted fish supply.

2. **Biofloc system:** Biofloc technology (BFT) is recognized as a sustainable and eco-friendly method of aquaculture that maintains water quality, along with the generation of microbial proteinaceous feed for aquatic organisms such as fish (Ahmad et al., 2017). The name of this technology came from the fact that when microbial communities such as phytoplankton, bacteria, and living and dead particulate organic matter aggregate in water they form a biofloc by the principle of flocculation (Avnimelech, 2006).It has many advantages over traditional aquaculture practice, it has also certain constraint and improvisation is still needed

to get more sophistication in this method. Nevertheless, there is a huge potentiality of this technique as it is an alternative for intensification (Crab et al., 2007). Entrepreuners have already started handling this technology and there is more scope in the coming years.

- **Aquaponics:** Aquaponics is an integrated system that links hydroponics with recirculating aquaculture (Tyson et al., 2011). It fulfils the criterion for being a sustainable agricultural practice of producing crops. In this novel system, both crop and fish production is possible and minimized the water usage and waste released to the environment (Diver et al., 2010). Moreover, bio-security is a key feature of this system because without the application of chemicals, drug, and antibiotics it can be operated. Expanding interest has been seen in aquaponics as a form of aquaculture that can be used to produce food closer to urban centers (Love et al., 2015). This system also need entrepreneurs to take up this system for intensifying fish production along with crops.

3. **Cage culture:** It is considered suitable to operate in a wide range of open freshwater ecosystems where fry are raised to fingerling in cages and fingerling to table size while maintaining the free exchange of water with the surrounding water body (Das et al., 2009). From an economical point of view, it is a low impact farming practice with high return and least carbon emission activity (Rao et al., 2013). It is feasible because of its simple technology and local construction material such as bamboo can be utilized with minimal cost which is particularly helpful in operation in remote areas. Empty polyvinylchloride (PVC)/Metallic drums (200-250 l) as float, 13 m long bamboos, nut, and bolts can be used for constructing the frame of cages. Marginal areas of the beels can be enclosed as pens using split bamboo screens/netting while in deeper areas net cage of various sizes and shapes can be suspended from floating platforms like bamboo/plastic/wooden (Bhattacharjya, 2004). Reservoirs that were constructed for the generation of hydro-electric power have been considered as a potential area for fish production using cage culture methods (Paul, 2017). In this context, northeast India holding so many dam reservoirs can be turned into a fish production hub. This area in fish culture hold good prospects of entrepreneurship like preparation of cages as well as the fish culture involved.

## IX. Women Entrepreunership in the Fishery Sector

Women have been identified as potential employees in the ornamental fishery sector in many countries (Lee, 2005; Jayashankar 1998 and Bertram 1996). Many women in India, particularly in rural regions, have taken up ornamental fish farming or breeding as a profession (Sahoo et al. 2011). Women are encouraged to explore ornamental fish farming because it requires only a few simple techniques and minimal investment. A backyard pond or a small place to set up some fish tanks can empower women in carrying out the operations while balancing household responsibilities and useful roles in society. Ornamental fish have a higher unit value than food fish. As a consequence, this sector provides an incredible opportunity for both rural and urban

.Backyard technologies are usually provided to women fishers. Women's participation in aquaculture extension and training programs has not been prioritized (Acharya and Benneth, 1982). Women can also manage integrated farms such as floricum-cum-fish culture, duck-cum-fish culture, poultry-cum-fish culture, and so on, according to several case studies. Household ornamental fish culture involves relatively little room, talent, or time, and can improve the household's financial status. Rural women's empowerment can be significantly improved by enhancing their employment in income-generating activities such as aquaculture. Women recipients of the women empowerment program are given the necessary training and supplies for raising fish seed to produce fingerlings in backyard ponds as a part-time job to supplement their families' income. Women as entrepreneurs can make a significant contribution to the nation's gross product. They aid in the creation of job opportunities for those women who are in need. They can impart in their children and other women a sense of financial independence. Overall, it raises the standard of living of women's groups, leading to increased self-esteem. Women are well-suited to this ornapreurial path because of their intrinsic patience, but only if they are properly trained. Significant work is required to unlock the existing and latent ornapreneurial empowerment of people in this sector.

## X.  Potentialities of Entrepreneurship in the Northeast

Aquatic resources of northeast India have the potentiality to boost its economy through entrepreneurial activity. Although, there is a range of scope for developing businesses but it has not been realized yet. Rich biodiversity, rolling hills, and its streams, numerous wetlands make this region an ideal spot for ecotourism and recreational fisheries development (Baruah, 2018). Due to the abundance of sport fish species, this region can be developed as a paradise for sport fisheries and hence encourage entrepreneurs and generate income Additionally, river rafting in the fast-flowing stream can be considered as a novel way of developing entrepreneurship. Moreover, the beels have the potential to generate extra revenue by the culture of highly valued air-breathing fishes. The employment of strategic management practice is required for its successful and sustainable operation. The ornamental fish industry is growing all around the globe and northeast India can be a major contributor to this sector. Breeding of indigenous ornamental fish species will enable this northeastern region to become more compatible in this area as the current practice of natural harvest is not sustainable. Recent increasing trends in the domestic market offer an opportunity for the personals to engage in aquarium fabrication and selling of aquarium accessories. Entrepreneurship through marketing of these ornamental fish has immense potentiality considering the demand for this commodity, especially in the developed countries. Apart from the ornamental fish,  food fishes have  also  high demand in northeast India. Moreover, a huge sum of money flows outward from this region solely to fulfill its demand for food fishes. In this context, a dramatic improvement is required in the aquaculture sector as it has the potential to counter the present scenario of fish import from other states (Business Standard, 2018). Along with the current practice of land-based aquaculture, the adoption of new technologies in the aquaculture sector can improve regional fish production. New and evolving

aquaculture technologies like recirculating aquaculture system, biofloc, aquaponics, and cage culture have lots of favorable features which can enable the producer to operate it in a more customized way. Although, the initial investment is a factor that prevents farmers from using these technologies in the long run it is believed to be more viable and economically feasible.

# XI. Conclusion

There are several options available for the improvement of fisheries sector of northeast India and it's up to the people to develop an entrepreneurial spirit to boost its economy through the sustainable utilization of the aquatic resources. Conglomeration of new technology, management practice, and creative endeavor in fisheries can help northeast India to climb the economic ladder.

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# Innovation in Edupreneurship in the Indian Context

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## Abstract

Every year, tens of millions of students graduate from high school, college, and university. However, not all students are able to make a living in accordance with the criteria of their degrees they have earned. They blame their instructors, colleges, and the entire education system for their condition. It's in this section that the root causes of these youngster's struggles are uncovered. In their own words, students complain that many educational institutions take their money without preparing them for the workforce. On top of that, many students find out midway through the course that they lack the prerequisite abilities to get the most out of the merged course they entered. Some new concepts for edupreneurship in the Indian context have been presented in this paper by the writers. There are five stages to the educational process, according to the writers. Innovative suggestions have been made at each stage, depending on the level of the course.

**Keywords:** Innovation, Edupreneurs, Methods of Evaluation, Edupreneurship

## I. Introduction

Entrepreneurship in the educational field is referred to as edupreneurship. Entrepreneurship is defined as the ability to create something new, to build something different, with the goal of enhancing one's own well-being and contributing to the well-being of society as a whole. The author's description of entrepreneurial spirit's abilities is as follows: producing something new and unusual, with the goal of promoting individual well-being and adding value to society, as a commitment Entrepreneurial spirit may be regarded as a person's capacity to think beyond the box. An educational institution's ability to produce students capable of making the most of a given course is at danger if that institution and the course itself are unable to attract the right pupils. Education in our country may appear to be at an all-time high. Even if we do a thorough investigation, we will find that there are still many areas of education where we can do better. The majority of people's educational journeys begin

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in elementary school (although there are some scanty institutions which educates people even in lack of school education). Those who struggled with topics in school would almost certainly have the same problems in college.

There is a wide range of grasping ability among kids. A single method of teaching isn't going to be enough for all students to grasp all of the material. Most students, instructors, and administrators are unaware of this truth. Students who are just beginning their college careers believe they have a firm grasp of the fundamental principles they learned in elementary school and are confident in their ability to put those concepts into practise. Only after passing the first test (or midway through the course) do students understand their inability to utilise the course's resources to its fullest potential. Nevertheless, because they enrolled in that specific course with the expectation of a brighter future and the investment of money, they finish it in various shortcut ways without fully understanding that course.

A student's life carries on even if he or she cannot find a job that pays a living wage. Many educational institutions seek out these less qualified students, promising them a great future (which seldom occurs), and extorting a substantial sum of money from them in return. Accordingly, it is time for kids (and their families and instructors) to be made aware of their own grasping abilities in more depth. Students who are underdeveloped not only jeopardise their own futures, but that of the entire nation as well (as many students may try to follow them). Only a small number of studies have attempted to focus on this topic. Edupreneurship is more than just making money off of education. Pupils (professionals) who can stand on their own two feet, but also have a comprehensive knowledge of all the studied ideas, are the result of new approaches used to generate better students (professionals). In addition to this, pupils will be able to better evaluate their own performance.

We have attempted to come up with some new ideas for how educational institutions might better prepare their pupils in this article. Afterwards, there are four sections to the paper itself. The following section focuses on those studies in which edupreneurship has had a role. Classifying educational institutions based on the sort of education they offer and recommending measures to improve students' learning experiences are the main points of this section. Following the creative steps outlined in part three, this section examines their effects. The research paper's fifth section finishes with a discussion of the paper's potential future directions.

We have compiled a list of relevant studies from across the world on the topic of edupreneurship. For a fundamental shift in educational practises, Leonard J Waks focused on a concept he coined: "reconceptualization." At the institutional level, rather than at the organisational level, he thinks that genuine educational transformation takes place. A conceptual argument has been used by him in an attempt to show this.

Furthermore, author Chaitra Ramanathan in her research has proposed a new approach to Indian education that connects it to the reality of students and academic

subjects. She points out that kids are weak in self-awareness and self-identity. Problems in India's education system are exacerbated by a population split between urban and rural areas and by class and caste disparities. Finally, she used Freirean pedagogy to examine the educational system's dependence on textbook culture in India. Fariborz Rahimnia, the author of a study on strategy implementation in Iranian higher education, attempted to build a framework for analysing the impact of strategy implementation. He conducted semi-structured interviews with university administrators and top academics. Planned outcomes, organisational, human, managerial and environmental elements were identified to be the most significant influencers and categorised.

The framework presented in the study provides a thorough breakdown of the components that have an influence. For the purpose of their study, the writers K.K.George and Parvathy Sunaina sought to identify the factors influencing educational reforms in Kerala. It also looked at Kerala's educational budget as a separate topic. They found that despite the state's high GDP, the state's education budget was extremely low. Unaided self-financing institutions, notably in the field of professional education, took advantage of this scenario. An educational system that was heavily funded by the state would have a negative impact on the state's development and social and economic well-being. Roelofs Henk, Samplonius Raut, and Shilpa proposed an edupreneurial educational technique in their study paper, which provided risk and value-added experience in a pull system for learning entrepreneurialism. For experiential learning, the authors employed an entrepreneurship-themed Lego game as a means of promoting entrepreneurial behaviour in an edupreneurship-friendly atmosphere.

Research conducted by Ibrahim Ahmad Bajunid shows that the growth of the middle class, as well as professions and professional leadership, is critical to Malaysia's national development. There are more than 4,00,000 persons working in Malaysia's educational system according to the study. According to the study, teaching professionals are capable and eager leaders in their own right, but they also have the potential to serve as role models for others.

## II. Edupreneurship Innovation

Based on the sort of instruction they deliver to pupils, we've divided educational institutions into five categories. Primary, high school, college, research, and vocational training facilities are all included. It is in primary school that children discover the fundamentals of learning. Kindergarten through the seventh grade are included in this programme. Students in high school are said to be acquiring the foundational skills they'll need to succeed in college. This type of school also helps students determine their broad areas of interest. The eighth through twelfth grades are considered to be in the "high school" category.

In the United States, a college education is defined as a course of study that a student may use to build a successful profession. College education consists of

graduate and post-graduate studies. In order to contribute to the advancement of knowledge in society, a research institution is a location where students and professionals may work together to do research in their chosen fields of study or expertise. Vocational training centres are places where students can enrol in classes to learn the skills necessary to work in a certain industry.

Primary school students should be divided into groups based on their level of comprehension.

Students' comprehension should be assessed using an appropriate evaluation procedure. Counselling with parents should place more emphasis on conceptual learning than rote memorization.

In order to be promoted, a student must have thoroughly grasped the contents of the class. Otherwise, he will be forced to take the same subject again. Students' comprehension level should guide the selection of extracurricular activities. High school students, who are in their teenage years, should be mentored on a regular basis by their teachers. Low-understanding pupils' issues should be addressed on a case-by-case basis. A student's development or decline in progress should be communicated to him or her on a one-to-one basis. All pupils should be required to participate in activities that are beneficial to their health in every way. The capacity to understand rather than just memorise should be cultivated in students. Prior to admitting students, there should be an eligibility (or entrance) exam that tells them exactly what courses they are qualified to take. Classes should be differentiated according to students' proficiency levels, taking into account any potential language barriers. Depending on their skill level, students should be made aware of all of the possibilities accessible to them individually. Students should only be granted degrees if their performance levels are sufficient; otherwise, they should not be. Those students who fail should not be charged fees for the current academic year (repeating session).

Research Institutions are taking new and creative measures. Students should only be allowed to apply to these schools based on their level of interest. Prior to being accepted, applicants should be made aware of all of their duties and obligations. Each student should be monitored to ensure that he or she is making steady progress on their assignments. Felicitation should be given to those ideas that can be implemented and are truly original. It is never acceptable to award a degree to an ineligible candidate. Vocational training schools are taking new and innovative approaches. Students should be educated on the existing and future state of the field before enrolling. Efforts should be made to ensure that only qualified individuals are admitted. Students should be informed on a regular basis on how well they're doing academically and otherwise. Students should be briefed about the field's opportunities and risks. The diplomas should only be awarded to students who have successfully completed the requisite number of sessions and tests (or degrees).

While obtaining the character is quick, patience is required in order for academic habits to become the norm and eventually a requirement. The goal of

assessing pupil's entrepreneurial abilities is to help them acquire new skills. The ability to assist in maintaining the national identity convergence and technique should be mixed together. Differences in indicators have been found using a model and a t-test. Therapy for character education and those students' entrepreneurial abilities are not the case. Creative thinking and reacting are the two indicators that are the least reliable. 60% of the world's most pressing issues may be categorised into these new categories. Because of this, it must be enhanced additional investigation into edupreneurship models that are typified by educational resources that are tailored to the needs of the student's advancements in technology.

## III. Method

Design study using a mix of philosophical and empirical assumptions is known as "mixed methods research." In addition to being a technique that uses a combination of quantitative and qualitative ways to gather and analyse data, Mived Methods Research also goes by the name of a philosophically-based philosophical assumption. The goal of mixed method research is to overcome the drawbacks of both quantitative and qualitative methods of inquiry.

The ability to communicate effectively with others about how someone else can develop or generate something of economic value values the well-being of people and society as a whole. Learning that isn't just concerned with improving one's grades, but also consideration is given to one's soft talents. Seventy-seven percent of the pupils in the experimental class are self-starters. Talents in either area or a control class of 64% This is a significant difference in terms of percentage, since experimental students are more engaged in educational activities than students in other classes thorough studies of local specialised food stores and simple product design.

To hone their skills student autonomy in learning via systematic application of entrepreneurial concepts designed. Teaching resources based on local potential provide students greater opportunities for creative thinking and thoughts on how to create something new, helpful, and profitable for the benefit of society. Next, each indication of student entrepreneurialism is discussed (Sunarsi, 2019).

Intention is the source of willpower, and a clear goal along with a focused mind leads to a determined action. When starting a business, you must be able to handle any and all risks. There is no use in trying if you don't put forth any effort. As a result, everything of one's heart and soul must be put into action in order to achieve their goals. Willpower + Strength; you will become a stronger person if you put in the effort. To keep a stiff upper lip in this context signifies a refusal to acknowledge one's own guilt. Because you will experience a level of guilt in business that you have never experienced before. As a result, a powerful individual you will become an outstanding person and deserve to be a successful person if you have a hard face entrepreneur. Difficulties, obstacles, challenges, and issues are widespread in the business sector. By mental and personal traits, as well as an unwavering will to achieve, are necessary to be an entrepreneur. Everything went off without a hitch.

# IV. Qualities

This tenacity of purpose is cited by a number of great business people as one of the entrepreneurs that wish to succeed must have the following qualities:

1. **Confidence:** Running a business requires a strong belief in one's own talents. An entrepreneur with the character to succeed will be better able to handle your doubts and anxieties in operating a firm if you trust in your own abilities because of high levels of self-confidence. Belief in one's own abilities or self-confidence are two examples of this concept. A person's life and how he or she sees oneself as such can be a source of insight into the individual's self-concept. Recognise the positive aspects of other people as well as their flaws and flaws of their own. Belief in one's own skills is an important criterion for judging an individual's self-confidence (Ayus Ahmad Yusuf, 2016). The belief in oneself against all occurrences that pertain to one's particular capacities to be confident is the phenomena that happens, analyse and overcome it, can act in making judgments decisions are made on their own, without the input of others (Sunarsi, 2016).

2. **Honesty and responsibility:** In order to be an entrepreneur, one must have the courage to take a risk by mobilising all of one's resources and efforts and the ability to generate more valuable goods or services. A self-confident entrepreneur who has the personality to succeed has honesty and integrity always a part of his business. Many people are interested in starting their own businesses. In order to be able to compete and make the most profit, many of our rivals are working hard. For the sake of full disclosure, then is a critical attitude to adopt in order to build and maintain public trust and confidence in our company.

   When conducted with an honest mindset, company can flourish (Bagautdinova et al., 2013; (Victoria & Elena, 2013) Victoria and Elena. It's important to be honest with ourselves and others if our company product is experiencing product failure. The quality of our products is a concern for customers. That's how we'll be judged by our customers. If we don't tell the truth, we won't be able to do good business and our business will suffer. We'll lose money if customers stop buying our stuff. Those that run companies progress is made by people who are constantly upbeat and who do their business with integrity at all times. It is because; the nature of honesty and trustworthiness of an entrepreneur's business is one of the keys to its success towards him from the public. In business, honesty is essential, and you should never compromise on it. Once you're discovered lying, it's not just one person who knows. The internet and social media have taken over our lives. Regardless of quality, all information immediately circulated over the globe. Anything you say or do can be shared around by others and your company, too. Make sure your reputation is well-known in the neighbourhood as a result of this effort.. Don't allow yourself to be swayed by the negativity that surrounds you. A bad name has been disseminated and damaged by those who spread it. Ethics in entrepreneurship is something that entrepreneurs, as well as their customers, must pay close attention to. The

importance of honesty to a company's bottom line is directly linked to its ethical practises. The success of entrepreneurs is to ensure that the current social standards are adhered and the ethics is designed to ensure the customer and the employer both feel appreciated. Entreprenuer's ability to get along thanks to a shared sense of ethics. Establishment can be done. As a result, entrepreneurial ethics need rules and regulations. It is important to be honest in all aspects of one's life. Consequently, if someone regards himself as a social being, he is thus a member of society. It must develop the characteristic traits necessary to live up to one's moral and ethical obligations. A lot of students start a business while they're still in school in order to get their own hands on some money and experience. Entrepreneurial potential, but ethics are still a mystery to them. Because, there are still competitors in its field. There are a plethora of variations. When it comes to becoming an entrepreneur, honesty is the key. As a result, customers will have more faith in the products and services that businesses supply. Honesty encompasses a wide range of behavior-related areas of life. as well as our deeds and our actions of the individual. Due to the fact that a company's ability to grow and gain customer confidence depends on its level of honesty and other commercial partners.

3. **Endurance:** Never give up on your ability to be resilient, tough, strong, and not easily disheartened. Commitment is a mindset that persists through setbacks in pursuit of a goal. Hurdles, hurdles, and more hurdles. Invigorated, unfazed by adversity, and determined to succeed. An entrepreneurial ambition means that the entrepreneur has great hopes for his company endeavours. Have a high probability of success in the management of business activities/business handling all challenges and obstacles in enterprise. It is essential for entrepreneurs to be self-aware. Those that are aspirational in their commercial pursuits have a strong desire to advance. Zulihar and Ismail, 2015 (Kolvereid & mo, 2019). The ability to think creatively about and manage a firm, from its inception to its eventual demise, is essential and it is alone impossible to run a successful company. Additionally, a business owner must come up with new and interesting products and services to attract customers. Consumer items allow them to stay abreast of the latest fashions and demands in their market. It is, in fact, possible. To produce a product that is a market leader in terms of innovation and creativity. Moreover, tenacity is the ability to successfully manage one's business relies heavily on self-confidence and a sense of accountability. However, prior to that, an entrepreneur must have at least one thing that may be used to determine the commencement of a new firm. The success of an entrepreneur lies in their self-belief. This is something that entrepreneurs frequently overlook. In reality, a major issue in entrepreneurship is a lack of confidence, particularly among new and inexperienced business owners in their early stages of business.

4. **Tenacity and Persistence:** Decide what you want to do and stick with it, even when it's not clear what you're trying to do. Self-affirmation motives determine a person's inflexible persistence in achieving a goal. In contrast to persistence, which is inextricably linked to students' hopes and dreams, insistently suggests that

you're. If you accidentally made a decision or someone else made a decision for the students, follow through with it. Perseverance and stubbornness, on the other hand, leads to a dead-end from pointless action, which discourages growth. Being stubborn may lead to a person losing touch with reality, which can have negative consequences. Consistency helps preserve good dynamics and relationships in the face of inertia paralysis. Learning is one of the most difficult scourges to overcome. This can happen for a variety of reasons. This is in part due to the fact that education is tedious and the material being studied does not hold one's interest. In the minds of some, schoolwork has no bearing on the kind of work you'll be doing later in life. It's inevitable that these destructive tendencies will if the individual is not able to encourage themselves to study, it will undoubtedly have a bad influence. The self-doubt is the biggest obstacle to progress. Consequently, it is necessary to employ a few strategies to keep oneself motivated to study and be given a shot at a brighter future. A new generation of professionals must have a better understanding of the current business climate than their predecessors. Individual sustainability competencies must be examined before the beliefs and responsiveness can be considered. In the improvement of one's entrepreneurial skills. Students are well-prepared to deal with the effects of globalization. Economic competition will fail and decline if the nation's golden rule is broken. Young people today aren't well-versed in starting their own businesses. Portillo Navarro & Millán Jiménez (2016; Portillo Navarro & Millán Jiménez, 2019)

5. **Possibilistic and Innovative:** Students should be encouraged to develop an entrepreneurial mindset because of the low score on this Indicator 60 percent. There are several stages of achievement. First, the transformation of mindset to something positive and the attitudes and motives to change for the better. This is the main asset of a change in a better life. Second, the transformation of ways of thinking from merely relying on logic to creative and innovative thoughts; sometimes even having to think in unusual ways. Third, Action; when the mindset has changed and the way of thinking has been fixed, the next step is to act which is to show the skills to look for opportunities in pouring creativity and innovation. Most entrepreneurial experts agree that entrepreneurial competencies in the form of the ability to think creatively and act innovatively become the main estuary of entrepreneurship education (Mulyani, 2014). then work networking creative is needed as a way to find success with many partners building relationships for mutual cooperation and greater business development (Mayer-Haug, Read, Brinckmann, Dew, & Grichnik, 2013).

6. **Future oriented:** Create a character is the process of making a person's habits or mindset Perfectly produced, interesting, and different can be distinguished from other people. The importance of character in entrepreneurship is character must become the foundation for intelligence and knowledge (brain and learning) of an entrepreneur. Relationship of significant social behaviour on objects, groups, events, or a symbol. Three components of mutual support, namely: a cognitive component is a representation of what is agreed by the individual owner of the

attitude, the affective component is a feeling that involves emotional aspects, and conative components is an aspect that is in line with the behaviour that is held by someone(Maulida et al., 2016). A person who is willing to put himself at danger for the sake of arbitration or want to sell anything in another market, need to acquire it there at the same predetermined price (arbitration). For an unknown fee, either now or in the future. It seems as if everyone has an opinion on an explanation of the entrepreneurial process. Personal or soul tendencies of a person are referred to as an entrepreneurial mentality. Or an individual that has an effect on their actions or behaviour, worth, or prospects. There are two ways in which you might be an entrepreneur: as a business owner, or as someone who wants to be an entrepreneur in the future. The public's perception of entrepreneurship has evolved through time to include a more upscale appearance and fashionable. Today's entrepreneur doesn't wear a suit and a tie and isn't bound by rules. However, it's more liberated and edgy. This is a very remarkable development that entrepreneurship is becoming more accessible to a greater range of people. There has been a full-time job since 2008. Vacancies in the workplace are becoming increasingly rare and hard to come by. As a result, the phrase "gig economy" was coined. Temporary and part-time employees are often referred to as "temps" in this context. Because of technological advancements, anyone who wants to be successful in the "Fourth Industrial Revolution" should pursue a career in entrepreneurship. It's possible that businesses throughout the world may no longer be constrained by national borders in the near future. Their freelancers, who are located all over the world, may be used to help them run their firm over the globe. The definition of entrepreneurship has shifted considerably in the last few years. As entrepreneurs, we must always be on top of our game keeping up with the (global) trends without sacrificing enduring principles like ethics. There must be a strong foundation for entrepreneurship to thrive. In addition to being motivated by cutting-edge technology and high-quality products, one must also have steadfast business goals and a having a solid grasp of the economics necessary to succeed as an entrepreneur.

7. **The national character of edupreneurship:** Graduates from tertiary institutions have a poor level of competence and competitiveness, which reduces their ability to be accepted by employers. The field is also rather small. The upshot is that a large number of qualified but unemployed individuals across the country are having a tough time finding jobs. When it comes to establishing mental entrepreneurship in pupils who have been indoctrinated, there is a critical need." Entrepreneurship in education is also referred to as "edupreneurship," and it aims to integrate entrepreneurial ideas and mindsets into the curriculum. The educational world. Education is generally viewed as a process of self-improvement and entrepreneurship that is intertwined which in French refers to adventurers, risk- takers, and businesspeople. "Entrepreneurs are more than just a one-man band." Entrepreneurs since they must be able to add value and provide something new taking advantage of possibilities by being creative and innovative in the face of adversity". As a goal-oriented learner, the goal is to instil a sense of trust in others. In order to ensure that the final product is satisfactory, tasks are done

correctly and efficiently and are well-liked and respected, and can be trusted to deliver accurate results and evaluations. Risk-taker and challenge-taker with a leadership attitude are also entrepreneurial characteristics. It's critical to have a positive mental attitude and to lead by example. A good communicator, able to organise, manage, and analyse well, and someone who enjoys advising and helping others criticism that can be improved upon. Because this character encourages pupils to think about the future, they will be more likely to succeed in the long run. A person with a clear sense of direction for the future helps in the development of a student's mind and spirit of entrepreneurs in the sector of education to attain success. He continued, "Edupreneurship is not meant to be a substitute for entrepreneurship." Students should not be viewed as entrepreneurs, but rather as edupreneurs in education. Entrepreneurial ideals may be absorbed if they are recognised and understood. Keeping students engaged in the classroom learning process is essential for their long-term success. Educators help students learn by facilitating the process so that they may do so effortlessly and at their own pace. Each potential may be developed to its fullest extent at the same time, and class is one of the areas where this occurs. There's no doubt that learning must be carefully managed such that its existence serves as a supportive component in achieving success. It helps in attainment of learning goals, particularly competence and the assimilation of moral values pupils. As previously indicated, character education serves primarily as a means of assessing students' academic progress and pupils are able to put their ideals into action via character education absorb the values that are the foundation of character. Students that have excellent values instilled in them are what they are, and good values cannot be changed. Notwithstanding their rarity, they may be found throughout many different spheres of value moral, social, and religious. Character education is built on these ideals. Because of the difficulties of restricting the scope, it must be covered in diverse disciplines. Values of what has to be taught that are important to focus on particular core values or prioritised values, when necessary, and where there are more values of goodness in nature that may be created to a greater extent using these values. Deity, humanity, unity, society and social justice are the Pancasila ideals. Entrepreneurial orientated students can learn to practise bending, forethought, hard effort, and accepting responsibility by participating in educational activities preparing for the next stage of life. The location of social problem-solving becomes crucial to rebuilding.

## V. Submission

On the basis of the t-test and descriptive analysis, it is clear that students' grades differ. The lowest creative indicator is 60% of pupils cannot be investigated when the student's entrepreneurial drive is recognised with special attention. The integration of entrepreneurial thinking and practises into classroom instruction is critical. Entrepreneurship skills are lacking due to a lack of character education. It's integration of entrepreneurship in the classroom implies that two potential "benefits" can be gained as a result of attainment to be made all at once; to get first-hand knowledge of entrepreneurialism and virtue students.

# VI. Consequences

To begin, kids should know that the information they're learning comes from real-world sources, and that's why it's so critical that a course's content demands must be tailored to the students' interests and drive to study. There are several ways to help educators help their pupils learn, and learning is one of them to study in an enjoyable and straightforward manner, in order to meet their predetermined learning objectives. Approach, educators must organise learning in such a way that it is both well-planned and well-located, as well as efficiently utilised. Students, teachers, and learning objectives comprise the trifecta of educational components (4) models, approaches, tactics, and learning methods for establishing a learning model in the classroom education in agronomy (Roman, 2015); (6) evaluation of the processes and outcomes of learning. Entrepreneurial abilities can also be honed by focusing on students' procedures and goods. As Rosana and Tiarani (2012) note, project-based learning may help students develop their own business acumen. Project-based learning is a great deal for both students and instructors (Mulyani, 2014) as well as a process for acquiring competent attitudes, information, and abilities via thoughtful and methodical instruction. The activities aimed at promoting learning will emphasise the importance of each step along the way to classroom learning may be improved by incorporating entrepreneurship ideals. One method instructors may use for educational growth entrepreneurship is to educate in the classroom. The ultimate objective is for pupils to be well-rounded academic entrepreneurs. As a result of their character education, these pupils have developed an entrepreneurial spirit. In addition, the character's entrepreneurism will serve as the seed money for the accomplishment of his or her loftier goals in the future. Throughout every sphere of life, whether in business, economics, politics, social issues, the law, or even health care, education. Character development is the process through which a person's habits or attitude are formed in such a manner that they are distinctive, the ability to stand out or be recognised from others in terms of appearance In order to be successful in business, one's character must be the basis (Correa & Co., 2015). Attitudes are more durable than ability and learning for an entrepreneur grouping of people's thoughts, feelings, and actions in relation to socially relevant things. Attitude is made up of three parts: the cognitive component, the experiential component, and the symbolic component. The emotional component of an attitude is a reflection of the owner's own beliefs. An emotion that includes emotional components, as well as the inclination to act out in a certain way according to the mindset of a learner who is pursuing proficiency (Maulida et al., 2016).

# VII.  Conclusion

Pupils in elementary school will be more attentive and engaged in their studies. They'll get a good education in teamwork and other characteristics. As a result, low-performers in high school will not feel like they're a failure, but they'll instead strive to enhance their own performance. Students will have a better understanding of how they might use their talents in other areas. Admission to college will not be based only on a student's high school diploma. Only pupils with a high degree of academic

achievement will be allowed to graduate. A job in research is a good option for those who are truly interested in the subject matter. Students that are passionate and capable of finishing their research assignments will do so shortly. There are a lot of vocational schools out there. Students will be more likely to acquire high-paying positions. Students that are eligible will make significant progress. As a wrap-up and a look to the future, here are some insights on the study. We've attempted to highlight the potential advancements in the edupreneurship field. We divided the educational institutions into five categories and came up with a list of things that needed to be improved. The edupreneurship market will grow as a result of implementing the proposed reforms in educational institutions. Our goal is to provide a foundation for every type of schooling in the near future. E-learning is an alternative for edupreneurship that has both potential and limitations, according to our current study.

# Edupreneurship in Education

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## Abstract

The significance of entrepreneurship in education is examined in this chapter. Edupreneurs is to understand, describe and evaluate the Implementation of Edupreneurship education. It is the capacity to put thoughts into practise. Education in entrepreneurship entails taking risks, being creative and innovative, and having the ability to plan and manage projects to accomplish the goals. The entrepreneurship model was developed as an economic model. Today, however, entrepreneurship is a reality in education as well since the educational sector has grown more alluring for entrepreneurs and technological advancements have opened up new possibilities for autonomy, decentralisation, and customization in educational institutions. Entrepreneurs were encouraged to invest in education in the same way that they would start enterprises in more commercially focused industries by the new forms of education, such as virtual schools or online courses. They are referred to as "edupreneurs" as they take risks to invest in education.

## I. Introduction

Edupreneurs typically have a mission in mind and are passionate about highlighting good effects. They can be seen establishing new educational institutions and enterprises, creating cutting-edge edtech tools, managing new educational institutions, and delivering keynote addresses all around the world. They lead with a focus on education for the twenty-first century and are well known both inside and outside of the classroom. The entrepreneurial model is derived from economics. Despite its ups and downs, the economy has achieved tremendous results and shown a remarkable capacity to adjust to constantly changing situations, contrary to what some experts might believe.

The educational sector is now appealing to business owners. Technology advancements have created new options in education for autonomy, decentralisation, and customization. The emergence of a new class of entrepreneurs interested in investing in the educational sector in the same manner they would start firms in other, more market-oriented sectors is facilitated by new forms of education like virtual schools, online courses, or distance learning.

## 1. Edupreneurs: what are they?

Educators who operate their own businesses to support their schools are known as edupreneurs. Many teachers who have left traditional educational systems for various reasons have discovered that their own skills and passions have allowed them to carve out specialized niches. They provide services for organizations, people, and even open, free, large communities. They make learning more individualized for student clients, make a living, and give back by aiding others.

They take charge of their own financial affairs, establish new learning environments, develop their own curriculum, and enjoy the kinds of artistic fulfillment available only to independent, free-lance teachers.

They are unencumbered by the status quo, government red tape, glass ceilings, prejudice, and unfairness. They can freely teach, share, inspire, write, and create— whatever they want to do. They are unrestricted by governmental boundaries and closed mental environments.

Many edupreneurs conduct their business online, where they can create sizable networks of students and educators. They can decide to work for free, change the world, and publish motivational content on their websites while still making a good salary.

The internet is full of user-friendly technology and web tools that make it possible to publish, produce movies, eBooks, websites, engage students through Gamification, and even build virtual worlds for language learning.

## 2. Why is this essential?

On the front edge of education are edupreneurs. They devote time and consideration to honing their art, market segments, and mission statements because they also feel the need to "be" someone. As a result, they are frequently extremely motivating, narrowly focused, distinctive, and different from what you would find at conventional educational institutions.

The learning process is being redefined by edupreneurs. Because they too want to experiment and try new things with the help of cutting-edge online networks, classroom teachers frequently gravitate toward the webinars and courses of online teachers.

## II. Knowledge Economy Challenges for Education

New organizational and economic activity models have been developed as a result of the knowledge-based economy's emergence in the Internet and e-business era. It is well known that a knowledge- and idea-based economy is one in which global competition is facilitated by communications technology, rapid change is a

constant, innovation is valued higher than mass production, investors prefer to invest in new ideas or innovative methods of production over newcars, and prosperity comes from innovation firms rather than optimization.

Therefore, the knowledge-based economy's substantial shifts in organizational paradigms and the management of work created new difficulties for the Romanian educational system. Therefore, a growing demand for individuals who can handle competition from an increasingly tough global market has resulted from the necessity to construct flexible organizations to respondswiftly to environmental demands. As a result, lifelong learning becomes essential, necessitating a continuum of professional specialisation. As a result, numerous businesses are offering alternate kinds of education, particularly non-formal ones, for specialized training.

The development of the global network has made education more participatory, allowing both professors and students to contribute equally to its effectiveness. The degree of dependency between teachers and pupils, students, or trainees determines how effective education is.

Decentralized organizational structures also call for the growth of individuals who are imaginative, inventive, and entrepreneurial, and the educational system is necessary to achieve this goal.

## III. Educational Innovation and Change

The entrepreneurial model is derived from economics. Despite its ups and downs, the economy has achieved tremendous results and shown a remarkable capacity to adjust to constantly changing situations, contrary to what some experts might believe.

The educational sector is now appealing to business owners. Technology advancements have created new options in education for autonomy, decentralisation, and customization. The emergence of a new class of entrepreneurs interested in investing in the educational sector in the same manner they would start firms in other, more market-oriented sectors is facilitated by new forms of education like virtual schools, online courses, or distance learning.

Edupreneurs are unconventional educators who, despite having a little representation in the educational system, have mostly developed novel and fascinating modes of instruction in the modern day. Their success is related to the risks they take when they foresee various requirements and speculate on potential answers. Entrepreneurship requires innovation, talent, inspiration, and originality. Although it is not a common or simple behaviour, it is praised. In bureaucratic systems, like public schools, for instance, decision-makers typically do not select hazardous options or look for novel approaches to problems.

Instead, they would take no risks and behave in accordance with tried-and-true methods. Administrators of public schools and other educational authorities must behave in this way. They frequently support administrative changes and think that modern education can be improved with better training and budget allocation. Many instructors who are professionals would like to do similarly. When faced with uncertain options, they hesitate and look for ways to reduce the risk, such as small classes, best practises, increased discipline, and so on.

## IV. Innovative Programmes for Teaching

Edupreneurs have started innovative programs for teaching the world's knowledge capital in order to guarantee that the expanding population has access to quality educational resources and can find employment. The way students are taught in our educational system is where the issue is. In India, the Push Model is applied to education. Modern education, however, requires effective and pertinent teaching strategies. The government must put more of an emphasis on vocational education, while the private sector and large corporations will need to drive quality education in schools. Instead of emphasizing employment preparation, India's current educational system emphasizes degrees.

Many edupreneurs have taken part in skill development in India as a result of the national skills development policy's emphasis on skill development.

- It is important to accurately assess the effectiveness of educational initiatives launched bypublic organizations in light of the caliber of instruction provided.
- The possibility that educational opportunities will lead to employment and complete the circle of learning by designing educational platforms to the existing student demographics across various social-economic groups.
- A huge focus on curriculum evolution at the state and federal levels. Both new instructors and seasoned teachers who can contribute a novel perspective should be in charge of this.
- Improved infrastructure and internet connectivity in schools to allow the introduction of cutting-edge technical items (using tablets, note books, etc.) in classrooms.
- We frequently rely on infrastructure fixes to address fundamental issues in education thatdon't ultimately affect students' learning results. additional work

## V. Challenges and Confines

As a result of current regulations, educational entrepreneurship has its limitations. Entrepreneurs in education can create schools, conduct creative programs for various student groups, or advance educational quality. They aim to meet an unmet or insufficiently met demand in the public education system. They innovate in various manners. Edupreneurs frequently cater to a small portion of the population and offer specialized educational materials created specifically to meet their needs.

Parents are able to pay for the education that private institutions are providing, which suggests that the official educational system does not include different groups or that private institutions offer a better education than public schools - perhaps with better teachers, more highly trained staff, better working conditions, better economic incentives, and a wider range of extracurricular activities like sports, individualised instruction, advanced technology, modernlanguages, and civic/mane education.

Edupreneurs are more active in the non-formal sector, largely because it is less regulated. Building a school or a university is more difficult than registering an organisation that offers education without a formal degree, such as a club, a playground, or an association. Because thereis a growing need for teaching today and the formal educational system is unable to meet it, non- formal educational organizations have students. Customers of the non-formal system could be recent graduates who require new skills and knowledge, however not credits or degrees. Professional training, current language classes, after-school programs, summer schools/camps, moral education, leadership education, and company training are just a few examples of the many areas where innovation is possible.

There are restrictions in the non-formal education sector, but they differ from those in the public education sector. Regulations governing certification as well as other obstacles make it challenging to enter the educational field. Private schools must adhere to management and financial rules, have accreditations, and receive approval to operate. This could also result in corruption or restrict innovation. The majority of reputable universities or the state's educational bodies must accredit teacher preparation programs. Additionally, this is a replicable approach for teacher preparation. All of these rules are significant roadblocks that make it challenging for an edupreneur to enter and operate in the education business.

Entrepreneurs in education must show that innovation is effective and affordable. Additionally, they ought to act professionally and stop acting like outsiders or external actors in this field.

The real challenge today is to create cutting-edge educational systems that combat poor performance and guarantee ongoing development. Starting with curriculum and teaching in disciplines like communication, sciences, technology, and engineering, as well as entrepreneurship education, civic education, leadership, and global education, the demand for innovation is present in many educational areas. The training of teachers and school administrators as well as vocational training require creative thinking.

## VI. Conclusion

Public schools exhibit entrepreneurialism as well, not just private institutions. In fact, is more crucial in public schools because administrators there must manage both requests from many clients and pedagogical innovations. To enhance circumstances in their schools and even transform the learning environment, they must

conduct activities such as new instructional technology, creating a new school culture and structure, fund raising, educational marketing, andnetworking.

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# New Age Entrepreneurship

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An entrepreneur creates or develops a new business and takes on the responsibility of converting ideas into commercially viable entities. Entrepreneurs are often seen as innovators working with new ideas, services, goods, or businesses. However, contrary to popular belief, a successful entrepreneur is not someone who necessarily starts a new business. You can also have an entrepreneur who plays a key role in setting up a new vertical within an existing business or company. These innovators are always on the lookout for opportunities and building a venture that helps bridge the gap between goods, services, or knowledge among the target audience.

Entrepreneurship is finding new opportunities to do things better and then snatching the opportunity. Persistently pursuing new opportunities, assurance to innovation and challenging traditional boundaries of thought is what entrepreneurship is all about. Entrepreneurship is the lifeblood of a free market economy and with changes in the business processes in the market economy, we today see the emerging profile of the ICE (Information, Communication & Entertainment) age entrepreneur. The appearance of ICE age entrepreneur has been mainly due to growth of Internet Economy and Venture Capital funding. The Internet Economy has rewritten the business rules and opened a lot of opportunities for the Indian entrepreneurs in the field of information, communication, entertainment, various IT enabled services and pharmaceuticals. The new internet economy is based on creating service organizations with strong information base and making profits from cutting costs of intermediaries and converting losses and wastage into savings and revenues. The following are the five principles of business revolution in the new information economy

- Ideas are more valuable than plants, tools, natural resources and cash
- It's not enough to have good ideas. One must implement them more quickly than ever before.
- Companies compete globally.
- Companies are less hierarchical than they used to be.
- Companies have many shifting alliances.

In the light of these developments, the profile of the entrepreneur has also changed.

# I.  Changing Profile of an Entrepreneur

1. **Access to resources rather than ownership of resources:** in the traditional economy, large capital and ownership of the resources like land, building, machinery was needed to carry out production activity. Financing was also asset based, ie bankers and financial institutions were funding entrepreneurs who were the owner of the resources. Hence a trend had developed where the entrepreneur was giving more significance to ownership of physical resources and share markets were also reflecting this philosophy.

   But in today's Internet economy entrepreneurs believe in access to resources rather than ownership of physical assets. Most of the new age entrepreneurs are in the information based service industry where the quality of service is the key thing and it is due to knowledge of the specialists employed rather than physical assets. Share markets also give high valuations to companies having human assets.

2. **Inclination towards building non tangible assets:**  In the days of the traditional economy due to excess of demand over supply whatever was produced by the industry was sold irrespective of quality. Also entry barriers for new players were very high hence building non tangible assets like brands etc were not a priority for the entrepreneurs. But in today's economy, the entry barriers to many businesses have been lowered and Indian firms are challenging with corporations and discarding from countries like China, Taiwan etc. Hence today's entrepreneurs are focusing on building non tangible assets like brands, information base, team of qualified professionals which are key differentiating factors in knowledge based service industries.

   Increasing trend of adopting entrepreneurship as a career by people from service backgrounds:

   Earlier knowledge of business was not easily available, it used to reside in business community. To start a manufacturing unit heavy investment was required and due to lack of venture funding as a source of finance the entrepreneurs from family business background, who had admittance to family funds were having an upper hand over entrepreneurs with service circumstances. But in the Internet economy knowledge based service industries were required. The knowledge based industries required low investment and had lower entry barriers. This reinvigorated people from the service background to take up entrepreneurship as a career and the accessibility of venture capital catalysed the process

3. **Importance of entrepreneurial skills than ability to control business:** In the traditional economy the survival and growth of entrepreneur depended on his/her ability to control business environment. In today's dynamic business environment those who offer best service will survive.

The emergence of Professional Entrepreneurship: The traditional economy entrepreneur used to cultivate his enterprise like a baby and his emotional attachment never allowed him to sell his enterprise. But today's entrepreneurs are becoming more professional and are selling their successful start-ups to bigger businesses and moving further in their journey of entrepreneurship. Sabir Bhatia of Hotmail and Rajesh Jain of India world are examples of professional entrepreneurs.

The new age entrepreneur also chooses to outsource the production activity and focus on knowledge-based activities. There is also a distinct preference for service sector opportunities rather than the manufacturing sector. In view of the changes mentioned above, the role of education and training becomes very important and in this context it is possible to envisage three key ways in which the word 'enterprise' and 'entrepreneurship' can be linked:

- Education *about* enterprise;
- Education *through* enterprise; and
- Education *for* enterprise

The first of these relates to the role of education in raising the awareness of enterprise and entrepreneurship as a key change agent in the economic process. The second concerns the ways in which the education process itself can be enhanced by using pedagogic styles which work in and makes use of 'enterprising' situations, including student cantered and real world project driven approaches. The third is precisely aimed at entrepreneurship expansion and would include preparation existing entrepreneurs as well as for new start-ups.

## II. Skills Required for Successful Entrepreneurship.

1. **Curiosity:** All great entrepreneurs have this trait that helps them discover new problems, explore potential opportunities and innovate based on these ideas. Curiosity is what leads them to explore avenues beyond their comfort zone and venture into unexplored territories.

2. **Strategic thinking:** Learning to dismantle a problem to reach its very core and then building upon the opportunities of growth is a sign of a successful entrepreneur. Strategic thinking allows the leaders to think of innovative solutions and identify the low hanging fruits.

3. **Time management:** No leader or successful individual can make it big without proper time management. Given the nature of their work and the responsibilities involved, they have limited time available, which needs to be managed effectively. It requires careful planning, setting certain milestones, efficient execution and iteration. No project would see the light of success without the right time management and allocation.

When an entrepreneur ensures that time management is prioritised while leading a team, it acts as a compelling reason for others to follow and a guide for them to emulate.

4. **Resilience:** Developing new ideas and innovative concepts are often accompanied with failures and hurdles. Being able to handle stress, rejections, lack of focus, and burnout is an essential trait of any entrepreneur. The eagerness and determination to fight are instrumental in building a successful business.

5. **Discipline:** Self-discipline paves the road for **finance leaders** to disrupt industries through innovation. Leaders are spearheading political and corporate empires that work as great inspiration for the youth, thereby propagating rapid growth and development globally. Being consistent in delivering objectives materialises to motivation in an organisation to remain committed and persistent while ensuring the delivery of goals.

## III. New Age Entrepreneurship in India

Meanwhile, the Indian regulators are doing their part to make it easier for tech start-ups to float IPOs. The Securities and Exchange Board of India (SEBI), the nation's capital markets regulator, has made several changes in a regulatory framework that it had first announced two years ago to allow tech start-ups to float IPOs.

SEBI had established the Innovators Growth Platform (IGP) in early 2019 for start-up IPOs. However, the platform failed to take off, leading SEBI to make some changes in the IGP last year.

SEBI further eased its rules for start-ups planning to launch IPOs. Now, it allows investors in a start-up to hold 25 per cent of the pre-issue capital even one year prior to its IPO, instead of two years earlier.

In addition, SEBI allowed an 'Accredited Investor' to hold 25 per cent of the pre-issue shareholding as against 10 per cent earlier. The regulator also eased rules to let loss-making start-ups migrate from the IGP to the main board.

# Innovation and Technology in Edupreneurship

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## Abstract

Every year, a low number of people graduate from schools, colleges, and universities. However, not all students are successful in securing employment that meets the requirements of their earned degrees. These less fortunate pupils merely blamed their instructors, universities, and educational system for their predicament. We discover the true causes of these students' situation here. Simply put, students say that a lot of educational institutions take their money without preparing them with the necessary abilities to compete in the market. Additionally, a lot of students find out in the middle of the course that they lack the prerequisite abilities to benefit fully from the course. The writers of this paper have attempted to present some novel concepts for innovation and technology in edupreneurship.

**Keywords:** Edupreneurship, Employment, Abilities, Innovation, Technology, Entrepreneurship Assessment

## I. Introduction

Edupreneurship is the intersection of entrepreneurship, teacher preparation, and digital education. New ways of teaching will arise as educators start to create their own educational practises using entrepreneurial approaches and mindsets. Because entrepreneurs desire to make money and spread their ideas, many instructional innovations will move outside the classroom and result in new educational products or business models. The educational system is undergoinginternal renewal.

At all levels of education, technological advancements are having a big impact. The traditional classroom setting is being disrupted by online courses, teaching aids, educational software, social networking tools, and other developing technology. Developing strategies and ways to manage and employ technology in education requires a thorough understanding of the impacts that technological advancements have on students, teachers, and educational institutions.

Edupreneurship describes business ventures in the educational sector. This industry has chances and problems just like other industries. The entrepreneurial market now includes more than just non-profit organizations. An educational institution runs the danger of not acquiring the right qualified students for the following batch if it is unable to produce professionals who can benefit the most from that course. It appears that our nation has excelled in all facets of schooling. A thorough examination will undoubtedly show that there are still many areas in which education may be improved.

The majority of people's educational careers begin in schools. Those who struggled to comprehend topics in school would undoubtedly experience the same difficulties at the next level of their study. Not every pupil has the same level of grasping ability. This means that notall pupils will be able to learn all of the concepts if a teacher just uses one teaching method or, perhaps, two. Most students, professors, etc. do not recognise or accept this fundamental fact. Students who are beginning their college education believe they have grasped and can apply the fundamental ideas that were taught to them in school. However, they don't understand they don't have the necessary abilities or knowledge to fully benefit from the course until after the first exam or in the middle of it. However, because they paid money to enroll in that particular course in the hopes of a better future, they sometimes rush through it without fully understanding what they are learning. These poor students attempt to find a job typically one that pays less and carry on with their lives. Many educational institutions look for these kinds of less qualified students and entice them with promises of a bright future which rarely materializes and large sums of money.

The comprehending level of each student needs to be known or made known to students, parents, and teachers in more detail, as was already said. The futures of the entire country and theless developed kids are both destroyed as many students may try to follow them. On this topic, very few studies have attempted to focus. With education as the focus, edupreneurship involves more than just financial success. It uses cutting-edge techniques to produce better pupils professionals who can not only stand on their own two feet but also come up with superior solutions to any challenge in their field while having a thorough comprehension of all the ideas covered. Additionally, it features improved self-evaluation by the students. The writers of this paper have made an effort to offer some cutting-edge recommendations for educational institutions to take in order to better prepare the students.

Four sections make up the remaining text of the essay. The research projects where edupreneurship has contributed are the topic of the following section. The third

half of this essay organizes educational institutions according to the type of education they offer and makes recommendations for ways to enhance students' learning styles. The fourth section provides more information on the effects of the creative actions outlined in section three. The research article is concluded in the fifth section, which also discusses the route this study will take going forward.

## II. Literature Review

We provide a summary of the research on edupreneurship done by various researchers across the world. The author Leonard J Waks in his paper focused on the reconceptualization component of the fundamental transformation in education. He contends that institutional change, not organizational change, is where true educational transformation takes place. He has made an effort to support this claim with a conceptual argument.

Similarly, the author Chaitra Ramanathan in her paper has presented a model Freirean pedagogy that can transform Indian education and connect it to academic fields and student reality. She stresses the need of identity and self-awareness for pupils, saying that our students are deficient in these areas. In addition to these, caste and class divisions, urban and rural population differences, and other variables affect the quality of education in India. Finally, she used an analysis of the Indian educational system's dependence on the culture of textbooks.

K.K.George and Parvathy Sunaina in relation to the economy, society, and polity, it looked for areas where Kerala's educational system can benefit from reform. In addition to the aforementioned, Kerala's finance practices for education were also examined in the research. According to their findings, a very tiny part of the state budget was devoted to education despite the state's high gross domestic product. Unaided self-financing institutions profited from this situation, particularly in the field of professional education. As a result, Kerala's educational system was substantially subsidised and supported by the state, which had detrimental social and economic implications and hampered Kerala's development.

The authors Roelofs Henk, Samplonius Raut and Shilpa they proposed an entrepreneurial pedagogic method in their research study that offered risk and value-added experience in a pull system to learn entrepreneurship. In order to modify behaviour toward entrepreneurship in an entrepreneurial environment, the authors employed the Lego game of entrepreneurship as a method for experiential learning.

The author Fariborz Rahimnia in his paper tried to Iranian higher education has made an effort to build a framework to examine the impact elements of plan execution. He conducted semi-structured interviews with the university's manager and top academic staff members. Planning implications, organizational, individual, management, and environmental effect aspects were identified as the major contributors. The study presented a framework that provides comprehensive information on the impact factors.

The author Ibrahim Ahmad Bajunid in his research paper uses the development of the middle class, the professions, and professional leadership to discuss national development in Malaysia. The article evaluated how well-equipped and eager teaching professionals were to offer fundamental leadership principles to both their own and other professions.

## III. Role of Technological Innovation and Entrepreneurship

Due to the increased competition, many business owners are now talking about innovation. But what does innovation mean and why is it significant for business owners? Innovation therefore essentially refers to the replacement or enhancement of something. Entrepreneurs use innovation as a specific tool to take advantage of developments as an opportunity for a new line of business. Aninventive entrepreneur is someone who can manufacture cutting-edge items to satisfy market demands and trends. Innovation in Entrepreneur plays a role in several ways like in:

1. **Creative growth:** Innovation improves a brand's character, inventiveness, and design-thinking process. By masteringthe techniques of creativity, a new firm can achieve the pinnacle of success. Innovation in entrepreneurship can help a company stay on top of the latest trends, which can lead to a variety ofopportunities.

2. **Continuous development:** When you're always making changes, innovation helps your organisation last. A good businessperson will understand the value of innovation, which will boost the entrepreneurial spiritof their company.

3. **Reinforcing the brand:** The development branding process reveals the specifics, which enables the HR innovationleaders to discover new approaches to become more inventive. This item is extremely important because it serves as one of the key catalysts for success.

4. **Making the finest of existing products:** We are aware that introducing new items is crucial for entrepreneurs, but maintaining a culture of innovation and making the most of current products is even more crucial.A corporation can improve its current products to boost productivity, profits, etc. A corporation can recruit better employees, which will increase the health of the organisation, by boosting the design thinking process and making ongoing inventive advancements.

5. **Responding to trends and competition:** Innovation in HR focuses on anticipating future trends while responding to present success and needs. Responding to emerging trends can help an entrepreneur's business find solutions to expand more quickly. This is made possible by innovation in entrepreneurship.

6. **Distinctive promotion position:** Customers typically view innovation culture as something that gives its products some interesting values. Entrepreneurial innovation can bring benefits that can aid the business in gainingfavourable attention.

7. **The use of social media:** With social media's assistance, an organization's innovation campaign can draw in a variety of ideas. Social media has been shown to be excellent for encouraging, managing, and focusing on your business.A company can use social media to learn about the fundamental requirements of its clients. By improving our products to meet these needs, we can help our firm expand over time.In an effort to draw clients and satisfy their needs, numerous businesses have begun to provide a variety of original ideas. With this, competition is also increasing to a new level, making it harder than ever for an entrepreneur to survive in this time. It might be challenging for an entrepreneur to exist without a ground-breaking concept, a strong staff, and numerous alluring offers.

The ability to apply innovation to your organisation requires the proper knowledge and abilities to help it expand and thrive in current market. And only by attending the appropriate institution can one achieve this. MIT ID Innovation, which provides students with knowledge andskills centred on industry, is at the top of the list of premier institutions. Therefore, MIT ID Innovation Institute can undoubtedly assist you with this if you also desire to dominate the globe with your original ideas.

8. **New approaches to edupreneurship:** Based on the kind of instruction they offer pupils, we have divided educational organizations into five categories. They include elementary schools, secondary schools, colleges, research institutions, and facilities for vocational training. In primary school, kids learn the fundamentals of education. This ranges from kindergarten through the seventh grade. Children are said to learn the fundamentals needed for a college education in high school. The children at these facilities also identify their broad interest areas. The term "high school" refers to grades 8 through 12. The institution where children seek education in order to launch their careers is referred to as a college. College education includes graduate and postgraduate courses. A research institution is a location where experts and students do research in their areas of expertise and advance knowledge. Vocational training centres are establishments where individuals can enroll in order to develop their professional skills in a specific field.

## IV. New Initiatives in Primary Education

1. Students should be classified according to how well they understand.
2. A student should only be promoted if he has thoroughly grasped the topics covered in theclass; otherwise, he should repeat the material.
3. Extracurricular activities should be prioritized based on the kids' comprehension levels.
4. A proper evaluation procedure should be established to gauge students' comprehension.
5. Parental counseling should put more emphasis on conceptual learning than rote learning.

## V.  Innovative High School Practices

1. Problems with low grasping kids should be identified and addressed individually.
2. Each student should receive personalized feedback regarding his or her degree ofprogress.
3. All pupils should be required to participate in exercises that are beneficial to their healthin every way.
4. Students in high school being in the teenage groups should be managed with care byongoing mentoring procedure.
5. Rather than just testing students' memorization skills, one should also test theircomprehension abilities.

## VI. Innovative College Moves

1. Before admitting candidates, there should be an eligibility test, and the test should specifically tell the candidates of their eligibility level for a course.
2. Different classes should be offered to students at different levels, taking into account anylanguage barriers they may have.
3. According to their performance level, students should be informed of all the possibilitiesthat may be open to them individually.
4. Degrees should only be granted to pupils whose performance is good; otherwise, theyshouldn't.
5. Fees for that academic year shouldn't be assessed to the unsuccessful students repeatingsession.

## VII.  Innovative Steps taken by Institutions

1. Students should only be admitted to these schools using procedures that accurately assesstheir degree of interest.
2. Prior to admission, candidates should be made aware of all the duties and obligations.
3.  Each candidate should be evaluated for making reasonable progress on his work duringthe course.
4. Ideas that can be put into practise and are truly new should be praised.
5. The degree should never be awarded to an applicant who is less qualified.\

## VIII.  Benefits of Innovative Measures

1. The youngsters will be more focused and motivated to learn.
2. They will acquire a strong sense of teamwork and other values.
3. People who perform poorly won't feel inadequate; instead, they'll work to get better.
4. Students will be aware of different fields in which they can succeed.
5. Simply finishing high school will not be enough to qualify for admission to a college.
6. Only students with strong academic performance will receive a diploma.

7. Candidates that are truly interested in research will pursue it as a career.
8. Energetic and competent students will swiftly finish their research projects.
9. More students will obtain decent jobs.
10. The qualified students will make outstanding development.

# IX. Conclusion

In this present scenario everyone has made an effort to concentrate on the innovational technology that could be done in the edupreneurship sector in this study. We divided the educational institutions into five groups and noted several areas that needed improvement. Following through with the suggested improvements will increase respect for educational institutions and foster a thriving edupreneurship market. In the future, we intend to create a framework for each unique type of schooling. Our future research will take into account e- learning as an alternative for edupreneurship, with all of its benefits and limitations, based on theexisting research.

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# The Sophistication of Digital Technology Tools in English Language Teaching

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## Abstract

Deviations and transition are necessary for mankind to survive and advance. Because education is so important for building a sustainable future, changes in education are especially significant. The development of information and communication technology (ICT) has had a revolutionary impact on 21$^{st}$-century society. ICT technologies have altered predictable methods of teaching and learning in numerous disciplines, including language instruction, from the standpoint of education. In order to access universal power, one must be gifted in both English and technology. In Korea, the dominance of English and technology has played a significant role as an essential element or motivator in many aspects of daily life, such as admission to and graduation from the right university or selection in the right profession market. Those who have access to these two resources can advance academically and, in the end, socially **(M. Kim, 2004).**

In general English as a Foreign Language (EFL), Instructors enriched their teaching practices by utilizing a variety of Web 2.0 technologies in addition to standard ICT equipment like computers, projectors and interactive whiteboards (IWBs) in nearly all of their courses. Furthermore, regardless of their prior ICT training, instructors showed confidence in their ability to use ICT tools. Teachers viewed ICT technologies favourably, citing several advantages for both teaching and learning. Infrastructure issues were viewed by teachers as the primary barrier to ICT use.

**Keywords:** Teaching, English Proficiency, Native English Speaker, ICT Tools, Digitalization,

# I. Introduction

Technology has integrated itself seamlessly into the teaching and learning process during the former ten years. With the aid of teachers who can enhance students' learning processes, this technological growth of humanity is a crucial component of integration into the digital world. More than all educational institutions have access to the necessary teaching tools, such as interactive whiteboards, laptop computers, overhead projectors and other useful equipment. Using digital technology to make English Learning Teaching sessions are more engaging and successful for English language teachers. Instructors are frequently left to their own devices, and there is typically little understanding of ICT usage among teachers. Most educators in the creation make advantage of readily and conveniently accessible free internet worksheets and resources. Through websites or social networking, they learn how to apply some consequences.

Students can set their own learning speed and use supplementary teaching tools that enable them to review and solidify their understanding while surfing the Internet at home. Cheers to a wide range of internet browsers or applications, teachers and students can be accessible in outdoor settings. For instance, Skype fosters oral proficiency and offers fresh chances for pupils to develop their communicating abilities since users must actively listen to what the interlocutor is saying and respond accordingly **(Taillefer & Munoz-Luna, 2014)**. Accordingly, multimedia delivered through various technological tools should be advantageous to both students and instructors' foe English learning teaching.

## II. Digital Technology in Language Teaching

Numerous variables are altered by technological advancement. Tutors must follow that trend in education. The quality of the educational system has been impacted by the usage of technology in education.
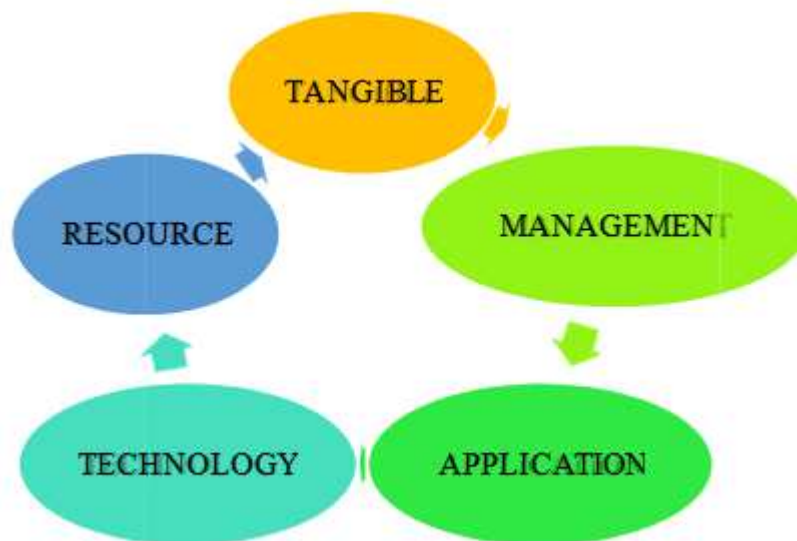


**FIVE STAGES**

Technology is altering how English language instructors and students learn and as a result, it is becoming a more important component of curriculum implementation. Additionally, emphasizes how crucial it is for English language instructors to be knowledgeable about the latest and finest tools as well as fully understand what is accessible at any given time. Multimedia technology may be used by teachers to deliver more engaging and colourful lectures.

It outlines five stages at which technology may assist in English teaching languages:

1. The tangible level, using devices like cell phones, digital cameras, computers, and tablets. A language course may be administered, delivered, tracked and reported on.
2. Using learning management systems (LMSs), which are part of the management level.
3. The applications level, which includes email and chat clients, blogs, social networking sites and word processing software.
4. The resource level, which provides access to reliable resources such online journals, newspapers, language teachers, and learning-focused websites
5. The level of component technology, which includes tools for support such as electronic dictionaries, grammar checks, spelling checkers and more.

In this instance, technology provides pupils with much richer knowledge that is now readily available. Technology will encourage pupils to participate more in their education as a result.

## III. Customs of Digital Tools

Technology now plays a crucial part in how children and adolescents are taught in the modern era of learning. To increase student autonomy, enhance academic process management, promote cooperation and improve communication between professors and students. Hundreds of digital education technologies have been established. Here are some resources that among other things make communication between teachers and students easier.

1. **Storybird:** Storybird seeks to enhance pupils' reading and writing abilities through narrative. Through a straightforward and user-friendly interface, teachers may use this technology to produce beautiful and interactive books online. The stories that are produced may also be printed, emailed and embedded in blogs. Teachers may arrange courses and grades, collaborate on projects with students and provide ongoing feedback via Storybird.

2. **WordSalad:** WordSalad is an application that creates "word clouds" from text given by anyone. By adjusting the word clouds' colours, typefaces and word orientation, it may be customized. The program recognizes the language of the content is written in, does its magic, and creates a lovely image. It  may be exported to the word cloud to smartphone or share it with pals after creating it.

3. **Pixtoon:** The most well-known and user-friendly comic and storyboard maker in the world is Pixtoon. Comic books may be used to teach English, which is a fun approach for pupils to learn the language.

4. **Memrise:** Memrise makes learning languages and vocabulary so much fun and exciting that you'll laugh out loud. Make your own rich, multimedia flashcard lessons.

5. **ClassDojo:** ClassDojo is a tool to help students behave better. Teachers provide their pupils immediate feedback so that positive behaviour in class is "rewarded" with points and kids are more open to learning. Students receive real-time messages from ClassDojo for working cooperatively, such as "Well Done David!" and "+1." The data gathered concerning student conduct can eventually be made available online to parents and authorities.

## IV. Paybacks

Min Pun **(2004)** lists the following as the prime advantages of using digital technology:

1. Encourages learners of English.
2. Improves pupils' communication skills.
3. Extends pupils' understanding of English culture.
4. Boosts instructional effectiveness.
5. Promotes student interaction as well as that between professors and students.
6. Establishes in the classrooms a conducive learning atmosphere.
7. Offers chances for English instruction outside of the classroom.

## V. Drawbacks

Older generations, like younger and middle-aged ones, list a few drawbacks of engaging modern technology:

1. It may detract from the primary subject.
2. It could be abused by students.
3. Students may unintentionally overdo it.
4. It creates a divide between conventional and cutting-edge teaching techniques.
5. It can undermine class interaction, idea sharing, and spontaneous participation.

The fallouts of Min **Pun's (2004)** study show that adopting digital technology in non- native speaking nations has a number of drawbacks:

- Emphasis on the supporting factors of successful instruction
- A breakdown in teacher-student communication
- A lack of in-person instruction
- Loss of pupils' capacity for rationality
- Expensive method of teaching languages

# VI. Recommendations

The subsequent are the responses in this situation for teachers of an older generation and for those teachers who are still unaware of the advantages of digital technology:

- Setting up discussion panels with instructors from earlier generations to exchange views on how to use and profit from digital tools in ESL instruction.
- Holding a demo lesson with the use of sophisticated technology can also be illustrated in this way.
- Scheduling a training event for educators who are genuinely ignorant about digital technologies

# VII. Conclusion

English Language classrooms have traditionally served as teaching environments appreciations to the close relationship between advanced technology and English language instruction. However, many teachers all around the world are hesitant to use them because of specific gaps in their knowledge. However, Deborah Healey notes that "many teachers, teacher educators, and administrators find it challenging to know how best to integrate computers, other kinds of digital technology, and the global contact provided by the internet in language education" (Healey, 2011). Digital technology may be used effectively in English as a Second Language (ESL) lessons to help English language learners improve their overall English language abilities without being harmed.

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# Innovation in Edupreneurship: A Study on Edupreneurs as Change Agents in the Indian Context

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## Abstract

*India's education system has been growing faster in the last two decades, challenging to move from the traditional model to a more qualitative and holistic one. With the adaptation of diverse approaches to teaching-learning pedagogy in the era of the 'education revolution, progress has been visible but slow compared to its global contemporaries. With the new-age innovation in curriculum and teaching and an amalgamation of technology and learning, edupreneurs and thought leaders aim to place India worldwide. Leveraging the emergence of the new education pedagogies, Today edupreneurship has emerged as an effective model for altering the terms of innovations, initiatives, and changes often connected with transforming the education system.*

*Against this background, the paper attempts to the growth of edupreneurs in India and their unique role in the present education system. The article also examines the latest innovation in the edupreneurship market.*

**Keywords:** Edupreneurship, Innovation, Education Sector, Technology, Learning - Process

## I. Introduction

Educational entrepreneurs are innovators who produce changes in the public education system with their characteristics and activities. They think beyond existing constraints and solutions. Edupreneurship refers to entrepreneurial activity in the educational domain. Like other sectors, this sector, too, contains challenges and opportunities. Today edupreneurship has emerged as an effective model for altering

the terms of innovations, initiatives, and changes often connected with transforming the education system.

An edupreneur is mission-driven and works within the education sector. An edupreneur builds new education organizations and businesses, develops the latest edtech tools, runs schools, and leads the 21st-century education mindset

## II. Education Revolution

Education is the most promising avenue for those interested in changing the existing educational practices. With the uprise of the education revolution, the education system in India is viewed not just as a commercial business but as an accepted ladder to long-term success and credibility today. The education landscape in India requires innovations and a better purpose.

India is a dynamic place in the global education industry. The country has more than 1.4 million schools with over 227 million students. There is a sizable number of children who are at an age where they can enroll in a preschool. It increases the demand for preschools and people who can run them efficiently. With innovation in curriculum and teaching and the amalgamation of technology and learning, edupreneurs have placed India on the global map. With these drastic changes, the Indian education sector is growing faster with leaps and bounds

Despite high investment and weak government regulations, edupreneurs managed to transform the Indian education sector. India has over 250 million school-students, India's Education Sector has opened as an excellent opportunity for potential entrepreneurs willing to flourish as 'Education Entrepreneurs.'

## III. Education as a Core

The schools and colleges that comprise the core education sector provide government-recognized qualifications to their students, making it the most regulated area of education in India. Examples of entrepreneurs have successfully set up chains of schools or colleges. Modern problems need solutions, and ancillary education entrepreneurs have done just that. With the broadest range of models, these edupreneurs made learning accessible and fun for students, offering them education on the go.

## IV. Innovation in Education

Nowadays, the educational domain has become lucrative for entrepreneurs. Advancements in technology offer education new opportunities connected to autonomy, decentralization, and customization. Innovative arrangements of education like virtual schools, online courses, or distance learning boost the growth of a new class of entrepreneurs interested in investing in the educational domain.

More than 250 million school-going students and several new schools and colleges are coming up. India's Education Sector has opened an excellent opportunity for aspiring entrepreneurs to venture as 'Edupreneur' or 'Education Entrepreneurs.'

## V. Edupreneur as Change Agents

Today, many Edupreneurs aim to provide a valued impact on bettering education across India. Edupreneurs are responsible for developing a solid management team to help groom the students and teachers. Innovative learning methods have been the hallmark experience of the learning process. Edupreneurs, over the years, have acted as change agents in developing the education standard of India.

The 'innovative learning methods are the by applying latest and user-friendly technology in teaching and learning, edupreneurs adapted a simplified teaching pedagogy for diverse students.

## VI. Growth of Online Education

Edupreneurs are developers of educational products and supporting materials, and they engage in supplying tutoring services and act as educational consultants. Edupreneurs also take up the task of developing and providing educational software and running independent schools and institutions specialized in educational outcomes.

The growing demand for good quality education and the readiness of parents to pay more for schooling/education has quickly altered the dynamics of the education sector in our country. The advancements in virtual /online teaching and learning platforms have become significant game changers in the education sector. With internet penetration into the rural parts of India, edupreneurs are offering online learning platforms to convey knowledge to the young generation.

Edupreneurs who make education more meaningful for students are the need of the hour. Edupreneurs as potential change agents are crucial to creating value for the students.

**The following are some of the benefits of online education**

1. Customized learning through user-friendly software, ease, and simplification of the assessment process with real-time monitoring of individual students is made possible in online education

2. Edupreneurs enable easy usage of class time productivity for classroom discussions and similar student-related activities in the online space.

3. Create an organization where all individuals and teams work as a network, innovate, and enhance productive well-being.

It is only because of these budding Edupreneurs that Indian kids & students can grow up in an interactive and educative environment.

## VII.   Latest Innovations in the Edupreneurship Market

**Adda247 is one of the largest education-technology companies in India, focused on quality education and training for every student. The mobile App, the second-largest Ed-tech platform for paid users, creates a hi-tech avenue for seamless educational content delivery to its students.**

**Toppr: is India's most popular after-school learning app. Toppr provides a fun and personalized experience concerning learning. It uses AL (artificial intelligence), machine learning, and extensive data analysis to study and understand student behaviour and create adaptive learning paths, ensuring a unique and personalized learning experience for every student**

**Aakash Digital: developed its e-learning platform, Aakash Digital. Their digital learning program brings quality classroom coaching directly to one's home while saving time, effort, and money, providing learning flexibility to students. It also offers comprehensive course coverage. The various online courses help empower students to study, restudy, clarify doubts and assess progress with the help of learning tools such as Aakash iTutor and Aakash Live**

**Gradeup:** Set up in 2015, Gradeup aims to be the most comprehensive and effective exam preparation platform for students in India. Today Gradeup is India/s most preferred exam preparation platform for competitive exams. With more than 1.4 crores of registered students across 2500 cities, the Gradeup website and App help prepare actively for various exams.

**Byju's:** This App brings together the best teachers, technology, content, and media to create a seamless, world-class learning experience for every student. In 2015, BYJU became one of the most preferred education platforms globally. Their niche is creating personalized learning experiences for different learners. The App offers highly personalized and effective learning programs for students.

## VIII.  Challenges of Edupreneurs

1. The difficulty in modernization, extended gestation periods, lack of interest in education start-ups, and poor internet stand as significant obstacles for edupreneurs in the online space.

2. The skillset required for educational entrepreneurship is more diverse. Explore and support the field of impact investment in education for students, entrepreneurs, investors, funders, academics, and policymakers

3. Universities in India should focus on subjects like Impact Investment in Education. While Indian universities focus on AI, Analytics, and STEM courses, there is a vast requirement to start focusing on Impact Investment in academics. Academic research has a distinctive contribution to make the development of social investment. Peer-driven studies and research can build impact investment in education. Sustaining the initiative might be challenging unless an edupreneur gets the proper funding.

# IX. Conclusion

The current education system in India is degree oriented instead of employment oriented. Under the national skills development policy, the emphasis on skill development has encouraged edupreneurs to participate in Skill development in India. Today, with the efforts of the edu-leaders above and edu-preneurs, India has entered the "education revolution" era, creating the need for more edu-leaders and edu-preneurs to develop a robust education system to nurture future world leaders. However, this cannot be carried out in a day and needs vital support from educators, parents, students, and investors alike.'

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# Problems and Prospects of Technology in Education from Students Perspective: A Review

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## Abstract

Education is the key to a successful life. The quality of human life depends to a large extent on the quality of education received by an individual. Education helps in fighting the social evils and to distinguish between what is right and what is wrong. An educated person can contribute significantly towards the upliftment of the society and thus contributing towards the social development of the country. The mode of education has evolved over the decades and is still evolving. The gurukul system of teaching, where classes were conducted amidst natural setting, slowly faded away and was replaced by classroom teaching or commonly known as Chalk and blackboard form of set up. However, in recent years it can be seen that there has been a huge influx of technology and technological devices in the teaching process. The influx of technology can be highlighted from the fact that nowadays classrooms of various educational institutions are equipped with projectors and screens with audio visual support so that the teaching-learning process becomes a healthy process rather than just a speaker-listener system. Technology, no doubt has been a blessing in the educational system but with the rapid spread of technology there comes some problems and limitations as well. This paper attempts to discuss the prospects and problems of technology in education from students' perspective.

## I. Introduction

Education is considered as a noble activity which is done with the objective of achieving certain aims and objectives like transmitting knowledge, inculcating behavioral skills and prepares human beings to lead a balanced and healthy life. However with the changing times and rapid development of technology and the changing mindset of the students, the system and mode of education is also changing, the mode of education has completely changed from the conventional chalk and blackboard set up to a completely technology based classroom supporting audio visual mode. Earlier the classroom environment was totally rigid and the students

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were expected to be mere listeners and the teacher was the speaker and the frequency of teacher student interaction was extremely low. However with the changing times and scenario the education system has completely changed. Students these days cannot be considered as mere listeners or empty vessels. In today's times there are so many technological devices and the current generation being completely tech savvy is very much aware of the current happenings. Modern education system is much more of student teacher interaction and interpersonal communication rather than simply speaker and listener. A teacher of today's times and days should be a guiding support, facilitate the learning process and make the classroom an interactive and a conducive place. In simple terms, technology in education means the use of technology in the teaching and learning process. With the use of technology in education the engagement and involvement of the students in the classroom increases as they involve themselves more in the interactive sessions, quizzes and games. It also helps teachers and students to collaborate on various research projects, presentations and the students enrich themselves with knowledge and experience through the collaboration. Technology helps students and teachers in choosing a proper research topic of their interest as lot of information can be accessed with the help of technology. Students can undertake various types of courses in arts, music and other disciplines with the development of technology. With benefits come limitations as well so with the introduction of technology in the education sector. The concentration of the students keeps on shifting as they can access everything with the gadgets available with them. Accessibility of information with the use of technology often leads to lack of concentration and lethargy in the class which leads to inefficiency in the class. One of the most common drawback or limitation of use of technology in education is that it is very expensive and not all students come from the same economic background to afford the gadgets. Another aspect of the same problem is that not all schools are financially sound and capable enough to introduce these changes in the education system.

## II. Review of Literature

Diversified work can be seen in the field of Technology in Education. Some important research work published in various journals, working papers and thesis are presented here. The various scholarly works can be reviewed as under:

*Aggarwal (2009)* in her paper have attempted to study the various aspects of e-learning in a developing country like India. The author tried to study the role of e-learning in spreading education to the remote areas in the country, the various advantages and disadvantages of e-learning and the future prospects of e-learning in India. After a systematic review of literature it can be concluded that the Indian market for e-learning is still very young and raw and there are a lot of suggestions that has been suggested such as including those areas under the ambit of e-learning which are outside any university in collaboration with a university and the e-learning platform.

***Goswami (2014)*** in his paper have laid emphasis on the role of technology in the current education system. The author has tried to convey to the readers that the demand for technologically advanced professionals is very high in the country. Thus, arises the need for introducing and implementing technology in the field of education which will enrich the students with the technological experience and hence they can face the competitive world after they pass out. Students can develop various modern technical skills and analytical skills as well.

***Abramenka (2015)*** in their study based on a survey and the application of Mann – Whitney U tests attempted to study the barriers of online teaching. After a detailed study and review of the study it can be concluded that various online courses that are present have no doubt have enrolled a large number of students but at the same time they have not able to retain the students which in itself is a major drawback.

***Aithal, Aithal (2016)*** in their paper attempted to study the impact of digital learning on higher education. The paper revealed that online teaching and learning has been touted as the next generation education and is definitely going to bring about a change in the higher education system.

***Jindal, Chahal (2018)*** in their paper have tried to study the challenges and opportunities of online education in India as the number of internet users in India is increasing rapidly. After a systematic review of the paper it can be concluded that online education can be a huge success in India if it is implemented in collaboration with industry, universities and other institutes. The success of online teaching and learning can be measured more effectively if the students get good opportunities after passing out.

***Raja, Nagasubramani (2018)*** in their paper has attempted to study the impact of technology in education. After reviewing the literature it has been concluded that technology has had a positive impact on education. However with positives come the negatives as well. Teachers and students should always focus on the positive effects of technology in education and the government should take proper steps to implement technology in the educational system across the country.

***Ratheeswari (2018)*** in his paper tried to study the role of Information and Communication Technology in the modern education system. The paper further revealed that a proper teacher training program needs to be formulated in order to ensure that the Information and Communication Technology is a success.

***Doyumgac et al (2020)*** in their study based on a survey attempted to study the various support and barriers of online teaching and the barriers of online teaching during the pandemic. After a systematic and thorough review of the literature it can be concluded that the pandemic has affected people all over the world. However during the pandemic the digital or online mode of learning emerged significantly and internet has been a major support for the process to conduct smoothly. However one major drawback in this matter is the diverse socio-economic background of the students, not

all students can afford the new system of education which is completely digital and technology oriented.

***Hassan, Khan (2020)*** in their study based on a qualitative survey through a questionnaire attempted to study the online teaching-learning programme during the Covid- 19 pandemic. The study revealed that the pandemic has affected the lives of millions of students and educational institutions all over the world. However the internet has proved to be a savior for the students and all educational institutions as the teaching learning process could be shifted to a digital mode. However, students are of the opinion that they would have further enjoyed the process had things been properly planned well in advance the learning process would have been more smooth and enjoyable. However, one major drawback in the entire process is poor network connectivity.

***Naik et al (2021)*** in their study based on a survey using a questionnaire attempted to do a comparative study between traditional teaching and online teaching. The study revealed that conventional teaching methodologies including chalk and duster are sometimes better than online teaching. The main difficulties faced during online teaching and learning is a lack of teaching infrastructure, connectivity issues and limited availability of technological devices with each and every student.

## III. Objectives of the Study

The objective of the paper is to provide an insight into the problems and prospects of technology in the education system from students' perspective.

## IV. Research Methodology

The paper is a review of the existing literatures and reports and is based on secondary data collected from various journals, research papers, reports from various websites and other published materials.

## V. Discussions

With the emergence and advent of internet and rapid development of technology the education system is also changing rapidly. Education in today's era is no longer confined to just books and copies, it has become more interactive and a holistic process where equal importance and emphasis is being given to the interactions between the teachers and students. Students can participate in various interactive sessions which will help in developing their personality, help them in learning various traits, gain immense knowledge. Today's students are equipped with laptops and phones and they have access to all the information at their hands. Teachers are also trained and updated with latest technology so that the teaching learning process can be carried on without any difficulty. The Covid-19 pandemic has further accelerated the growth of digital education in the country and hence it has further accelerated the role of technology in today's educational sector. Even though

ICT in education sector has been in news and talks for quite some time but the pandemic has further accelerated the need for its implementation. The Govt. of India is also aiming to spread digital and technology oriented mode of education to every nook and corner of the country in order to ensure equality in terms of accessibility to the new mode of learning. However, the technology oriented mode of learning is still at an infant and budding stage in our country which is one of the limitations of this new mode of learning. The huge economic diversity in our country is one of the barriers in the implementation of the new mode of learning. In India there are various sections of the population who belong to different economic groups and every new technological innovation or introduction cannot be advantageous to all, advertently or inadvertently one group or the other is always suffers. Thus, introduction of technology in the education sector and the numerous digital learning courses that are coming up as a result of the increasing role of technology in the education sector which is beneficial to the students but there is a dark side to this glorious phase. India, which is predominantly a developing country and a major portion of the population, lives in the rural areas where there is major network and connectivity issues and there are some places where even electricity has not reached, this creates a problem in the technology based learning and the accessibility to smart phones and other electronic devices in these regions are extremely low or sometimes even nil and to add to that not all schools are financially strong and stable enough to afford and install a smart class as it requires huge investment of capital. As per the various literatures and the reports reviewed it can be said that apart from the regional disparity there are numerous other problems which arises due to the increasing usage of technological devices and the increasing smart class culture. With the 24*7 access to smart phones and other electronic devices students are getting detached from the books and the reading culture is slowly fading away. The fluctuations in the concentration level of the students has also increased tremendously as all digital content is just a fingertip away and with the availability of gadgets it has further fuelled the matter. The technological and digital era is completely new in our country and the foundation has to be very strong for the successful implementation of technology in education sector. Government and various NGOs should come forward to ensure a wider geographical coverage and enable the successful spread of technology based education in the country in order to reduce the disparity. The NGO eVidyaloka which is a Bangalore based NGO whose main vision is to provide quality education to the rural children with the help of passionate individuals as volunteer individuals with the help of technology. The NGO is mainly focusing on children between the age group of 10-14.

## VI. Conclusion

The changing scenario in the education sector and the demand for highly skilled and technologically upgraded workforce in the world of business and numerous other sectors have made it necessary to introduce technology right from the very onset of the learning process so that technology becomes a part and parcel of their life and by the time they complete their education, the students will be very much used to the latest technology which will be of great help to them. However, one thing

must be kept in mind that spreading technology based education in every nook and corner of the country is quite a challenging task and it will take time.

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# A Study on Problems Faced by Hearing Impaired Children in Inclusive Settings

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## Abstract

Inclusive education is a new approach towards educating the children with disability and learning difficulties with that of normal ones under the same roof. It brings all students together in one class room and community, regardless of their strength or weakness in any area, and seeks to maximize the potential of all students. It is one of the most effective ways to promote an inclusive and tolerant society. Right of person with disability act 2016 (RPWD) gave much emphasize on PWD students and their rights to enjoy the quality like dignity and respect for his or her own integrity. But a large number of people with disability specially Hearing impaired children faces numerous problems in inclusive setting. In Assam the total number of disabled person are 5, 30,300 out of which 51,825 are people with hearing loss. This is equivalent to 10% of the total disabled population within the state (Vaani, deaf organisation report, Guwahati). It was also observed that 80% of total population of deaf people live in rural areas. Literacy rate of the state is very negligible i.e, 39% (VAANI, 2001). The picture of disability in our country as well as in Assam is very pathetic. NEP2020 gave much more importance to improve the quality of education for person with disability. So through this paper the researcher wants to highlight the problems of Hearing impaired children in inclusive settings and focus the challenges of NEP 2020.

**Keywords:** Disability, hearing impaired, inclusive education, PWD

## I. Introduction

Education is considered as a powerful instrument for all round development of a child. According to Kothari commission, 'Destiny of a Nation builds in class room teaching'. It is a fundamental right of every child which help the individual to link the main stream of development or society and nation as well. But in our society there are some people who cannot access such general education for progress because of some difficulties. They require special care and training for survival. According to Kirk

(1986) when youngsters in the same class room remarkable different, it is difficult for teacher to help them reach their educational potential without some kind of assistance.

To help that the school device for children who differ significantly from the norm is called special education. In this regard Government of India over the last five decades have been providing towards comprehensive range of services towards education of children with disabilities. Kothari Commission (1964) which highlighted the importance of education with disabilities during the past independence period, it expresses that the education of children with disabilities must be a part of the general education system. In 1974 the Centrally sponsored scheme of Integrated Education for disabled children (IEDC) was introduced to provide equal opportunities to children with disabilities in general settings. The Govt. initiatives in the area of inclusive education can be traced back to national policy, 1986 which recommended as a goal, to integrate the disabled with general community at all levels as equal partners, to prepare them for normal growth and to enable them to face life with courage and confidence. The person with Disability Act, 1995 chapter v of the PWD Act ensures that every child with disability is entitled to free education up to the age of 18 years. Keeping in view Govt. of India had accelerated the new scheme of inclusive education to achieve the target of education for all (EFA) by 2010. Sarba Sikhsa Abhiyan (SSA) is on providing inclusive education to all children with special needs in regular school. This includes education through open learning, distance education, special schools, home based education, and community based rehabilitation. SSA ensures that every child with special needs irrespective of the kind, category and degree of disability is provided meaningful and quality education. Hence, SSA has adopted a zero rejection policy.

Right of person with disability act 2016(RPWD) provides that the appropriate government should ensure that PWD enjoy the right to equality, life with dignity and respect for his or her own integrity equally with others. According to NEP 2020 attempt has been made for free access to education for all children with disability and to achieve an inclusive and equitable society. But, a good number of special children suffer from short comings of their auditory organs, known as hearing impaired children. Due to their defective hearing mechanism they are unable to hear and speak which may lead problems of language communication. These special children tend to be unsocial and incapable of making adjustment in their environment; they have poor self-concept, inferiority complex and submissive which leads to isolated life away from the society. They need special care, institutional education and parental support for their progress.

## II. Concept of Inclusive Education

Inclusive education means all children in the same class room in the same school. It means real learning opportunities for groups who have traditionally been excluded specially in case of children with disabilities (UNICEF). Inclusive Education (IE) is defined as a process of addressing the diverse needs of all learners by reducing barriers to, and within the learning environment. It means attending the age

appropriate class of the child's local school, with individually tailored support (UNICEF 2007). Inclusive education is a process of strengthening the capacity of the education system to reach out to all learners. Inclusive Education denotes that all children irrespective of their strengths and weaknesses will be part of the mainstream education. The National Educational Policy (NEP) 2020 attempts to addresses the growing inequality plaguing country's education system today. Among others the NEP 2020 recognises high dropout rates among socio-economic strata and vulnerable minorities. Inclusive education is a new approach towards educating children with disabilities and learning difficulties along the normal ones within the same roof. It implies that all learners with or without disabilities are able to learn together through access to common pre-school provisions, schools and community educational settings with an appropriate network of support services. The Principle of Inclusive education was adopted at the world conference on special needs education. The idea of inclusive is further supported by the United Nations Standard rules on the equalization of opportunities for a person with disabilities proclaiming participation and equality for all.

## III. Meaning of Hearing Impairment

1. Hearing impairment indicates some damage or malformation of the hearing mechanism or defects in hearing apparatus.
2. As a result of such impairment, the affected child may get disabled in terms of the functional use of his hearing senses.
3. Consequently, the term hearing impairment may be defined as, 'a genetic term indicating a hearing disability which may range from mild to profound (Brill, Mac Neil and Newman, 1986).
4. Hearing impaired children may be classified into two types - (i) Deaf and (ii) Hard of Hearing.
5. According to Federal definition, ' Deafness means a hearing impairment that is so severe that the child is impaired in process linguistic information through hearing, another without implication, that adversely affects a child's educational performance (IDEA Act of 1990).
6. Hard of hearing is a less sever disability people who are hard of hearing can possess information from sounds and usually profit from implication provided by hearing aids. Both deaf and hard of hearing children are said to be hearing impaired.

## IV. Objectives

The following are the objectives of the study. They are

1. To study the nature of inclusive education.
2. To study the problems faced by Hearing Impaired Children in inclusive settings.
3. To study the suggestions given NEP 2020 in inclusive education.

## V. Methodology

The study is based qualitative in nature. The paper has been done on the basis of secondary data. Data related with work is collected from books, journal, periodical, annual report, internet website etc. Moreover, work is done on personal observation by the author the present study falls under descriptive analytical method.

## VI. Discussion

Problems faced by Hearing Impaired children in inclusive settings: The various problems faced by Hearing Impaired children in inclusive education are:

1. **Communication problem:** One of the major problems faced by the hearing impaired children in inclusive settings is communication, due to their defective hearing mechanism they are unable to communicate with their peer groups .Since, Hearing children are not familiar with sign language it becomes difficult for the hearing impaired children to communicate with them easily.

2. **Negative attitude and stigma:** Negative attitude towards the learners with hearing Impairments is another major problems faced by the Hearing Impaired students. These negative attitudes in turn cause feeling of self-pity, anxiety, inferioty complex and isolation. These feelings lead to academic maladjustment, negative attitude and rejecting children with Hearing Impairments referring to them as a burden to the society.

3. **Lack of awareness and sensitivity:** The whole idea of inclusive education is defeated due to lack of awareness, positive attitude and insensitivity on the part of teachers, classmates, parents and community leads the children to experience discrimination.

4. **Lack of specially trained teachers:** due to the lack of specially trained teachers, the hearing impaired children have to face difficulty in learning. Teachers lack competence and will to modify methodology as per the need of children with special need.

5. **Lack of flexible curriculum:** curriculum designed for children with hearing impaired and hearing children are same. But due to their language constraint it is difficult for them to understand cognitive aspects of learning.

6. **Inappropriate teaching and learning aids:** Children with hearing impairment require various types of teaching and learning aids. In India, most of the schools do not have proper teaching and learning aids.

7. **Poor perception: The major problems faced by Hearing impaired children is the poor perception and expression of language. Inability of the teachers of using the right method and techniques to develop the understanding level of hearing impaired children causes poor perceptibility.**

8. **Classroom management:** Another most important problem faced by Hearing impaired children in inclusive setting is classroom arrangement. Overcrowded classes lead to lots of problems.

9. **Problems of adjustment:** Normally hearing-impaired children are looked down on and ridiculed by normal children. They face both personal and social adjustment problems. Because of this, they feel inferior and ultimately it leads to maladjustment.

10. **Lack of support:** CWSN children require regular support from parents and teachers to make satisfactory learning. We found that there is lack of support in some schools and even they discriminate the children with special needs.

11. **Peer rejection:** peers generally try to bully and sometimes reject them. They feel that these children are not a part of them. This is one of the major causes why hearing impaired children drop out from school. Peer rejection is one of the main barriers of inclusive education.

## VII. Suggestions

The existing problems faced by the Hearing Impaired children in inclusive setting are numerous. NEP 2020 takes some important steps to overcome the problem and try to make an equitable and inclusive society. Steps are mentioned below-

1. **Ensuring universal access at all levels of school education:** NEP 2020 emphasizes on ensuring universal access to school education at all levels, pre-school to secondary. Infrastructure support, innovative education centre to bring back dropouts into main streams, tracking of students and their level, facilitating multiple pathways to learning involving both formal and non-formal education modes.

2. **Early child hood care:** The current 10+2 system in the school will be replaced by a new 5+3+3+4 curriculum structure corresponding to ages 3-8,8-11,11-14 and 14-18 years respectively. Under the school curriculum, this new system will bring an uncovered age group of 3 to 6 years. This is the age that has been recognised globally as the crucial stage for the development of mental faculties of a child.

3. **Reform in school curriculum and pedagogy:** The school curriculum and pedagogy will aim for holistic development of the learners by equipping them with the key 21stcentury skills, reduction in curricular content to enhance essential learning and critical thinking. Students will have increased flexibility and choice of subject. A new and comprehensive National curricular Framework for school education, NCFSE2020-21 will be developed by NCERT.

4. **Sign language:** As language barrier is the main problem of Hearing Impaired child in class room, NEP202 stated that Indian sign language(ISL) will be standardised

across the country, and National and state curriculum materials developed, for use by students with hearing impairment .Local sign language will be respected and taught as well ,where possible and relevant .

5. **Full participation:** Children with Disabilities will be able to fully participate in regular schooling process from the foundational stage to higher education, with support of educator with across disability training, resource centre accommodation, assistive devices appropriate technology –based tools and other support mechanism tailored to suit their needs .Every state \district will be encouraged to establish "Bal bhavans" as a special day time boarding school, to participate in art- related, carrier related and play related activities. Free school infrastructure can be used as Samajik Chetna Kendra.

6. **Special educator:** There is urgent need for additional special educators for certain areas for school education specially for children with disabilities \ divyang at middle to secondary school level. Such teacher would require not only subject teaching knowledge but should also acquire relevant skills for understanding such special requirement of children.

7. **Holistic approach:** Traditional system of education should be removed and need to introduce new pedagogy and curriculum for all round development of the students. The goal will be to create holistic and well-rounded individuals to cope up with key 21 st century skill.

# VIII. Conclusion

Inclusive Education is all about welcoming diversity. It is about making educational opportunities available for all children, irrespective of their differences. Differences are seen as a stimulus for fostering collaborative learning among all students. Inclusion is concerned with the identification and removal of barriers. It involves changes and modification in content, approaches, structures and strategies, with a common vision encompassing all children of the appropriate age range. It is an approach which looks at transforming educational environments to address the learning needs of all learners. It aims at enabling teachers and learners both to feel comfortable with diversity and to see it as a challenge and enrichment of the learning environment. Promoting inclusion is about improving educational and social frameworks to cope with divers learning needs of all children. Teacher has sole responsibility to create a conducive and equitable environment. So that they may adjustment themselves in the class room. Therefore it is the duty of school, parent society to upgrade their status and also provide them the circumstances in which they can live with high level of self-concept. Hope NEP2020 will bring a radical change in the life of differentiable child and make equitable and inclusive society.)

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# Educational Technology as an Innovative Revolution in Edupreneurship

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## Abstract

Education is the key weapon of development and growth of every country. And literacy in India is the prominent way for socio-economic progress. Millions of students completed their degrees from different schools, colleges and various universities every year. But yet not all students are successful in the way of earning as per the standard of living with their degrees. Now it is a very different scene today, with the Educational technology of teaching and introducing some innovative concept having been accepted as an important change of the system of education in India. Many individuals are interested of doing a new category of business, commonly referred to as Edupreneurship. It's basically a combination of two words i.e. Education and Entrepreneurship. Which create a unique category and content for potential candidates who are interested in a new way of teaching. After the involvement of radio, television, digital recorders, computers, and other such devices as a result of innovations in electronics in Education sector, the concept of Edupreneurship becomes more prominent basically for those who are highly interested in a new way of doing business and ready to takes the responsibilities in creating and developing a programme, product and services, technology for the enhancement of learning in education sector. This era is known as The Fourth Educational Revolution or Educational Technology or this is also known as Educational Technology Revolution. Therefore, this article represents the contributions of Educational Technology as innovative in Edupreneurship along with the different ideas and significance of Edupreneurship so that young people with education degrees can explore to become self reliantand employees of labour.

**Keywords:** Educational Technology, Entrepreneurship, Edupreneurship, Edupreneur

## I. Introduction

As our society learns towards digital, distance and enhanced technologies, education follows through and takes a leading role. Lifelong learning is not an advantage, rather a necessity. An Entrepreneur recognizes a problem and offers a solution, and this problems solution is Edupreneurship. In short, Edupreneurship consist of two important concepts i.e. Education + Entrepreneurship = Edupreneurship. Where Entrepreneurship means doing things in a new and better way and an entrepreneur is one who creating something new, introducing ideas radically different from routine, offering products to satisfy needs those have remained undiscovered and exploits it's as an opportunity. And the other term is Education. The

basic meaning of education is a lifelong learning process of development and growth of every individual as well as the process of modification of behavior of individuals. Specially after the Fourth Educational Revolution or Educational Technology Revolution, Edupreneurship has been gaining a huge importance in the present Education System. Educational Technology is in the form pf detailed application of the psychology of learning to practical problems. With the involvement of radio, television, digital recorders, computers, and the other such devices as a result of innovations in electronics helps the education system to make the learning process more effective and developed. Therefore, Edupreneurship is a process through which an entrepreneur solves a problem of the education sector by his unconditional thinking and also innovates learning by Building some unique learning programs, developing e-learning software and apps, or even getting involved in the gamification of learning a particular content area.

## II. Review of Literature

Kenny Netshiongolwe, (2020), this study highlighted the effectiveness of education for entrepreneurs in the world. The research mainly focus on essential for the significant associations that are further involved in terms of handling the most critical ideas that can be useful for the significant associative level, which can be useful. This study is based on both secondary and primary data. Here the study found that the business can face a couple of essential troubles that will be huge to the extent of speaking to a phenomenal necessity for different affiliations that are in the massive prerequisites for the progressions to the extent creating proximity in South Africa.

Sunday Olawale Olaniran and Juliet Perumal, (2021), describes in their study about the opportunities of different present Entrepreneurship which young individual with education degrees can explore to become self-reliantand employers of labour. The data collection of this article includes both primary and secondary data. As a final result this article states that Entrepreneurship Education is the way out from the huge youth unemployment rate facing Africa, and other developing continents of the World, So countries in Africa cannot afford not to create enabling environments for young people to run small and medium enterprises (SMEs). As well as those who studied education related courses are not left out as they can explore any of the educational enterprises.

Maria Liana LACATUS and Camelia STAICULESCU, (2016), this paper discussed about the new concept of Edupreneurship and Edupreneur and also the role and significant issues of Edupreneurship which is based on innovation in present education. As well as this study highlighted the various forms of edupreneurial initiatives. In conclusion this paper represents the various forms of edupreneurial initiatives which may appear as the viable solutions for the problems that schools and school mangers are facing now a days.

## III. Objectives

1. To understand the overall concept of Entrepreneurship in Education in short Edupreneurship
2. To highlight all the technological Contribution in Educational Entrepreneurship as the new Revolution.

## IV. Methodology

This paper is descriptive in nature and this is purely based on Secondary Data collected from various books relating to both Educational Technology and Entrepreneurship, as well as from related research papers, articles, Book chapters published, various journals, various internet websites and other relevant sources etc.

## V. Discussion and Analysis

There are many people who are interested in a new way of doing business like Edupreneurship. Edupreneurship is one of the new revolutions in education sector. The concept of Edupreneurship involves two terms i.e. Education + Entrepreneurship

1. **Education + Entrepreneurship = Edupreneurship: Entrepreneurship** is the process whereby an individuals or group of individuals use organized efforts to pursue opportunities, to create value and grow by fulfilling wants and need through innovation and uniqueness, no matter what resources the entrepreneur currently has. It involves changing, revolutionizing, transforming and Introducing new approached. Where, Edupreneur is the entrepreneur who solves all the problems relating to education by using different strategic ideas, different learning programs, expertise, knowledge etc.

   In the other words, **Edupreneur** is a person who works in the education industry using Learning as economic resources with the aim of creating positive value. Edupreneurs are usually considered as mission-driven as well as its bringing light of positive impact. **Edupreneurship** involves building new educational organizations, businesses as well as developing the various latest educational techniques, new schools, and also offering important keynote deliverance all over the world. They deal with 21st-century educational view point which is known globally inside and outside of the classroom Therefore, **Edupreneurship** basically refers to a process by which a person known as Entrepreneur solve the problems of education sector or who works in education by using different learning programs with their unconventional thinking ideas, skills and knowledge.

2. **Examples of edupreneurship:** There are some examples by which an Individual can become an Edupreneur or can start Edupreneurship:
   - Bloggers
   - Youtubers.
   - Coaches (Personal Development, Health, Business, Life, etc.)

- Affiliate marketers
- Podcasters
- Strategists

3. **Technological as innovative revolution in education:** Technology Revolution in education can be broadly classified into two categories:
   - **Technology of Education**
   - **Technology in Education**

**\*\*Technology of Education:** It refers to the application of behavioral sciences like psychology of educational theories and practical teaching learning problems, instruction, motivation etc. It involves: Analysis of instructional problems, selection of Instruments for evaluation, selection of strategies to obtain the desired result from the Teaching Learning Process, Teacher behavior, Programmed Learning, System Analysis.

**Technology in Education:** It refers to the use of equipments and machines like use wide range of audio visual equipments, hardware and sophisticated electronic devices such asfilm, digital movie cameras, projectors, radio, television, tape/digital recorder, teaching machines, computers, the internet, etc. for educational purpose .\*\*[ J.C Aggarwal, essentials of Educational Technology, 2014, pg-397]

**\*\*Programmed learning as 'Technological Revolution' in Education:** According to Edgar Dale, "Teaching is a broad, vague, ill-defined term, where as 'Instruction' is a purposeful, orderly, controlled sequencing of experience to reach a specified goal. 'Programmed Instruction' is a sub head under instruction and represents a more rigorous attempt to develop mastery over specified goals to secure 'Insured' learning".
\*\*(J.C Aggarwal, Essentials of Educational Technology, 2014 pg-134).

Basically, it is an individualized technique of instruction which is based on technique principles that have been known for years. It presents the instructional matter step by step in logical order and the size of the unit of information presented to the people is small as well as the immediate feedback is given to the learner.

Moreover, the programme is prepared in such a way that the students automatically participates actively by making response continuously.

And the programme is developed empirically through a series of tryouts and is refined gradually. Effective sequence of frames is retained and ineffective ones discarded.
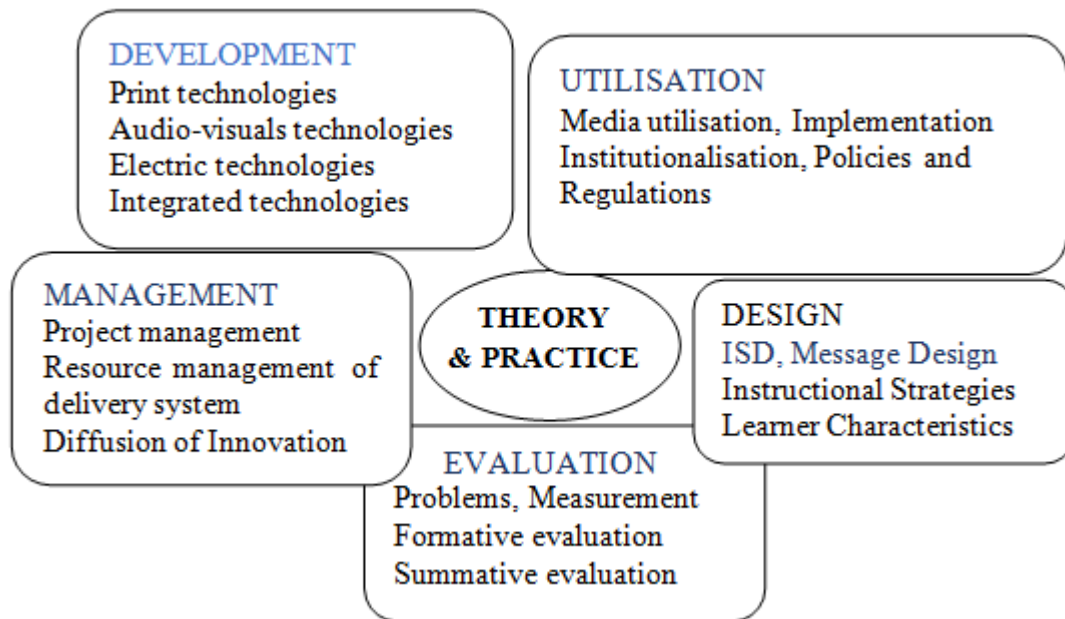
**Domains of Instructional Technology**
**Association for Educational Communication and Technology**

4. **Contributions of educational technology in edupreneurship**
   - **Developing new resource of learning:** i) Educational television, b) The Language Laboratory, c) Teaching Machines, d) Computer Assisted Learning, e) Programmed Learning, f) Simulated Teaching, g) Micro-Teaching etc.
   - **Increasing use of hardware software in education:** Audio-visual aids like charts, models, film- Strips, slides, audio-cassettes, sophisticated equipments and gadgets like film projectors, radio, tape recorder, record player, television, video, teaching machine and computers come under the category of hardware. Moreover, Software teaching technology is directly related to the psychology of learning which comprises behavioral changes resulting from experience.
   - **Development of some institutional initiatives:** Gyan Vani (FM Radio channel), IGNOU ( using tap recorders, VCR, color TV sets, audio and video cassettes), Gyan Darshan ( Educational TV programmed in India with 24 channels), Internet in India, Gateway Internet Access Service(GIAS),
   - **Major organizations and institutions having websites in education:**
     - ➢ Ministry of Human Resource Development, Dept. of Education, Government of India.
     - ➢ University Grant Commission (UGC), New Delhi.
     - ➢ National Council of Educational Research and Training (NCERT).
     - ➢ National Council of Teacher Education ( NCTE), New Delhi
     - ➢ Several Boards Of Education, including the CBCS. Etc.
   - **UGC and the use of educational technology:** Including Dissemination of CEC Programmes, Training in multimedia techniques, website, video streaming, Programme production, Telecast or CWCR Programmes, media Tap Library, and UGC-Infonet etc.

- **Introducing some new and latest technology in education:** i) Artificial Intelligence, ii) Computer Assisted Instruction, iii) CD-ROM, iv) dial Access, v) EDUSAT, vi) E-mail, vii) Tele- conferencing, viii) Tele- Tutorial, Tele-Seminar, ix) Videotext, x) Virtual University, xi) Digital Resources etc.

5. **Some advantages or significance of use of technology in edupreneurship**
   - Individualised instruction
   - Improvement in the quality of teaching
   - Meeting the problem of mass education
   - Equalising educational opportunity
   - Providing continuing education
   - Make teaching learning attractive, inspirational and effective.

# VI. Conclusion

Entrepreneurship plays an important role in development and contributing to the economy of a nation. In most of the developing countries including our India, Entrepreneurship has not found the place in Education Curriculum. In the present era when there are a lot of opportunities and increasing need for entrepreneurship, the short supply of entrepreneurs in the society is largely due to the absence of Entrepreneurship element in Education System. So, this article represents the overall concept of Edupreneurship which is basically focused on entrepreneurship in education. It also highlights the various educational technologies which has been using by the people to developed education and make it more effective. At last but not the list, this also states some important point which indicates how educational technology helps the Edupreneurship and how it changes the overall education system.

# Competitive Position, Core Competencies and Strategy Options of Godrej Consumer Products

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Godrej Consumer Established in 1897, the Godrej group has grown in India from the days of the charkha to nights at the call centers. Ardeshir Godrej, founder, lawyer-turned-locksmith, was a persistent inventor and a strong visionary who could see the spark in the future.

## I. Competitive Position of the Godrej

Godrej was leader in the Fast moving consumer goods in North India for a long time. Its market share was started to decrease when the HLL initiated its strong advertisement campaign and decided to acquire competitor brands. The strategies adopted by the HLL affected the performance of Godrej and Procter & Gamble in India. When the Godrej consumer initiated to regain the market share and to capture second place in the personal care products especially, Indian Tobacco Corporation entered the market and thrashed their dreams. ITC with a strong marketing campaign, attracted retailers by promotions and consumer by heavy advertisement at right time and at right frequency, reached its brands. ITC's brands are the major threat for the top FMCG companies like HLL, P&G and Godrej. Introduction of the brands by the ITC reduced those companies market share and induced them to think for sustainability. Thus it is time to rethink, Godrej should design effective marketing programs to reach its objectives mentioned in the business plan.

## II. Strengths and Weaknesses of Godrej

The strengths and weaknesses of Godrej as compared to its competitors in the market are:

### 1. Strengths
- Brand name is strongly positioned in the consumers mind.
- The brand Godrej reputed well in the minds of consumers as old, quality, Indian and respectful brand

- Cinthol a popular brand of Godrej, can be used for extension and creating awareness.
- Top management and the employees of Godrej are very big resource for the organization.
- The organization is having adequate financial reserves which will help them to develop new product, features and technology.

## 2. Weaknesses
- Poor Marketing activities are now a major weakness for Godrej
- The prices of the Godrej products are targeting high and middle class people only.
- Poor advertising policy
- Very less number of product varieties when comparing to HLL & ITC

# III. Core Competence Model

Core competence may be a competency in technology, process, engineering capability or expertise which is difficult for competitors to imitate

## 1. Core competencies of Godrej based on the core competence model
- Godrej has tendency to develop, inform and reach a collection of FMCG products due to its brand equity
- Godrej is targeting cost conscious households in the country
- Godrej is having obvious idiosyncratic brand scheme targeting middle class segment
- It is having wide distribution network making their products available everywhere in India.
- Optimized resources and economies of scale in the production process
- Quality products at affordable price

## 2. Comparison of the core competencies of Godrej with COMPETITORS
- Distribution network is the very good in Godrej and HLL whereas ITC and P&G are comparatively performing less in distribution
- Good leaders and Management created vision and working on the same in Godrej but it cannot be seen in competitor companies
- Godrej is the old, quality and Indian brand as in the consumers mind when comparing to other competitors but HLL having a brand image of Foreign brand and ITC is marketer of cigarettes.
- Clarity in the product line is the big advantage for Godrej but HLL is having too big product line which made consumers confused.
- Godrej brand is inspirational and continuously focusing to provide value for money when comparing to other FMCG companies
- Godrej is not giving heavy advertisements which are advantage in terms of less cost and less price but HLL and ITC are giving heavy advertisements which incur more cost.

### 3. Plan to sustain the core competencies of Godrej

- The concern can have high level skilled persons for the business process to reduce the cost of the product.
- Godrej can create more unique selling propositions to attract customers and reduce the competition level.
- Now the concern is concentrating on Points of parity and in future it should make points of difference for their brands.
- To maintain the quality of the product, the concern should automate quality control process by having Computer Integrated Quality Management system.
- Godrej should maintain the database of retailers for future communication and they should motive the intermediaries to reach the products to the consumers.
- They can extend products with clarity product line and few internal competitors for their product categories.
- Economies of scale and mass customization should be the prime principle of Godrej to provide value for money.
- Heavy advertisements may incur cost but advertisement at right time, right channel and right frequency will create awareness as well as increase the demand for the product.

## IV. Strategy Options

The numerous strategic options to gain competitive advantage in the market for godrej are

- Corporate restructuring for diversifying risks and tapping new markets
- Introducing new variants and brands to face competition
- Low cost and low price strategy
- Reach out rural market
- Advertisement and promotion
- Increasing unique selling propositions

## V. Review of Strategy Options

Corporate restructuring strategy is used to acquire competitive brands to diversify risk and to establish new markets. The advantage of it is increase in the market share and sales. The disadvantage of the restructuring strategy is costly.

Introducing new variants and brands will help the company to expand its business and to face the competition. The demerit of it is incurs more capital investment for new technology, new plant and for new production process.

All the competitors are marketing their product with low price by achieving low cost. Cost leadership already achieved by the concern further cannot decrease the cost.

Godrej can reach their products even in rural areas by developing further the distribution network. It will help the organization to increase the demand for the product.

Heavy advertisements and attractive promotion schemes will convert the people as customers. It incurs more cost and will result in reduction in profit.

Godrej should increase the number of unique selling propositions to gain more competitive advantage in the market.

## VI. Conclusion

The most suitable strategy option to improve the performance of Godrej consumer products is advertisement and promotion strategy. This marketing mix strategy only can help the organization to design and implement other strategy options discussed. Telecasting in right television, time and frequency will create brand awareness and attractive promotion schemes to induce the customers to use it.

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# Global Corporate Strategy in Apple Inc. View

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Apple a revolutionary company in the minds of all variants of consumers having core competencies and competitive advantage

## I. Core Competencies and Dynamic Capabilities of Apple Inc

1. **Innovation:** Product innovation created values for Apple Inc. through innovative products and services. Apple started its business with Apple I, differentiated its products at a regular time period, diversified the business and now offering software, hardware, consumer electronics, music store, mobile phones, operating system etc.. Within 6 years they have launched new products like Iphone, Ipad, Ipod touch, Superdrive, Apple TV etc

2. **Leadership:** Leadership played a vital role at apple, Steve jobs, Tim Cooks followed a mixed combination of leadership styles like benevolent and democratic. Apple has encouraged its employees to execute, innovate and accomplish the work with excellence. In 2006 – 2012, Steve Jobs was the CEO, everyone appreciated his leadership because he influenced innovation from everyone in the company.

3. **Perfection:** When comparing to competitive products, the apple products are unique in designs, usage and quality.

4. **User friendly:** Ipod, Iphone and Ipad are the products attracted everyone because of its user friendly nature. Designing is the key role of Apple to offer such kind of user friendly products.

## II. Strategic Alliances and Mergers & Acquisitions of Apple Inc

1. Apple and Disney is having strategic alliance to improve the performance of Disney store – Experience and to reduce the losses of itunes stores and Disney stores

2. Apple and HP is having alliance to deliver a HP branded digital music player based on apple's ipod
3. Apple and Microsoft allied to make Office for Mac and to bundle apple with Internet explorers in their new machines
4. Apple acquired 24 companies from 2000 onwards, some of the firms are Netseletor, Astarte-DVD Authoring Software, bluebuzz, Poly9, C3 Technologies.

## III. 'Diffusion of Innovation across Apple's Value Chain'

The Diffusion of Innovation theory classifies five different group of customers who are ready to purchase a product. The groups are innovators, early adopters, early majority, late majority and laggards.

Steve Jobs was the greatest innovator and entrepreneur of our times, who created game-changing innovations including the Apple II, Macintosh, NeXT, iMac, iBook, iPod, MacBook, OS X, iPhone and the iPad, and made Apple the most valuable company in the world. Steve Jobs was the co-founder, chairman and chief executive officer of Apple Inc.

Apple launched Apple I, an electronic chipset computer targeted customers preferring desktop computers in 1976 and it was upgraded with Apple II, Disc II, Apple II +, Apple III, Lisa, Apple IIe, Mac 128k, Apple IIc, Mac +, Mac II and Mac SE.

In the drives market, it started to offer and use Disk II for its computers and then upgraded it with profile HD, 400k drive, HDSC, CD super dirve and now it is super dirve.

In printers' product category, their product at the earliest period is Apple printers, Laser writer, Style writer and now color laser writer.

Even their innovations made in input devices also, at the initial period they have used normal keyboard and mouse, then they have introduced adjustable keyboard, USB mouse, Wireless mouse, Mighty mouse and now the company is offering magic mouse and keyboard.

Their first diversification from the computer products and innovative one Newton's message pad introduced at 1993. The journey started from there introduced quick take camera for photography and Wiggleworks, home learning software children.

In 1996, Apple acquired Steve Jobs Next Software, Steve Jobs named as Interim CEO routed for new range of innovations at Apple. In 2001, Apple introduced Ipod, induced great demand for the product and company, made innovation as the prime strategy of the company. Ipod attracted almost all categories of customers fall

on Diffusion of innovation theory, which induced apple to offer different Ipods like Ipod Nano, Ipod touch, Ipod shuffle and Ipod touch.

In another area Mac notebooks upgraded with PowerMac cube, iMac G4, iMac G5 and iMac core 2 duo.

In 2006, Apple introduced Apple tv targeting the customers interested in mobile tv. Previous to this they are having experience by introducing SPKR in 1993, TVbox in 1994, Pippin in 2005.

A revolutionary change made in the electronics market, not only for them, Mobile users, Apple company and also for competitors by introducing Apple Iphone in the market. From top to bottom across every section it becomes a dream to have Iphone.

In 2010, Apple introduced Ipad by altering the Apple Newton message writing introduced at 1993.

Innovation of products at Apple not taking too much time, made frequently but the customers are not irritated with it and also not confused. But the customers are showing interest towards the new and they are ready to upgrade their products. At initial stages, only innovators liked the products of apple, introduction of Mac induced early adopters also, the change has made while introducing Ipod and Iphone. Now the customers aware about the Apple products are having a dream of getting it, in particular all categories of customers.

Apple can be told an example for strong brand image, thus it is easy to enter new market, fix high price and offer different products. In a customer satisfaction survey, most of the Iphone customers are satisfied with their user experiences and most of them already owned an Apple product. Customers are loyal to the Apple brand and publicity, advertisement and hard selling techniques made the customers to stand in the que and they are not worried about the shortcomings of the product. (Benjamin, 2008)

All over the world Apple iPods, iPads and iPhones were diffused quickly, most category of the people accepted and admired with the products.

Apple iPhone was introduced at January 2007, within three months it reached 1.5 million phone sales target. (Wingfield, 2009). Ipod took two years to reach the count, thus the consumer rate of acceptance is more with the new innovation.

Within three years Apple iPhones were sold out more than 20 million and the market share increased from 9.1% to 14.4%. (Kane, 2009). Apple started to export it and the sales made was 25.1 million in 2009 which was 82% higher than the previous year sales. (Slivika, 2010). In July 2009, Apple's overall profit increased by 15%, and the firm announced that it was unable to produce enough iPhones quick enough to meet consumer demand (Prystay, 2009).

## IV. Breakthrough Innovation in Consumer Electronics and Entertainment

People may know only about the innovation made by the Apple but it is interesting to know how Steve Job's Innovations changed the whole global technology environment. He also changed the role of leaders and strategic leaders on innovation, innovation should be culture, different, unique and attractive. Steve jobs appointed as Interim CEO, at that time the company was in struggle and financial sickness. His wide vision on the concern helped Apple to start lauch of specialized products to people and it can be called he started the digital era.

Apple introduced the iPod, called digital portable mp3 player in 2001 which is compact, attractively designed, can store approximately 1000 songs. The launch made huge demand for the product, sold out heavily, it can be understood by seeing one out ten plugged with white wire in ear.

Pirated things become very common at the initial period of 21st century, to stop it Apple launched ITunes music store. iTunes offered songs, videos, mobile phone apps and it is very easy for iPod customers to sync and download. iTunes generated income for Apple, and it is 20% of its total income. For both iPod and iTunes, so many competitors arrived, people started to tell all digital music players as iPods.

Phones upgraded with mobile phones, then handy cell phones, phones with calling as well as data sharing facility and now the era of Smart phone. When Apple introduced iPhone in 2007, people felt they never felt and saw anything like iPhone. iPhone offered calling facility, data transfer, in built ipod, mobile applications, camera and all other features of a smart phone with a high perfection. It is easy to download third party applications through iTunes store, which made iPhone as a pocket computer.

It is clear that after the entry of Steve jobs, whatever the product lauched by Apple it become the fashion and trend of people. iPod reduced market for headphone music player, iTunes reduced market for piracy sites and iPhone reduced the market for other brand ordinary mobile as well as smart phones.

The same environment again made by Steve Jobs in the name of iPad, which started to decrease the sales of desktop computers and laptops and also increased the sales of tablet PCs. Apple's product popularity not only leveraged by it but by competitors also to market their digital music players, smart phones and tablet PCs. iPad can be used as a personal computer to enjoy multimedia, read books, and browse internet with camera and wi-fi. In 2006 Steve jobs introduced Apple Red iPod Nano with the capacity of having 2000 songs and at the launch joined the BAND U2. Apple agreed to share $10 from each product to fight against aids in Africa. His last public appearance made in the launch of iCloud at Worldwide Developers conference. iCloud can be used to share the files, music and mail in Apple product and mail id. There are nine applications can be stored which are iTunes, Photos, Apps, books. Contacts, Calendar, Mail, Documents and back-up.

# V. Conclusion

It is pleasure to complete the work with the quote of Strategic leader Steve jobs which will clearly define all about Apple. "A lot of companies have chosen to downsize, and maybe that was the right thing for them. We chose a different path. Our belief was that if we kept putting great products in front of customers, they would continue to open their wallets" (Jobs, 2011)

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# Challenges Every Edupreneur Faces and How to Overcome Them

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## Abstract

Entrepreneurial skills are essential to a nation's character because they allow pupils to recognize their strengths and weaknesses, which in turn helps them to develop their character. Entrepreneurs in the area of education are referred to as Edupreneurs. These edupreneurs have changed this country's education industry. In banking, insurance, and other service areas like IT, manufacturing, sales, and fashion, we see many job alternatives for today's youngsters. It is because the economy is booming, and liberalization is taking hold. Education is a sign of a well-developed economy. It is hoped that this article will serve as a guide for young people who want to start their businesses, create jobs, and have a positive impact on India's long-term progress and prosperity.

**Keywords:** Edupreneurship, Experience learning, Entrepreneurial learning, Edupreneur

## I. Introduction

To build an economy, you need a well-educated and well-educated populace. This necessitates the development of an education system that can adequately train our future generations. We seek people with entrepreneurial and social sensibilities who want to build education businesses to make a difference in today's world. The word "EduPreneur" refers to a person who enters the educational sector and establishes his or her educational institution. Higher GDP expenditure on education has made Singapore, Malaysia, and China major participants in the cross-border higher education market, drawing many renowned institutions from advanced nations and hosting a significant pool of internationally mobile students. Singapore, Malaysia, and China to advance economically, India must place a priority on increasing access to higher education throughout the country [1].

Entrepreneurship and education have been combined to define "eduupreneurship" (entrepreneurship). The goal of Edupreneurship is to infuse classrooms with entrepreneurial ideas and a can-do mentality. Entrepreneurship, which in French means adventurer, risk taker, and entrepreneur, combines education and self-maturation. There must be additional value and something new for an

entrepreneur to stand out. Etymologically, edupreneurship may be regarded as a learning process that concentrates on entrepreneurial activities in theory and practice, which alludes to both terms above. Entrepreneurship is not a myth but rather a reality or construct (building) that can be mastered via education, training, simulation, and intensive internships. This is where theory and practice are affirmed. There are three key things that we can learn about the concept of entrepreneurship here, namely creative innovation (renewal of power), copyright, opportunity creation, and risk discussion. Every human can be a creative reformer, dependable opportunity generator, and fearless risk taker if entrepreneurship is seen in these three ways.

In 2017-2018, India had a Gross Enrollment Ratio in Higher Education of 25.8%, with over 250 million students enrolled in schools and colleges totaling 39,050 and 903, respectively. Indian Education Sector has opened up as an excellent opportunity for businesspeople who want to pursue a career as "edupreneurs" or "education entrepreneurs" due to the country's rapid advancements in education.

Since India's government permitted 100 percent foreign direct investment in the education sector, some of the best minds in the world have banded together to make India a more educated nation, opening up a world of limitless opportunities for its citizens. These so-called 'edupreneurs,' whether individuals or businesses have made education more readily available and more convenient for everyone. [2].

Major corporations, such as Procter & Gamble have created the 'SHIKSHA' platform to raise money for education. In the years afterward, several companies have adopted this philosophy. This shows that education should be accessible to everyone, regardless of their circumstances.

Some prominent educators believe it is an excellent chance for budding entrepreneurs with a passion for education to develop educational institutions that may benefit all of society.

Despite this, many individuals see education as a "money-making industry," leading to a climate of distrust. As a result, edupreneurs face enormous obstacles since their mission is not widely accepted.

It is also said that entrepreneurialism is the capacity to develop something new that is both valuable and beneficial to the individual and society at large. A person's entrepreneurial spirit is a mental attitude and soul that is constantly active and creative; empowered; creating; working; unpretentious, and striving to enhance revenue from its commercial operations. On the other hand, entrepreneurship is defined as the ability to take advantage of new chances to grow one's company and quality of life. The human spirit and the human soul Entrepreneurship must be owned by entrepreneurs but also by the professions and roles played by those in those professions, such as teachers, lecturers, students, physicians, soldiers, and police officers, to name just a few examples. Everyone's edupreneurship potential develops for different reasons. According to Riant Nugroho, there are three categories of

entrepreneurs: those who have no choice but to be an entrepreneur, those who want to be an entrepreneur, and those who are forced to be entrepreneurs by circumstance. In the beginning, people learn to survive on their own, for example, by keeping cattle, becoming merchants, or operating a company certain because of the constraints imposed by poverty, dropping out of school, or the loss of their parents. Some people opt to start their businesses after being laid off from their day jobs [3].

For the second time, someone creates a company out of need. When a person sees an opportunity, such as political policies and government facilities, he or she may start a company.

Third, someone has set their sights on being wealthy and successful by starting their own company and networking with others. Somebody is attempting to achieve the goal of financial security and independence without being constrained by the constraints of a job schedule. For the most part, they pursue a four-year degree in business administration, finance, or a related field of study.

## II. The Importance of Edupreneurship

An entrepreneur is a self-employed individual who makes a living by running his or her own business. To put it another way, he does not rely on himself or anybody else. As a first step in starting a business, he gathers the necessary resources and means of production to put together a business plan. A direct result of these actions is the creation of new jobs and revenue for both citizens and government, as well as opportunities for other workers to earn a living while contributing to the common good. Other benefits include repurposing unused raw materials for societal purposes and technological advancement, stimulating new investments, and expanding government revenue sources [4].

Both internally and externally, an entrepreneur is a valuable asset. Increasing the offenders' buying power is one way that an entrepreneur may help reduce their degree of dependency on others. When it comes to external employment creation, entrepreneurs play an important role. The national unemployment rate is lowered as a result of entrepreneur-provided job possibilities.

Per capita income, buying power in society, and decreased unemployment rates influence national economic development. Further reducing crime levels has a positive effect on reducing unemployment rates. Entrepreneurship necessitates the presence of an entrepreneur. Entrepreneurs play an important role in a country's economy:

1.  Creating new employment
2.  Unemployment should be reduced.
3.  People's incomes should be raised.
4.  Combining natural and human resources for production
5.  resources (labor, money, and knowledge))

6. Boost the nation's economic output
7. Promoting economic development
8. Reducing social and economic disparity
9. Making it easier for people to build equitable and thriving communities.
10. Boost the economy
11. Aiming to stimulate the creation of innovative products
12. Boosting the productivity of employees (Human Resources)
13. The beginning of a relationship between two people.

Research shows that small company owners work harder, earn more money than their larger counterparts, and are more proud of their accomplishments. Every aspiring entrepreneur should consider the advantages of owning a micro, tiny, or modest company before starting one. Entrepreneurship's advantages have been outlined as follows [5]:

1. It gives individuals a chance and freedom to control their destiny by starting their own company, which gives them the freedom and opportunity to fulfill their life's purpose. If you are a businessman, you will do all in your power to make your ambitions come true.

2. The ability to grab chances to make numerous adjustments that new companies believe are essential means that new firms have more opportunities to improve. Businesses are now finding a method to connect their concern for many economic difficulties socially with the desire to live a better life by offering basic housing that is healthy and acceptable for usage, as well as by establishing trash recycling to save limited natural resources.

3. Make it possible for you to realize your greatest potential. Many individuals have realized that working for a firm may be monotonous, devoid of variety and excitement. Entrepreneurs, on the other hand, are exempt from this rule. Both work and recreation have a lot in common, yet there is a big difference. Entrepreneurs use their businesses as a means of self-improvement. Creativity, excitement, originality, and their unique vision all play a role in their success. Power, spiritual development, and freedom to pursue one's interests and hobbies are all benefits of owning a business.

4. Have the chance to earn money. Most entrepreneurs do not want to be rich, but those that succeed in their ventures tend to become wealthy, even if money is not their primary driving force in the early phases of their firm.

## III. Literature Review

Entrepreneurial traits and attributes are examined in depth in the literature study presented here, which includes a wide range of sources. Although Kogan and Wallach [6] noted that risk-taking propensity could not be considered a distinguishing characteristic of entrepreneurs, this distinction has since been overturned by others. A

young entrepreneur's risk-taking style is clearly defined by research. The entrepreneur's well-being and financial security are directly linked to the risks he takes on behalf of his or her job, family, and health. Losses from personal financial commitments can hurt a person's living standards and emotional well-being. A person's willingness to take risks is therefore critical in the decision-making process. Some evidence suggests that entrepreneurs who succeed do so by taking calculated risks [7].

Entrepreneurship has been shown to impact a country's economy and society positively. Entrepreneurs may help a country's economy flourish, as this report argues. In order to produce the best entrepreneurs in the country, we must focus on young people; for this purpose, no one is more valuable than a teenager. Students must choose a professional choice while still in school. There are several benefits to giving young people entrepreneurial training and supporting them internally and externally, as well as praising and encouraging them. It will boost the economy and lower unemployment by generating new work opportunities. The Internet is critical in all of this since it is the greatest and cheapest means to sell items and is available to all young people. People create social media pages to market and sell their wares. Creative marketing is a favorite pastime for today's youth [8].

Entrepreneurs unquestionably serve as a source of energy for the national economy. What are the identities of these men? "On which economy can well flourish" is the response. They have a strong sense of self-worth. You cannot stop learning if you genuinely believe in yourself. You cannot stop turning a problem into an opportunity. You cannot stop seeing the positive in everything. You cannot stop learning from your shortcomings.

Achieving success as an entrepreneur is no easy task. Workforce, affairs, and assets are all brought together by the entrepreneur to meet the company's demands. Businesspeople always look for ways to change, react to, and capitalize on new opportunities. Getting people excited about entrepreneurship, especially young people, is critical to increasing entrepreneurial activity. In some ways, being an entrepreneur is inborn, but more often than not, the environment shapes entrepreneurs; for example, a recent study of women entrepreneurs showed that they transitioned from salaried employees to small company owners. They left their occupations because of several circumstances. They must attain their goals in terms of self-actualization, independence, and monetary gain. Entrepreneurial traits such as enthusiasm, attentiveness, and verbal and nonverbal communication abilities were discovered in these women [9].

## IV. Challenges for Edupreneurship

Entrepreneurs in practically every economy face hurdles in the form of disclosures [10]. Every economic system has an entrepreneurial culture, but there are flaws. New and rising entrepreneurs and the businesses they run are not well known by the general public. Anxiety, aversion, and fear of failure are common experiences

among entrepreneurs [11]. Still, the government has not given them a wide berth, and they continue to adhere to outdated formal norms. Some newbies and small businesses are not getting the help they need because of the absence of support from suppliers.

Regarding fiscal policy and investment expenditures, huge corporations and enterprises with ties to the government pose a threat. The problems include a lack of government funding, a lack of training, and a lack of support. As a result, many Saudi and Arab young people opt to work in public sector organizations, which might be a problem when it comes to recruiting talent. Inexperienced entrepreneurs are reluctant to share their successes or failures with newcomers [11], which is a problem for newcomers who need to learn from those who have gone before them. As a result of social connection and social support from elders and peers, most competent individuals opt to be workers rather than entrepreneurs.

1. **Fuel edupreneurship:** In order to grow the economy, businesses need a little more oomph to get things done. Entrepreneurs are motivated by a few characteristics, the most important of which is a deep belief in one's talents and the ability to transform oneself into a clever intellectual who uses his creative abilities to strengthen the company [12]. He/she should not be frightened of failure and should continue to observe and learn throughout their lives with a positive outlook. Students' personalities are shaped by the social and familial environments in which they grow up. These influences may either be good or bad for a student's development. The influence of each component is proportional. This research is crucial because entrepreneurship will grow in popularity in the years to come, particularly in countries plagued by high unemployment rates. Students who are graduating are outnumbering jobs. Therefore they are starting their enterprises and making good money. This pattern will continue to expand. It is thus critical to do a study on potential future difficulties. To combat the issue of unemployment, entrepreneurship is a must. Students should be mentored and taught entrepreneurship in institutions that provide such courses. To improve their notions, little tasks must be carried out.[13].

2. **Edupreneurship and competitiveness:** Poor economic conditions lead to political catastrophe because they stifle the economy's expansion. Sustainable fiscal policies may contribute to a healthy economy. Higher-income economies, in particular, may succeed in a competitive environment. People's lives may be improved by well-run businesses, which can also do well in global marketplaces. The competitiveness of a country is defined as its ability to use its people, financial, and natural resources productively over the long term. Competition is not achieved by lowering employee pay or devaluing the currency but by increasing effective productivity [14]. The mix of indigenous and international enterprises boosts productivity, making it a national asset. When there is more competition, wages and employment rise; for a country to compete with others, it must provide the most productive business climate [15]. While public and foreign enterprises are allowed to conduct business in Saudi Arabia, Saudi Arabia recognizes the roots of local development in private sector businesses. Affluent

growth and employment structure, however, are still major issues. In order to reap the benefits of this competitiveness change in terms of employee compensation, motivating entrepreneurship is an important first step. Consumerists can only explain the competitiveness of Saudi Arabia's panel-based economy and services. In the last several years, Saudi entrepreneurs have established themselves as a component of the country's economy.

3. **Perceptions related to edupreneurship:** There is a strong social resemblance for entrepreneurship in Saudi Arabia, without regard for competition. More than half of the public feels that starting a company is better than working for someone else. They feel that becoming an entrepreneur would help them rise in social standing and get them the respect and admiration they want. According to a section of the people, most of the industry is focused on solving social problems rather than creating innovative products. It seems that Saudi culture has become a little less energetic and a little less wise with the rise of the electronic media sector, according to assessments of community norms. No matter how much it has changed historically, Saudi Arabia has maintained its strong geological pressure zone, focusing on community ideals of free business. That is why it is fair to say that everyone rated on this issue is progressing, except for competition, which is necessary for a healthy entrepreneurial system. Middle-aged Saudi Arabians are a good indicator of the country's great self-awareness when it comes to entrepreneurship. According to a recent survey, about 80 percent of the younger generation started their own business, and about 70 percent of the population thinks that starting your own business is a better option than getting a job. In the six months following the survey, 81.5 percent of people saw excellent opportunities in businesses, which is a significant increase from 2009. Contrarily, the proportion of individuals who believe they have entrepreneurial abilities has fallen, while the number of people who believe they would fail has climbed. Individuals are equipped with the fundamental ideas and abilities to spot possibilities and to discover solutions where others vacillated in Tan and Ng's [11] definition of entrepreneurial education. As a rule, business schools focus on teaching students how to be effective managers in a large firm rather than how to lead or overcome difficult circumstances to foster innovation and creativity [16]. It has been concluded that employees have job insecurity, industries are moving towards complexity, and business schools have added the Feld for entrepreneurship, which helps to survive in dynamic and fast- growing industries because the process of scaling back is held frequently in dynamic and fast-growing industries. Various institutions use various methods to determine which entrepreneurship education program is the best in order to establish it as a standard. Researchers have shown that the learning by doing method is the most effective for comparison. The phrase "learning by doing" refers to students' active participation and physical engagement in class [17].

Similarly, ChyeKo [18] found that several research is going performed to identify the traits of successful entrepreneurs. When he came up with the model, he gathered data from entrepreneurs; he used two dependent variables achievement

motivation and locus of control; his research further described entrepreneur achievement motivation into sub-components that include moral values, the pursuit of brilliance, and dominance. The second component was similarly divided into three pieces, and he concluded that all successful entrepreneurs have these traits to attribute to chance, internal attributing, and strong people.

## V. Characteristics of an Edupreneur

Numerous studies have shown certain similar traits among successful business people. As a result of Nabi and Holden [19] finding that entrepreneurs are risk-takers, some cited motivation as a vital attribute; others concluded self-confidence and innovativeness of a person led him to a successful entrepreneurial career. Seven traits were taken into account in this study: creativity, the will to succeed, the ability to exert control, the predisposition to take risks, an optimistic outlook, motivation, and fortitude. As well as giving life a boost, entrepreneurship in a nation's economy may help it grow and succeed in the future [20]. The introduction of a new product, more market rivalry, and more alternatives for customers may all be achieved through encouraging independent merchants to generate new jobs. It is vital to consider both the unemployment rate and the level of social welfare. This includes a person's willingness to take a chance on himself and their ability to make wise judgments. In order to become a successful entrepreneur, it is possible to establish a small firm while working as a freelancer; nevertheless, most small enterprises fail to develop a major employment market [21]. Many people believe that the United States is a better place to start a company since it has higher borrowing rates than Europe, making it easier for entrepreneurs to get started and connect with growth. Cultural and national institutions are seen as impacted by businesspeople. Germany's financial system has several essential aspects, such as borrowing from banks and requiring financial intermediaries to be tightly prohibited. Trade unionists and business representatives are not favorable to entrepreneurs in Germany's labor market system. In addition, Germany has a more structured system need, and most employees have particular education.

1. **Locus of control:** A person's personality includes their sense of self-control as well. It is possible to have an internal or external locus of control. Outsiders have an external locus of responsibility, which means they cannot address any given problem. People with an internal locus of control believe that the events in their lives directly result from their own actions, which they believe they can influence. They do not point the finger elsewhere. Because of this, researchers recommend that entrepreneurs have an internal control center. According to several studies, entrepreneurs are likelier to have an internal control center than those who are not. [22].

2. **Risk-taking propensity:** Risk-taking propensity is the degree to which a person responds to risk and how much risk they can take. Entrepreneurs are also shown to have this trait, according to research. They put their finances, well-being, and

emotional well-being in danger. An entrepreneur's willingness to take risks distinguishes him or her from an employee [23].

3. **Positive attitude:** Positive feelings regarding an action or a circumstance are one way to demonstrate a positive attitude. Studies have shown that the trait of a positive attitude may be found somewhere in the personality of an entrepreneur. Individuals may find consolation in any situation if they have a positive outlook [23].

4. **Motivation:** Entrepreneurs have been said to be driven by a strong sense of self-motivation. It gives one the confidence to take a chance and come out on top. Motivation may be intrinsic or extrinsic, depending on whether or not internal or external factors generate it. An entrepreneur's character must have a strong sense of motivation.

## VI. Discussion and Conclusion

In reality, this research is very important because of the upcoming surge in entrepreneurial firms due to joblessness. A large number of students are graduating, but there are no jobs available. Therefore some of them are starting their enterprises and making a good living. This pattern will continue to expand. As a result, it is essential to study potential future problems. To combat the issue of unemployment, entrepreneurship is a must. Students should be able to take courses in entrepreneurship in universities, where they will be mentored and taught. Small tasks are important to help students better understand their study subjects.

All of a student's traits affect their proclivity towards entrepreneurship. In reality, students' personalities are shaped by their families and their upbringing. These influences may be beneficial or harmful depending on the family's culture and the larger society in which they live. Everything has a certain effect on the world in a particular way. Regulators should direct universities to organize entrepreneurship-related events to assist students in developing these abilities. Organizing various programs and seminars at the university level is the institution's role in instilling entrepreneurialism in students. There should be a course on entrepreneurship in every university's curriculum.

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# Edupreneur and Digitalization

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## Abstract

The term "edupreneur" is the combination of the word "educator" and "entrepreneur". Therefore, an edupreneur is who creates or who cares for income source from learning. In mathematical terminology, it is education plus entrepreneur is equal to edupreneur. Another terminology, which is very similar to educator, is teacher, but traditional teacher will not be looking after income source or profit loss balance sheet. Edupreneurs focuses on setting business and simultaneously students will get best quality of education. This is possible when the scale and maximize the impact as a teacher or educator, that need to develop such a system which will be operated even when a teacher is not directly involved in the process of teaching. Therefore, to achieve this digitalization is helping tremendously. Due to its easy accessibility and 24 X 7 availability, it is more accepted and popular among all over the world. Digitalization is platform, which will, helps eduprepneurs to reach their goals. During pandemic time this modern technology that is digitalization helped to reach students of in every corner of world.

**Keyword:** Edupreneuer, digitalization, educator, teacher, business, technology, augmented reality, virtual reality

## I. Introduction

The use of computer in various sectors is very old concept. As years passed modern technologies, evolved and still more modern apps are still coming up. This change from old traditional method of keeping records and business strategies are now

replaced by modern technology called digitalization. Digitalization helped to develop business platforms in many sectors such as education, healthcare, stock market, banking, and travelling, E commerce.

During pandemic period, this digitalization helped many of the learners to get education. The major impact of digitalization is that it can be accessible to anyone at any corner of world with their preferred time slot. Digital transformation is vital to play important role in evolving better entrepreneurship. Digitalization is transformation of society from all aspects, not in work environment but also in the educational context too. Integrated use of technology in field of education sector is not new, especially regarding internet. This transformation of digitalization is helping us to reach our goals with rapid rate and pace. Also these newer technologies and advanced modern techniques are helping to understand the topic or subject in more easier way like for example with the help of augmented reality and virtual reality students can understand the subject more easily as compared to traditional way learning.

As we are talking about the advantages of digitalization, similarly there are disadvantages of digitalization are also there. Common most challenge students and learners are facing is internet connectivity. So like that many challenges are there which should be fulfilled by the of edupreneur.

To generate the income and simultaneously solving the problems of the learner is big task for edupreneurs. Possible solution for the above common problem is to create easy to use or user friendly technique or module for better productivity and efficiency.
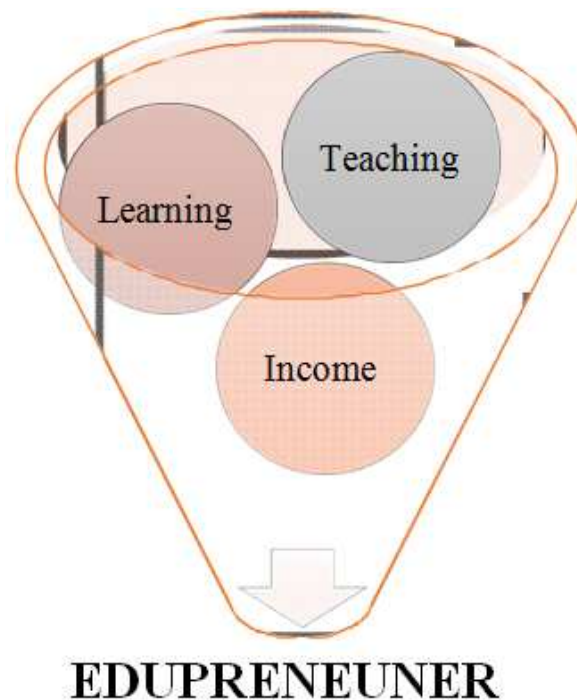


Figure 1: Concept of edupreneuner

## II. Edupreneurs Using Various Methods for Learning under Digitalization

1. **Online Courses:** Student or learner want to gain knowledge about new course or language or dance class or classical music, can attend the various classes with their convenient time, place and choice. Now all this is possible because of newer technologies and apps, which were developed by expert person or the institutes.

2. **Online exams:** This recent pandemic situation is best time to see the convince of exams to be held on online method. This not only helped to save time but in some fields it helped to not to repeat academic term also. At some extent it also saves the paper. So indirectly it saves trees also and it is nothing but preserving our ecosystem..

3. **E Books or digital textbooks:** The concept of e-book made easy life of every learner. These are available 24X7 and with easy accessibility. Some of the e-book have interactive sessions too and also having hyperlink which made the learners to understand the concept or topic or subject easily. This concept of E books is also favorable whenever every book can not be bought by the students. So referring many books at a time is possible by the concept of digital books. So forming the E library is possible because of the these modern technologies.
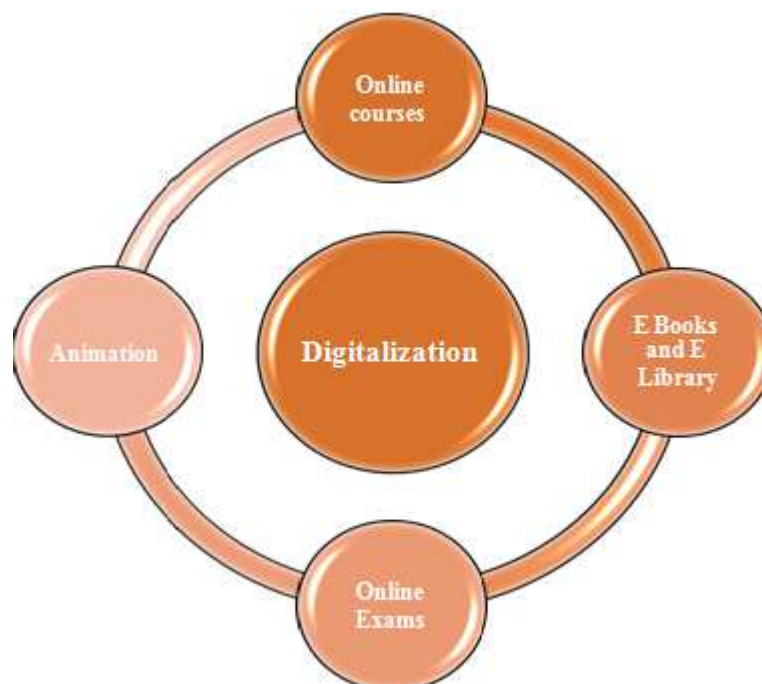


Figure 2: Various methods of learning under digitalization

4. **Animation:** Under this heading, best example comes for healthcare sectors especially for subject of anatomy and physiology. Location and functions of that particular organ is shown by animation with 3D effect, which is easiest method to understand the subject. Learner will have clearer idea about the topic with minimum efforts. Various animation videos, GIF, PPT made the concept easy for

students. For example in health care sectors functioning of pancreatic juice along with bile secretion is shown easily rather than drawing the diagram and explaining, and many more examples similarly.

5. **Virtual reality and augmented reality:** This concept is more of used in the subjects of astronomy, geography, even in the field of medical, surgery, nursing, dental too. Developing such type of apps will also is one source of income and which leads towards edupreneunership. Many large scale educational institutes have adapted these type of advanced digitalization methods. Modern era students are demanding such type of apps and technology, so there is no harm in adapting some of these.

## III. Advantages of Digitalization in the Field of Edupreneurship

1. **The teaching-learning revolution:** In older days teachers are the main source of education. But as the technology is advancing these traditional concept is changing. And its nothing wrong to think source of income through giving the education. In traditional teachers were never thought of concept of edupreneuners. But with modern era along with modern digital platform, education is very accessible at students convenient time, place too.

    Digitalization is changing all aspect of education. Integral approach of education and digital technology is not new concept, but the pace with which it is advancing is new, that is Internet, Internet Of Things(IOT), Artificial Intelligence(AI), Augmented Reality(AR), Virtual reality(VR), and many more technologies are used. All these technologies are proved to be for better quality of education.

2. **Personal transformation:** Adapting new technologies is the process of discovering that the teacher have so much to give to others and to students which provides full proof reinforcement of skills and knowledge. All these increases self efficacy, confident, motivation for more learning and teaching.

3. **Gaining global level students:** On the basis of advanced technologies, we can get students from any corner of world. And this is possible only because of internet. Student can join their favorite course from globally too. Like for example if south Indian dance can be learnt anywhere from corner of India, not only India but from any corner of world. This enhances income source also. But some years ago this concept was thought to be impossible. But thanks to digitalization.

4. **Accessibility:** Students from different geographical source according to their convenient time, they can access the desirable topic at any time. This also allows repetition for many times. The only lacunae in this is if poor connectivity of internet. Here students are totally dependent on internet. So the students residing at remote places there will be always poor internet connection. So in this case accessibility and availability is little hampered.

5. **Availability:** As per the traditional method of teaching learning process, availability of learning resources were few and for limited time period. Classical example for this is schooling age group. In this group teachers do teaching for limited time period, and about availability, practically it was not possible to be available at any time. However, exactly opposite is with method of digitalization. Thanks to all modern technologies and availability of all learning resources are now accessible at any time according to preferred time of student.

## IV. Assertive Role of Digitalization towards Edupreneuner

Below are some points which explains the importance of digital technology in the field of education.

1. **Enhances effectiveness of education:** There is no doubt that since the technology is introduced in classroom, there is over all growth of students. Digitalization promotes rapid and healthy educational impact across the world. The most assertive impact of digitalization on education field is that it is easily available at everyone's convenient time or place, secondly it is accessible 24X7. It enhances knowledge and skills of the students.

2. **More resources:** Technology such as Augmented Reality (AR), Virtual reality(VR) helped students to learn in better way. Like for example some years ago actual frog dissection was done in school biology practical. But thanks to augmented reality and virtual reality these dissections are done virtually without actually not dissecting animal and not harming the any living animal. This also prevents spreading of diseases. Other most common example is, for school purpose visit to pole (North Or South pole of earth) is very much easy because of the augmented reality. Walking on moon as astronaut made easy, thanks to augmented reality. This also helped in point of cost effectiveness. History lovers will be easily visiting museums, monuments under the technology of augmented reality.

3. **Usefulness of Virtual Reality and Augmented Reality in Medical Colleges**

    - **Simulations:** Finding sub cutaneous/ deep vein for IV or for injections--
      For giving intravenous injections, doctor or nurse can easily visualize the main vein or alternative vein.

      Best option in training of surgeries— It is well known that when it comes to any operation precision makes the point. So, to make this accuracy and perfectness surgeons should go under certain repetitive training. So now here is the role of augmented reality which provides good technology for such kind of training. One more additional point to all these are, that no one is harmed, no one is bleeding, no mistakes so, no question of legal point to be raised.

- **Study of subjects such as anatomy and functioning of body physiology made easy:** By combination of real and virtual images it is very easy to show actual location of organ in body, or vein in body. Other example is to study the interior structures of brain and spinal cord made very easy because of augmented reality. For physiological functioning of beating of heart or conduction system of heart, or how deglutition or gastric emptying is happening.

- **Augmented Reality in dentistry field:** Artificial Intelligence software helps dentist to build precise crown or caps.

- **Plan of Treatment or surgery for patients:** Virtual Reality helps to plan in advance complex surgeries for example neurosurgical procedures. In cases of PTSD-Post Traumatic Syndrome or Stress Disorder situation similar recreated and patient is slowly exposed in virtual world but this is strictly done by expert team at their therapy centers. Immersive virtual reality is useful to distract the patients when anesthesia or sedatives are contraindicated. More often hands on training is possible.

4. **More opportunities for communication and collaboration:** If we look behind some years ago, traditionally, classroom were isolated, and about collaboration was limited to classrooms or building. But today with the help of modern technologies helps to communicate the students who are geographically at long distance. And similarly we can have collaboration with any of the institute across the world. So more opportunities are open for better communication and collaboration. This will also supports income process.

5. **Research:** Many educational fields have taken various research projects, and with the help of all modern digitalization tools, it has been made more interesting and more easier to represent the evidences.

6. **Constant growing market:** All these online classes, online exams, E learning etc are constantly growing and in future it will have lot many scope for more huge market. Now a days people are preferring to go for all online courses rather than using traditional way of learning that of attending the sessions.

7. **Easy management:** Because of large number of students including all from different global origin, it is very difficult task to manage the whole knowldge material. However, developing a good LMS (Learning Management System) will help us to solve this problem. A good developed LMS is always a very good tool to manage the education sharing and to make overall methodology easier. On this one can make customized style and over all appearance of the educational material content.

# V. Challenges for Edupreneuner

Online teaching learning is seems to be more preferable and comfortable but not everyone was feeling the same for it. As it has many pros and cons, so traditional teachers are not happily accepting the E learning. Some major challenges to over come are,

1. **User friendly software? Not true for each case:** The apps, which were develop rapidly specially during pandemic period, all, were not user friendly. Some of them requires special training to operate. In India many students are from remote places so actual traditional method of teaching learning is only preferred, as there is poor availability and connectivity of the internet. But during recent pandemic period there was no option other than E learning. So many of the teacher under went the training for taking online classes.

2. **Improper class scheduling:** This is still continued as for example any webinar scheduled will be having local timings geographically, but if the student is from India want to attend the class it will be at some odd time that is EST (Eastern Standard Time) is 10 hours 30 min behind IST (Indian Standard Time). So in this case it is difficult to attend.

3. **Lack of interactive sessions:** Some what online sessions will be monotonous. There will be lack of communication or one to one interactions. So problems may arrive for understanding the topics.

4. **Lack of interest or boredom:** Boredom is lack of interest and fatigue is mental or physical tiredness. Latest example for fatigue is e-learning during this pandemic season, students can not go physically in school, can not meet their friends, can not do any physical activity like playing with friends etc. and these are the major impacting factors for learning. Teaching strategies should be change to reduce boredom of students. Sitting in front of laptop or mobile for hours together for attending school is major fatigue to students, and even harmful to their eyes.

5. **Human touch:** This point is important for in view of small children. However, we have developed advanced educational technology but still perfect blending of technology and human factor is still lacking.

# VI. Overcoming the Challenges

Moving beyond the comfort zone will defiantly reduces the chances of above mentioned challenges. To overcome these following are some solutions,

1. **Continue to build, but also develop your audience:** More often what makes eduprenerner different from other is the unique options that makes valuable in the eyes of the audience. That is what you have developed is a distinctive or even

more unique way to approach. So if eduprenuer has attracted more audience, it is good for business but more importantly, that right person is likely to be preferred.

2. **Looking beyond the traditional ways for new opportunities:** One has to constantly upgrade to sustain in the highly developing market. Adapting newer technologies or adapting new apps to develop and redevelop the education system, along with new customers. Like for example few year ago no one thought about artificial intelligence, augmented reality or virtual reality will play important role in education sector. But now those are becoming important aspects of education which made our teaching learning easy. Because of all modern technologies, various concepts are becoming very clear and at rapid pace.

3. **Assignments through online project based learning:** Submitting the assignment through project based learning is one of the creative and interesting challenge which students can take and do their best. They can use PPT, various GIF, Google classrooms, graphics, smart arts, google forms like case of the quiz forms etc.

4. **Creating easy to use tools or apps:** The apps which developed should be user friendly, so that the maximum number of students will use it. And indirectly it enhances the income too.

## VII. Conclusion

Digitalization immensely changed the education system, but it does not diminished the value of old time classroom learning method. In this modern era, the best part of digitalization of education is combination of both that is classroom learning and online learning too. Both the methods should go hand in hand to understand various topics in more better way. As the generations are also progressing, so they will be demanding such modern technologies. Now adapting such modern technology is inevitable part of educational system. In addition, there is no harm in adapting such advanced methods along with the technologies. Overall, this digitalization is boon to our education system as it also gives the blending of entrepreneur and education which is nothing but edupreneuner.

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# A Study on Edupreneurship Awareness among the University Students, with Special Reference to Guwahati City, Assam

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## Abstract

Educational sector became more smart for entrepreneurs and technological up gradation created latest opportunities for those entrepreneurs. Traditionally, the teaching was confined to the walls of classroom and lucid lecture delivery by the teachers to the students. But during Covid-19, online teaching came into trend. The individual who innovates teaching and learning is called edupreneur and that journey is called edupreneurship. This research is an attempt to get an insight on awareness level of edupreneurship among the students of different universities in Guwahati city and it has been found that the majority students of the universities of Guwahati city are moderately aware about the term Edupreneur and Edupreneurship. It can be suggested that social media is the majority preferable tool to broaden the awareness on edupreneurship among the students and citizens in Guwahati city.

**Keywords:** Awareness; Educational sector; Edupreneur; Edupreneurship.

## I. Introduction

Education is a foundation for a better future"- Elizabeth Warren

Most of the people in  this  generation  believes that education is a purpose to live for a better future. Education is an ideology that nourishes a youth to seek knowledge, behavior and skills for future utopia.

This concept of new innovation and creativity towards education formed by entrepreneurship is called edupreneurship. It is abundantly evident from the phrase "Edupreneurship" that it is a combination of the word Education and Entrepreneurship. Edupreneurs are entrepreneurs who take on risks to invest in education. An entrepreneur who works within the education sector is called an edupreneur. Mindset consist of our principles and our information. The educator who has that entrepreneurial mindset is known as edupreneur. That individual who innovates teaching and learning is called edupreneur and that journey is called edupreneurship. A new mode of teaching is the foremost plan of this term edupreneurship. Edupreneurship is the new dimension to entrepreneurship. An edupreneur has the capabilities of an entrepreneur such as Innovation, Risk Taking, Confidence so on and so forth.

In traditional learning, the teacher delivers knowledge to the students in classroom. No third party means is involved and hence the pace of learning is constant. But during Covid-19 pandemic, when all the countries were affected globally especially the education sector, the online teaching came into the trend. Online learning is the process of educating the public at large via the internet. Varied mode of teaching can be used such as one-on-one video calls, group video calls, and webinars at several apps such as Zoom, Google meet and so on. Online learning facilitates teaching from any location (our comfort zone i.e our home) and enroll students from various geographical areas. And hence this can be said that a shift has been witnessed from traditional learning to online learning and that's where Edupreneurship can be said to have a broad scope today.

It can't be denied that over the years there has been drastic development in the current education even though innovations and technologies are required. Today, for preparing various competitive examinations, there are education start-ups which cater to the needs of the people of different age groups such as: Gradeup; Byju"s; Unacademy.

In order to define innovative solutions to education models at different levels, new learning methods, multi skilling of the workforce, inclusive education, empowerment, and use of technology to meet the increasing challenges of maintaining India's growth, edupreneurship—or the entrepreneurial spirit—would be essential.

Scholars, academics, and thought leaders continue to be interested in the management of educational institutions and universities since it involves many different types of leadership styles, motivations, etc. There are so many positive developments taking place in the education, public, and business sectors today as well as in non-governmental sector projects throughout the world. The many development projects undertaken by edupreneurs are both thrilling and difficult. The main ingredients that result in high-quality delivery are diligence and tenacity. Every institution or university should make an effort to be innovative in the services it develops, guarantee that it is appropriate for society, and work to slake the thirst for knowledge that draws people to educational institutions. The holy duty and obligation

to manage and produce educational resources sustainably for the benefit of mankind in general and their development, in particular, falls to edupreneurs, who are the leaders of society. Edupreneurs are forces for positive change in the economy. As a social entrepreneurial group, edupreneurs have made amazingly positive changes to Indian society. For the sake of the economy, edupreneurship must be maintained and encouraged to expand. When supported, edupreneurs will show to be valuable resources for the economy, enhancing many different facets of it. Edupreneurs unquestionably are agents of change who strive for the betterment of society.

Therefore today''s education sector is connected between digital education, teacher training and entrepreneurship. The current education sector has opened larger prospect for aspiring businessman willing to flourish their life as an 'Edupreneur', or 'Education Entrepreneur'. Unfortunately, there are barely any studies or concepts on edupreneurship.

## II. Objectives

The main objective of this study is to identify the awareness level of edupreneur among the students of different universities in Guwahati and to suggest methods to spread edupreneurship among the universities students of Guwahati city.

## III. Literature Review

Various authors, academicians, research scholars have conducted research on different aspects of edupreneurship. A few relevant literatures relating to edupreneurship are:

Abreu & Grinevich (2013), this study reveals that as the junior faculty in the Higher Education System is involved more in teaching, research work and other administration activities, they remain packed all the time, so, the senior faculty gets more time to devote in entrepreneurial activities in comparison to the junior faculty. For a successful edupreneurship, experience and knowledge plays a vital role.

Friedman & Silberman (2003), study highlighted that Academic Entrepreneurship deals with detail study of micro and macro level of policies, behavior, technology etc, so that, it becomes a bit easier in commercializing the academic entrepreneurship, that is, edupreneurship in Higher Education Institution.

Chaitra Ramanathan (2006), in the study identifies that self awareness and identity are the two basic things that are missing among the students in the Indian education system, despite of this factors, distinction among the population based on the region, caste etc plays a vital role in the Indian education system which leads to decrease in its standard.

Roeles Henk, Samplonius Raut and Shilpa (2011), in the research paper tried to use entrepreneurship learning in such a way that will lead to change in the behaviour

of the population towards entrepreneurship in an edupreneurial environment. This pedagogic   helps in adding value in the entrepreneurship learning.

Devasenathipathi, Duraipandian.R,    In this paper, the authors tried to focus upon the innovations that could be made in the edupreneurship sector. According to the authors, the educational organizations can be divided into five categories and identified some points for improvement. By pursuing the suggested changes, educational institutions will be more respected and the edupreneurship market will flourish. Based on the current research, the future research work will also include e-learning as an option for edupreneurship with its opportunities and challenges.

Thus, this study shows that many study have been conducted on edupreneurship, but, no such study has been conducted with respect to check the awareness level among the student of Guwahati, Assam. Therefore, this study has been conducted.

# IV. Research Methodology

The study is **descriptive and exploratory** in nature. The study has been conducted among the students of different universities of Guwahati city, Assam. The data has been collected by circulating the questionnaire among the students of different universities. Convenience sampling technique was used to collect the data from the students in Guwahati. Apart from this, the researcher has also taken the help of some secondary sources such as journals, magazines, books, websites etc. The total **sample size** of the study is 108. The collected data and information have been analyzed on the basis of   **age, qualification, awareness regarding edupreneur** etc. of the respondents. Percentage method have been used for analysis of collected information.

**Data Analysis and Interpretation and Findings**

**1.  Age & qualification of the respondents**

Table 1: age of respondents

| Age (years) & Qualification | No. of Respondents | Percentage(%) |
|---|---|---|
| 18-21 yrs & Graduation (UG) | 64 | 59 |
| 22-25 & Post-Graduation (PG) | 25 | 23 |
| 26 & Above & Pursuing Doctorate | 19 | 18 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** From the above, it can be analyzed that majority of the respondents are between the age group of 18-25 years. From the above data, it is can be interpretated  that the respondents are either pursuing Under Graduate course or Post

Graduate course or Doctorate in Philosophy (PhD). And, the maximum number of respondents are either pursuing under graduation or post graduation.

## 2. Awareness about edupreneureurship

Table 2: the awareness about the term Edupreneurship by the respondents

| Awareness level | No of Respondents | Percentage (%) |
|---|---|---|
| Highly aware | 24 | 22 |
| Moderately aware | 58 | 54 |
| Aware | 0 | 0 |
| Moderately unaware | 14 | 13 |
| Highly unaware | 12 | 11 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** From the above analysis it is seen that out of 108 respondents, 24 respondents are highly aware about the term Edupreneurship, 58 respondents are moderately aware about the term Edupreneurship, 14 respondents are moderately unaware about the term Edupreneur and 12 respondents are highly unaware about the term Edupreneurship. From the above analysis it has been observed that 22% of the respondents are highly aware about the term Edupreneurship, 54% of the respondents are moderately aware about the term Edupreneurship, 13% of the respondents are moderately unaware about the term Edupreneurship and 11% of the respondents are highly unaware about the term Edupreneurship.

## 3. Awareness among the citizen regarding edupreneurship is poor.

Table 3: respondents view regarding whether the awareness on Edupreneurship among the citizen is poor

| Awareness level | No. of Respondents | Percentage (%) |
|---|---|---|
| Strongly agree | 30 | 28 |
| Agree | 52 | 48 |
| Neutral | 17 | 16 |
| Disagree | 9 | 8 |
| Total | 108 | 100 |

**Source:** *Field Survey June-July 2022*

**Interpretation:** As per the data collected, majority (48 %) of the respondents agree that the awareness regarding the upcoming entrepreneurship i.e. edupreneurship among the citizen of Guwahati is poor. At the same time, only a few respondents ( i.e. 8 %) thinks that the citizen of Guwahati are aware regarding edupreneurship.

**4. Source of spreading awareness on edupreneurship.**

Table 4: Showing the source of spreading awareness on Edupreneurship

| Source | No of Respondents | Percentage(%) |
|---|---|---|
| Social Media | 45 | 42 |
| Magazine | 16 | 15 |
| Newspaper | 31 | 28 |
| Television | 16 | 15 |
| Total | 108 | 100 |

***Source:*** *Field Survey June-July 2022*

**Interpretation:** From the above, it can be interpretated that as per the respondents, social media is the most preferable media to spread the awareness among the citizens in guwahati city followed by newspaper, magazine and television.

The major findings of the study can be highlighted as below:

1. It has been found that majority of the respondents are between the age group of 18-26 years and they are either pursuing under graduation or post graduation course and the respondents are moderately aware about the term Edupreneur and Edupreneurship.
2. While interacting with the students of the universities of Guwahati city, it has been found that majority of the respondents agree that the awareness regarding the upcoming entrepreneurship i.e. edupreneurship among the citizens of Guwahati is poor. At the same time, only a few respondent thinks that the citizen of Guwahati are aware regarding edupreneurship.
3. Therefore, the respondents have suggested that social media is the most preferable mode to spread the awareness among the students as well as citizens in the city.

## V. Suggestions

The study shows that the majority students of the universities of Guwahati city are moderately aware about Edupreneur and Edupreneurship. Moreover, it has been observed that the students express their views regarding the awareness on Edupreneur among the citizen as poor. The suggestions that can be put forwarded are as the following:

1. The first initiative that can be taken to spread the awareness level is by introducing few topics in the books in the education sector.
2. Holding seminars and webinars are a good initiative.
3. Advertisements in television, newspaper should be done to gain the attraction towards the topic.

4. Use of social media platform is a good idea. Various social media platforms are instagram, facebook, telegram and many more.
5. Awareness can be spread by speaking about the topic in the public gatherings by the renowned persons.
6. Journals and magazines are also one of the medium to increase the awareness level among the citizen of Guwahati.
7. Government should take some measures like giving loan to the edupreneurs.

# VI. Conclusion

An edupreneur is an individual who has the comprehension of a educator as well as a influence of an entrepreneur. With these two features, an edupreneur can create innovative things for the society and especially for the students. As education and technology go hand in hand, an edupreneur creates online courses, videos, webinars and can carry on selling them at the suitable price in the market. The scope of edupreneurship amongst the university students or the youths lies in the fact that this would allow them to make flaccid income.

After the analysis and interpretation of the collected data, it can be concluded that the awareness among the respondents is not satisfying. As edupreneurship is the upcoming new entrepreneurship in the current scenario and so, the citizens should be aware about the advantages, scope and the limitations of the edupreneurship and the various ways through which one can establish a startup as an edupreneur. Therefore, various measures should be adopted to increase the awareness level among the citizen of Guwahati as well as the government should take some initiatives and financial measures too.

With the help of this study, the user of this article will be able to have a knowledge about the new concept that will help them in enhancing the education system with the use of the latest technology, gain attraction of the students towards education through innovation teaching ideas, helps in improving classroom communication between students and teachers and also help in earning for a better livelihood. With the help of this study the user can get the idea that the level of strength that will have to be put on in this area, so that , at one point of time everybody have the idea about edupreneurship in one or the other form. Through edupreneurship, one can become employed by oneself for full time and also can brighten the future generation and show a better path to Rise and Shine.

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**Mr. Suman Roy** (M.COM, B.Ed, PGDFM, UGC-SLET) was 07 years teaching experience and currently working as Assistant Professor in Department of Commerce (Accountancy & Finance), Sonapur College, Sonapur, Assam, India. He received numbers of awards & appreciation like "TEACHER INNOVATION AWARD", "INDIAN HUMAINITARIAN AWARD", "TEACHMINT SILVER EDUCATOR", "TEACHMINT GOLDEN EDUCATOR" and entry into "INDIAN ACHIEVER BOOK OF RECORD". He publishes three book and five research paper in different journals, books and seminars. He also participated in more than twenty-five national and international seminars/webinars/training programmes. He delivered lecture in different workshops & Coaching Institute. He is also founder member of "Sky Groups of Foundation" and working as a social worker.

**Ms. Jyoti Hatiboruah** (MBA, UGC-NET) was more than 10 years of teaching experience and currently working as an Assistant Professor in the Department of Business Administration (HR and Marketing), University of Science and Technology, Meghalaya, India. She had received the "BEST TEACHER AWARD". She is having publications in edited book volumes, books, conference proceedings etc. She also participated in many national and international seminars/webinars/training programs.

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# GGBS, FLY ASH AND PLASTIC EFFECTS ONCOMPRESSIVE STRENGTH BY PARTIAL REPLACEMENT OF CEMENT CONCRTE

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**Abstract:**

The compressive strength properties of concrete with Ground Granulated Blast Furnace Slag (GGBS) and Fly Ash in concrete by partial replacement of cement. The incremental demand of cement in the construction field is a concern for environmental degradation, in this regard; replacement of cement is carried out with waste materials by using GGBS,Plastic and Fly Ash. On optimum level of GGBS and Fly Ash was assessed with varied percentage from 0 to 30% and Plastic 0 to 10% for different curing days. Replaced concrete were tested with the slump, compaction factor, Vee-bee and compressive strength. Cement to water ratio was maintained at 0.47 for all mixes. The compressive strength tests were conducted for 3, 7, 14 and 28 days of curing on a M25 grade concrete. The results obtained from the slump, compaction factor, Vee-bee and compressive strength of concrete containing GGBS and Fly Ash was increased as the curing time increases. The workability of replaced concrete improved when slump value achieved 30% as compared to controlled one SF0 and the compressive strength obtained 26.30% improvement at SF9 as compared to SF0. The outcomes indicated that the addition of GGBS and Fly Ash enhances the workability and compressive strength which eventually improved the mechanical properties of concrete.

**Keywords:** GGBS, FlyAsh, Plastic; Compressive Strength; Slump; Compaction Factor; Veebee.

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**EVALUATION OF GROUNDWATER TEST FOR DRINKING PURPOSE**

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**Abstract:**

Availability of clean drinking water is almost importance. Owing to the shortage of clean drinking water in recent years, identifying area of deteriorating groundwater quality is great importance. This realization has been the reason for the study of groundwater quality near the industry of Puliyur panchayat in Karur district of Tamilnadu. This study examines a sample from Puliyur. Which has issues with its quality for drinking purpose. Reading the study's findings will give you crucial information. Status of the groundwater in Puliyur. When a body of water is harmed by anthropogenic toxins, it is often considered to as polluted when it either cannot be used for human purposes, such as drinking water, or when its ability to support its biotic populations significantly changes. Despite their interdependence, surface water and groundwater have frequently been researched and managed as separate resources. In this study, 14 significant parameters were picked to calculate the water quality index. The World Health Organization (WHO) and Indian Council for Medical Research's criteria for the quality of drinking water were used to create the Water Quality Index (WQI) (ICMR). In this study, the weighted arithmetic index approach was employed to calculate WQI.

**Keywords:** Groundwater quality, Water quality parameters, Water treatment.

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# EXPERIMENTAL STUDY ON PERFORMANCE OF CONCRETE
# WITH VARIOUS STEEL FIBERS

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**Abstract:**

Concrete is a delicate material which has a low tensile strength and limited ductility. These weak points of concrete can be resolved by including fibers made up the various materials with high technical specifications. This special type of concrete is known as special types of concrete which exhibits superior properties in terms of strength and durability method due to the addition of steel fibers when compared to conventional concrete. These inconsistent characteristics of steel fibers have highly influence on the performance of SFRC. M25 grade of concrete with 0.5%, 1.0% ,1.5%, 2.0%, was planned in which workability tests were conducted to investigate the properties of the fresh concrete mixes. The concrete was investigated using Compressive Strength tests, and Flexural Strength. Mechanical properties of concrete like durability test and examination of micro structure of the concrete have been planned to be carried out.

**Keywords:** Concrete, Steel Fibers, Steel Fiber Reinforced Concrete, Crimped, Straight, Hooked.

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# AN EXPERIMENTAL STUDY ON PERFORMANCE OF CONCRETE
# WITH VARIOUS NATURAL FIBRES

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**Abstract:**

The concrete is considered to be the second in consumption by mankind, first being the water. The manufacture of cement causes several adverse impacts to the environment. Itis predictable to think about sustainable development by reducing the wastes generated or reusing it. This project aims to have a comparative study between ordinary reinforced concrete and natural fibre reinforced concrete. Experimental investigations and analysis of results were conducted to study the compressive &amp; flexural behaviour of composite concrete with varying percentage of such fibre's added to it. The concrete mix adopted is M25 with varying percentage of fibre's ranging from 0%, 0.5%, 1%,1.5%,2% and 2.5%. On the analysis of test results the concrete with coir fibre had improved performance as compared to the conventional concrete.

**Keywords:** Coir fibre, Sisal fibre, Jute fibre, Compressive and flexural behaviour, M25 Grade.

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## ASSESMENT OF WATER CONTAMINATION DUE TO INDUSTRY EFFLUENTS ON NOYYAL RIVER BASIN

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**Abstract:**

The study was conducted with the purpose to assess the water quality of Noyyal river and to understand the impact of anthropogenic activities on the water quality. Water samples were collected from different sites along the river and analyzed for various physical and chemical parameters. The results of the analysis showed that the water quality of Noyyal river was poor and the levels of certain parameters such as pH, electrical conductivity, and total dissolved solids were found to be higher than the stipulated limits. The results of the analysis also showed that the river was polluted due to the discharge of untreated effluents from various industries located in and around the river. The study also revealed that the water quality of Noyyal river was deteriorating due to the anthropogenic activities in the catchment area. The results of this study can be used to develop strategies to improve the water quality of Noyyal river and to protect the catchment area from further degradation.

**Keywords:** anthropogenic activities, physical parameters, chemical parameters, electric conductivity, untreated effluents, protect catchment area.

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# EXPERIMENTATION ON BRICK WITH GRANITE DUST

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**Abstract:**

Brick is a core material that is commonly used to build the wall of a building. Clay bricks are the most common brick type. It is made from sand and clay and uniformly burnt at temperatures between 800°C and 1200°C. Surface finishes are sometimes applied, e.g. glazed bricks. Glazed bricks are still being produced in large quantity and can be obtained from major English brick manufacturers and suppliers. Calcium Silicate bricks is manufactured from sand-lime (calcium silicate). The bricks are pressed under great pressure and steamed in an autoclave. The bricks are smooth, fine textured and light in colour. The colour of the brick is produced from material source, composition and firing temperature. Bricks have been used from antiquity to the present because of its remarkable properties such as compressive strength, durability and water absorption. Clay bricks are manufactured from the top layer of the fertile soil. Clay brick production causes a shortage of fertile soil hence it paves the way for degradation of the land. The shortage of natural resources results soil erosion, water scarcity and damages the whole eco system. In order to prevent the resource degradation and to fulfil the demand in construction industries we need to focus on alternate raw material for bricks. This study deals with the fabrication of bricks using granite dust.

**Keywords:** Brick, clay brick, soil, degradation, granite dust.

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# MANUFACTURING OF BRICKS BY USING INDUSTRIAL WASTE

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**Abstract:**

The use of fly ash-lime-gypsum (FaL-G) bricks has become an increasingly popular alternative to burnt clay bricks in India due to their structural and environmental benefits. However, the scarcity of fly ash has impacted the production and performance of FaL-G bricks. To address this issue, researchers have explored the possibility of incorporating incinerated sugarcane baggasse ash (SBA) as a supplementary cementitious material (SCMs) in FaL-G brick production. Two different blends were created for the study: Blend-1, which replaced coal fly ash with SBA (2.5 wt% to 30 wt%), and Blend-2, which replaced lime with SBA (2.5 wt% to 15 wt%). The bricks were tested for compressive strength, water absorption, weight density, apparent porosity and efflorescence in accordance with Indian and ASTM standards. Various techniques, including XRD, FTIR, SEM, and EDS, were also used to characterize the bricks. The XRD results revealed that the addition of IPMSA did not cause any phase transformation, but instead improved porosity, reducing weight. The study found that SBA incorporation at lower replacement percentages (2.5–20 wt%) in Blend 1 improved brick strength development. These findings suggest that the brick industry can produce sustainable, resource-efficient IPMSA-incorporated bricks.

**Keywords:** fly ash-lime-gypsum bricks ; sugarcane baggasse ash ; mechanical performance; apparent porosity; durability.

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# SUSTAINABLE UTILIZATION OF MANUFACTURING OF FAL-G- BRICKS USING SUGARCANE BAGASSE AS A SUPPLEMENTARY MATERIAL.

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**Abstract:**

Usually bricks are manufactured by mixing clay with water which can be formed in the desired shape that can be used after drying and firing at different temperatures. Since clay are insufficient and usage of clay creates environmental degradation fly ash bricks are introduced where fly ash is obtained from coal based thermal power plants. The over use of fly ash also created a demand . To overcome the demand for fly ash, construction industries have started using sugarcane bagasse ash which is obtained as the by-product of sugar producing process and it is made into ash at a particular temperature. So the sugarcane bagasse ash is introduced and used as an alternative for fly ash and lime. Different mix proportions are made with the replacement of fly ash with sugarcane bagasse to identify the appropriate mix with high strength. Till now the 20% of replacement of sugarcane bagasse gives the good compressive strength.

**Keywords:** Compressive strength, Sugarcane bagasse, Sustainable development, Reusing, Fly Ash.

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# SUSTAINABLE UTILIZATION OF MANUFACTURING OF FAL-G- BRICKS USING COIR PITH ASH AS A SUPPLEMENTARY MATERIAL

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**Abstract:**

Usually, bricks are manufactured by mixing clay with water which can be formed in the desired shape that can be used after drying and firing at different temperatures. Since clay are insufficient and usage of clay creates environmental degradation fly ash bricks are introduced where fly ash is obtained from coal based thermal power plants. The over use of fly ash also created a demand. To overcome the demand for fly ash, construction industries have started using coir pith ash which is obtained as the by-product of coir producing process and it is made into ash at a particular temperature. So, the coir pith ash is introduced and used as an alternative for fly ash and lime. Different mix proportions are made with the replacement of fly ash with coir pith ash to identify the appropriate mix with high strength. Till now the 20% of replacement of coir pith ash gives the good compressive strength.

**Keywords**: Compressive strength, Coir pith ash, Sustainable development, Reusing, Fly Ash.

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# MANUFACTURING OF UN-BURNT BRICKS MADE WITH SUGARCANE BAGASSE ASH AS SUPPLEMENTARY CEMENTITIOUS MATERIAL

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**Abstract:**

Bricks have been used since ancient times due to their exceptional properties such as durability, compressive strength, and water resistance. However, the depletion of natural resources has led to soil erosion, water scarcity, and damage to the ecosystem. As a result, it is crucial to find alternative raw materials for brick production to prevent resource degradation and meet the increasing demand in the construction industry. This study focuses on using sugarcane bagasse ash, a residual waste product from sugar mills that is rich in amorphous silica, as a supplementary cementitious material in brick fabrication. This material can be used as a pozzolanic material in brick production. The study investigates two mix ratios: Mix:1, where sugarcane bagasse ash replaces the up to 30wt% of fly ash, and Mix:2, where sugarcane bagasse ash is completely replaced for lime. In both mix ratios, granite powder and tile powder are used as fine aggregate in brick. The results of the study show that by replacing sugarcane bagasse ash with fly ash at a rate of 20%, the brick achieves high strength. This finding suggests that sugarcane bagasse ash can be a viable alternative raw material for brick production, reducing the reliance on natural resources and promoting sustainability in the construction industry. By utilizing waste products like sugarcane bagasse ash, we can reduce the environmental impact of construction and contribute to a more sustainable future.

**Keywords:** Sugarcane bagasse ash from sugar mills, Coal fly ash, Granite waste powder, Tile waste powder, Lime, and Gypsum.

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# EXPERIMENTAL INVESTIGATION ON SUGARCANE BAGASSE ASH
# IN ALKALI ACTIVATED BRICKS

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**Abstract:**

The use of sugarcane bagasse ash bricks has become an increasingly popular alternative to burnt clay bricks in India due to their structural and environmental benefits. Researchers have explored the possibility of incorporating incinerated sugarcane baggasse ash (SBA) as a supplementary cementitious material (SCMs) in brick production. This work focuses on the feasibility of utilizing Sugarcane bagasse ash for production of eco-friendly bricks based on the geo-polymerization technology. The procedure for producing the bricks includes mixing the raw materials in an alkaline medium and curing the brick ambiently. Unlike the conventional method for producing bricks, the new procedure neither uses clay and shale nor requires high temperature kiln firing, having significant environmental and ecological benefits. In this study, the effect of polymerization and their mechanical and durability properties are investigated using the standards provided by IS Code.The bricks were tested for compressive strength, water absorption, weight density, apparent porosity and efflorescence in accordance with Indian and ASTM standards. Various techniques, including XRD, FTIR, SEM, and EDS, were also used to characterize the bricks. These findings suggest that the brick industry can produce sustainable, resource-efficient IPMSA-incorporated bricks.

**Keywords:** fly ash bricks ; sugarcane baggasse ash ; mechanical performance; apparent porosity; durability

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## MANUFACTURING OF GEOPOLYMER BRICKS

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**Abstract:**

This paper presents the environmental assessment of geopolymer bricks produced from clay and waste bricks. The life cycle approach is the method used in this research to qualify, identify and compare the environmental impacts of geopolymer bricks and fired bricks. The results reveal that the manufacturing process of geopolymer bricks implies for the same compressive strength of fired bricks, a reduction of CO 2 emissions by up to 55% for clay-based geopolymer bricks. This research checks the environmental interests of the application of geopolymerization technology in the production of bricks..Bricks are the world's most versatile, durable and reliable construction material.Conventional bricks are produced from clay with high temperature kiln firing or from ordinary Portland cement (OPC) concrete,and thus contain high embodied energy and have large carbon footprint. In many areas of the world,there is already a shortage of natural source material for production of the conventional bricks. For environmentalprotection and sustainable development, extensive research has been conducted on productionof bricks from waste materials.Fly ash is a waste material of coal firing thermal plants and its accumulation near power plants causes severe pollution problems. Therefore, its utilization as a raw material for brick making will be a very beneficial solution in terms of economic and environmental aspects.

**Keywords:** flyash, sustainable development, eco-friendly bricks.

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# FEASIBILITY OF USING ON ALKALI ACTIVATED BRICKS USING PROSOPIS JULIFLORA ASH

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**Abstract:**

This work focuses on the feasibility of utilizing prosopis juliflora ash for Production of eco-friendly bricks based on the geo-polymerization technology. The procedure for producing the bricks includes mixing the raw materials in an alkaline medium and curing the brick ambiently. Unlike the conventional method for producing bricks, the new procedure neither uses clay and shale nor requires high temperature kiln firing, having significant environmental and ecological benefits. In this study, the effect of polymerization and their mechanical and durability properties are investigated using the standards provided by IS Code.

**Keywords:** Prosopis juliflora ash, compressive strength, water absorption test.

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# MANPOWER MANAGEMENT IN CONSTRUCTION PROJECTS

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**Abstract:**

This study aims to investigate the current practices of manpower management in the construction industry. The construction industry is known for its complex and dynamic nature, which demands effective management of human resources to ensure project success. To achieve this, a questionnaire- based survey was conducted with industry experts, managers, and employees from various construction companies. The questionnaire was designed to gather information on the current practices and challenges in managing manpower, including recruitment, training and development, retention, motivation, and performance evaluation. The data collected was analyzed using RII Method, and the findings showed that the construction industry faces numerous challenges in managing manpower, such as a shortage of skilled workers, high turnover rates, and inadequate training and development programs. Furthermore, the study found that effective communication, leadership, and teamwork were critical success factors for effective manpower management.

**Keywords:** construction projects, human resource, questionnaire survey, project management, success factors.

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# EXPERIMENTAL INVESTIGATION ON PAVER BLOCK WITH PARTIAL REPLACEMENT OF CEMENT WITH COIR PITH ASH

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**Abstract:**

Coconut fiber is a natural fiber extracted from the outer husk of coconut and used in products such as floor mats, doormats, brushes and mattresses. Coir is the fibrous material found between the hard, internal shell and the outer coat of a coconut. Applications of coconut fiber in paving block, which is quite economical, easy available and have desirable strength. Coconut fiber was added in proportion of 0.1%, 0.2%, 0.3%, and 0.4% in paver block. Coconut fiber was added as a partial replacement of cement in paver block. Then the paver block is tested for compressive strength. The result showed more strength as compared to paver blocks.

**Keywords**: Coconut fiber, Compressive strength, Flexural strength, Paver block.

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## PORCELAIN PAVER BLOCK

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**Abstract:**

In this modern world, India is one of the fast-growing countries in technology as well as infrastructure. Due to an intense rapid growth in infrastructure the demand of resources for construction has reached its peak. This project is based on a experimental study on the suitability of porcelain tile waste as partial replacement for coarse aggregate in concrete. The mechanical properties of the specimen like analyzing flexural and compressive strength characteristics of concrete specimens made out using porcelain tile as substitutes for conventional coarse aggregate as partial replacement using M30 grade concrete. In this project, coarse aggregate is partially replaced with various percentage by porcelain tile. The water cement ratio is maintained for 0.45. It produces workable concrete with satisfactory strength at 50% replacement.

**Keywords:** Porcelain Tile Waste, Coarse Aggregate, Flexural Strength, Compressive Strength, M30 Grade Concrete.

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## CORROSION ASSESSMENT METHODS IN REINFORCED CEMENT CONCRETE

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**Abstract:**

Worldwide huge amount were spent on infrastructure development projects, in which a major part is spent on demolishing deteriorated structures due to their reduction in serviceability due to various external factors. To attain sustainability in a view to reduce the consumption of construction materials, enhancing the durability of the available structure is strongly encouraged. This may be attained by preventing reinforced cement concrete (RC) structures from factors that affect serviceability such as corrosion. The research community is developing various techniques to predict corrosion in RC structures to prevent the structure in the initial stages by carrying out maintenance work instead of going for the reconstruction of deteriorated structures. Various techniques were developed either using practical, theoretical, or software methods to predict corrosion in concrete. In this article, comparison of some of the availablemethods were done to determine their accuracy. The corrosion of RC structures was mainly caused by chloride ions penetrating the structure or by carbonation. Chloride diffusion coefficients in concrete can be determined by theoretical methods such as Fick's second law, Nernst Plank Equation, etc. This coefficient can be used to predict the rate of corrosion in concrete. Electrochemical measurement, Eddy current, Half-cell potential measurement, etc., are the experimental techniques to forecast the corrosion rate in concrete reviewed. Recently various software's like Life 365, Thermos calc, Concrete Compass, etc., were developed to predict the corrosion rate in RC structures. This research paper reviews the effectiveness of the application of software to predict corrosion rate in RC structures by reviewing previous research works to identify an accurate method to be followed.

**Keywords:** Corrosion; electrochemical measurement; eddy current; life 365; thermos calc; concrete compass.

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## UTILIAZATION OF SAWDUST ASH IN BRICK

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**Abstract:**

This paper studies the influence of sawdust on the petrophysical properties of solid bricks. Brick samples without additives were handmade using a clayey earth that is rich in quartz and phyllosilicates and has some carbonate content. Similar bricks were made with added sawdust at 2.5%, 5% and 10% weight. The bricks were fired in an electric kiln at 800 ℃, 950 ℃ and 1100 ℃. The addition of sawdust did not change the mineralogy of the fired bricks. As the firing temperature increased, the quartz content fell and carbonates and phyllosilicates disappeared causing new silicates (gehlenite, wollastonite, anorthite and diopside) to develop. There was an increase in the vitrification of bricks, which also became more compact. At high firing temperature, the bricks had a higher water absorption capacity and worse interconnection between the pores. The high level of vitrification reached at 1100 ℃ enabled greater transmission of heat inside the bricks. The most refractory bricks were those fired at 800 ℃ with a 10% sawdust content. When subjected to the salt crystallization test, the most resistant bricks were those with the lowest sawdust content and the highest firing temperature.

**Keywords:** Solid bricks, Sawdust, Petrophysics, Thermal insulation.

# MACHINE LEARNING USING R PROGRAMMING
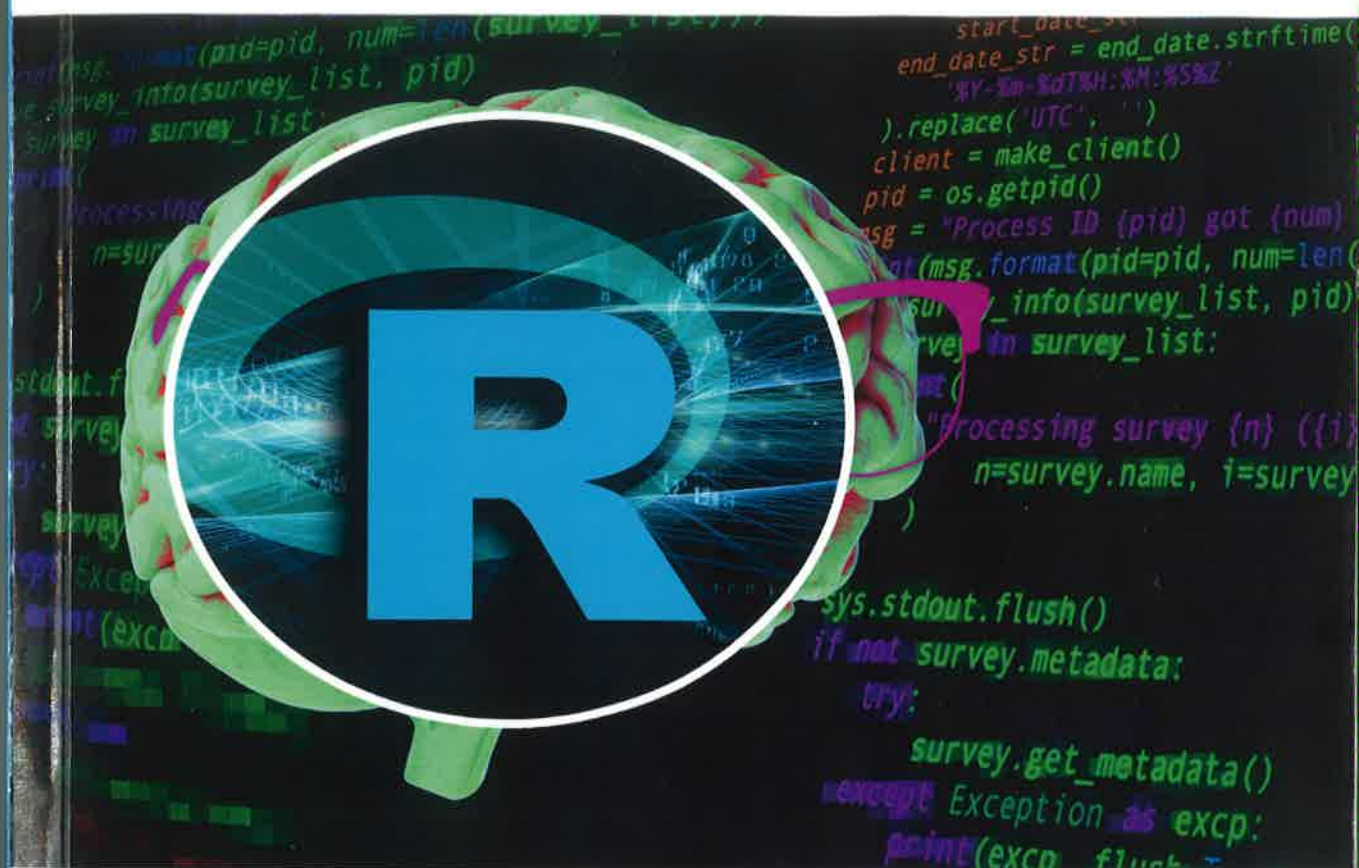
Dr. SURENDRAN. R

Dr. M. MURUGESAN

Dr. D. SUGANTHI

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# MACHINE LEARNING USING R PROGRAMMING

**FIRST EDITION**

**Authors**

**Dr. SURENDRAN. R**

**Dr. M. MURUGESAN**

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**Dr. RAMESH KUMAR YADAV**

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## TABLE OF CONTENTS

# CHAPTER 1

## INTRODUCTION TO R PROGRAMMING

### 1.1 Introduction

R is a statistical programming tool that's uniquely equipped to handle data, and lots of it. Wrangling mass amounts of information and producing publication-ready graphics and visualizations is easy with R. So are all sorts of data analysis, mining, and modeling tasks. Because it was first designed by statisticians for statistical purposes, R is exceptionally well-suited to data science, an important field in today's world. While R's core function is statistical analysis and graphics, its use extends past these and into AI, machine learning, financial analysis, and more. Consistently ranked as one of the world's most popular programming languages, not to mention one that commands high salaries, R has been around since the early 1990s and is still going strong.

### 1.1.1 What is R?

R is a scripting or programming language which provides an environment for statistical computing, data science and graphics. It was inspired by, and is mostly compatible with, the statistical language S developed at Bell laboratory (formerly AT & T, now Lucent technologies). Although there are some very important differences between R and S, much R is an interpreted language, which means that users access its functions through a command-line interpreter. Unlike languages such as Python and Java, R is not a general-purpose programming language. Instead, it's considered a domain-specific language (DSL), meaning its functions and use are designed for a specific area of use or domain.

### 1.1.2 Why to learn R?

1. R is a platform-independent programming language. This means that whichever operating system you use, your R program will work just fine.

## Author's Profile

Dr. Surendran. R is working as a Professor in the Department of Computer Science and Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai, India. He has 15 years of undergraduate and post graduate experience including 5 years of teaching experience in Gulf Countries (Oman and Bahrain). He handled interesting roles and responsibilities including Teaching in various Institutions with more success factors like Trainer of Trainer & Technical trainer for Placement department, Coach for various national & international program competition, Quality Improvement Committee Chair ( ABET Accreditation), Course Equalization Committee chair and Head Technology Development. Areas of interest and specialization include Artificial Intelligence, Machine Learning, Deep Learning, Data Analytics, and Cloud Computing. He is a reviewer for various renowned international journals. He has published more than 61 articles in various international journals and conferences and 1 Patent published. He has also given invited talks for various seminars, guest lectures, workshops, and conference chairs. Also organized many national and international conferences and workshops at various colleges.

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# DATA ANALYTICS USING PYTHON

Ms. K. Umamageswari
Mr. Sreenivas Panyam
Dr. Aruna S K
Dr. B. Padmini Devi

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**2   INTRODUCTION TO DATA UNDERSTANDING AND PREPROCESSING**

# CHAPTER 1

# *PYTHON FUNDAMENTALS FOR DATA ANALYSIS*

## 1.1 Introduction to Python Data Structures

Data Structures is a way of organizing data to be more accessible by context. Data structures are the basis of any programming language in which the system is built. Python helps to learn the basics of these data structures in a simpler way compared to other programming languages.

The basic Python data structures in Python include

1. List
2. Set
3. Tuples
4. Dictionary

Each of the data structures is unique in its own way. Data structures are "containers" that organize and group data according to type. The data structures differ based on mutability and order.
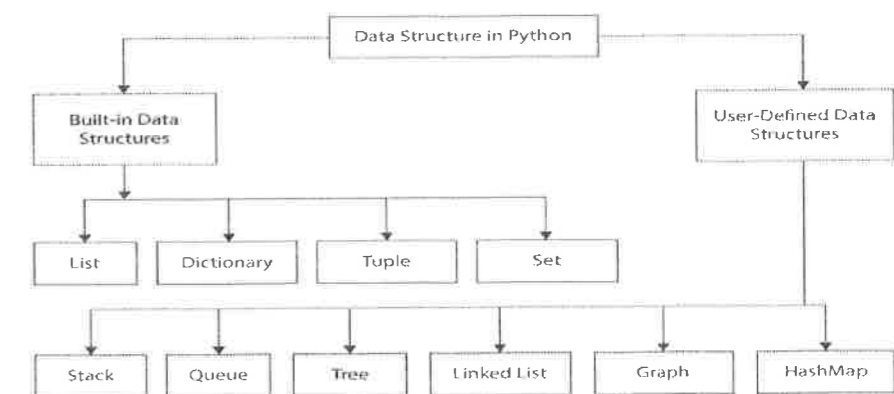


**Fig 1.1 Classification of Data Structure in Python**

## 1.1.1 List in Python

A list can be defined as a collection of values or items of different types. The items in the list are separated with the comma (,) and enclosed with the square brackets [].

1

# Author's Profile

Ms. K. Umamageswari, completed her Bachelor of Computer Applications from Thiruvalluvar University, Vellore in 2008. She had completed her Master of Computer Applications from Thiruvalluvar University, Vellore in 2011. She had completed her M.Phil Computer Science from Thiruvalluvar University, Vellore in 2016. Currently she is working as an Assistant Professor in the Department of Computer Science with Artificial Intelligence, SDNB Vaishnav College for Women, Autonomous, Chennai. She has over 5.6 years of full time teaching experience. She has published 2 research papers in reputed International Journal. Her main areas of interest include Machine Learning, Deep Learning, Data Science using Python, Artificial Intelligence, AI: Reasoning and Uncertainty, Design and Analysis of Algorithms, Computer Graphics and Big Data.

Mr. Sreenivas Panyam has 10+ years of experience in Technology Leadership with strong hold on forming, grooming teams and delivering extraordinary products and client engagements using cutting edge digital tech. Led a start-up (Medha Tech Software Solutions Pvt. Ltd) successfully chalking out technology roadmap and architecture. He holds a Post Graduate Degree in MCA and is pursuing Ph.D in Computer Science and Applications. His passion and administration as an entrepreneur resulted in the Center for Advanced Learning and Development (CALD), which laid the foundation for a progressive future in IT and in educational field. Through this he motivates youth to develop new advanced skills, and find themselves doing things they have never done before. He is the inspiration to the Youth to beat the system rather than be in the system if one's dreams asked for it. "Think Big, Think Fast, Think Ahead" Ideas are no one's Monopoly. He always believes in "Actions Speak Louder Than Words". He believes that if one had the determination and willingness to work, one could do wonders in business as long as the integrity and honesty was maintained.

Dr. ARUNA S K is an Associate Professor in the Department of Computer Science and Engineering, School of Engineering and Technology, CHRIST (Deemed to be University), Bangalore. She completed her master's degree in Computer Science and Engineering from Paavai Engineering College, Anna University, Coimbatore, and the PhD in Information and Communication Engineering from Anna University, Chennai. Her research interests include Image Processing, Machine Learning, and Deep Learning. Her research works have been published in reputed international publications. She is one of the co-founders of the government funded project, "Biodegradable Hydrogel gauze from Nano Sericin and Gelatin", which has been selected by the Ministry of Micro, Small & Medium Enterprises (MSME), Government of India in August, 2022. The total project worth is INR.2100000. She is one of the trainers for ICT Academy in association with Honeywell's training course on "AI-102: Designing and Implementing a Microsoft Azure AI Solution " which is funded by the Government of India. She also completed a funded consultancy work to support projects via Upskilling Training for the fresh employees of Capgemini.

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## FIFTH INTERNATIONAL CONFERENCE ON SMART TECHNOLOGIES IN DATA SCIENCE AND COMMUNICATION (SMART DSC-2022)

*Certificate of Participation*

Presented to

### P.Pandiaraja

Department of Computer Science and Engineering, M.Kumarasamy College of Engineering, Thalavapalayam, Karur, TamilNadu, India

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A Graph based model for Discovering Host-based hook Attacks

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Debnath Bhattacharyya   *Editors*

# Smart Technologies in Data Science and Communication

Proceedings of SMART-DSC 2022

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Kingsley A. Ogudo · Sanjoy Kumar Saha ·
Debnath Bhattacharyya
**Editors**

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# Contents

# A Graph-Based Model for Discovering Host-Based Hook Attacks

**P. Pandiaraja, K. Muthumanickam, and R. Palani Kumar**

**Abstract** Though computer malicious software can be referred with different names such as virus, worm, Trojan, spam, and botnet, their ultimate goal is to causing damage to the end-computer or end-user. The progression in computer technology allows a malware writer to integrate obfuscation technique to evade detection specifically API hooking in Windows. Unfortunately, signature-based detection approach such as anti-virus software at the end-computer is not effective against system call reordering. To overcome this shortcoming, many different behavior-based approaches have been offered. However, these approaches bear limitations such as false positive, detecting zero-day attacks, and improving detection accuracy rate from past experience. In this article, an application programming interface (API)-based call graph model is put forward which captures API system call during malicious rootkit execution in Windows platform. As graph model can be effectively applied to replica complicated relation between entities, we opt it to visualize malicious rootkit behavior activities by monitoring system API calls. This will help the defender to optimally find malicious system calls from benign calls. Our simulated experiment analysis proves that our method achieves higher detection rate and accuracy with less false positive compared to existing techniques.

**Keywords** API hook · Graph · Malware attack · Rootkit

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# 1 Introduction

Today hacktivists and cyber-criminals can able to write malwares with advanced evading techniques and continuing to evolve different techniques with the intent of assaulting end-user's privacy. A new type of malware will be launched every day by modifying its predecessor. The AV-Test report [1] detected more than 500 million malware samples in 2018. Analyzing such a huge malware sample manually is a tedious process, so we need to have an automated malware analysis technique to craft virus definition. Today, malware developers often integrate rootkit technique which mainly uses an API hook technique into malware software to avoid detection. A malware detector is a software program that can be operated locally on the victim computer discover and locate a malware. Usually, there are two different kinds of inputs given to a malware detector, namely unique signature of the malware or monitoring its behavior. After gaining these two inputs, it is easy for a malware detector to identify malicious programs.

Nowadays, a huge number of malicious samples are submitted frequently to security companies for analyzing whether each sample is malware or legitimate. In order to expose hijacked API calls, we need to have a behavioral monitoring system which categorizes malicious activities and legitimate activities. Existing tool such as [2, 3] are useful for generating reports on unknown executables which affect Windows API calls. However, the generated reports manually need to be clustered based on similar behavior or based on malicious activity. Analyzing a huge amount of malware infected information to recognize its intended attack is typically a difficult issue. Few present works have existed that rely on signature relied approach.

Activities of a malware can be detected by collecting anomalous network traffic for example, and botnet attack can be identified by collectively monitoring a network of computers and then look for computers that exhibit similar communication pattern. Though network-based analysis approach is useful, they suffer from several limitations. First, a malware packet may imitate as a legitimate packet to avert detection. Secondly, if the payload of a malware is encrypted, then collecting and analyzing network traffic cannot reveal its presence. Thirdly, network-based approach fails to sense malicious activities when they cannot do communication with remote attacker. In addition to signature-based approach, another fitting place to supervise and investigate malware behavior is at the end-host. We can detect a malicious code attack even before it gets executed in the victim computer. However, current host-based malicious code detection techniques do not use effective models. As a result, these models cannot capture central or essential properties of a malicious executable. An API call graph (ACG) is a candidate solution which is a suitable data illustration of the data and control flood of software programs. Additionally, it offers information about local data usage of a procedure and global data that can be exchanged between different procedures. Call graph acts as a suitable tool either to study the behavior of a program or for tracking the flow values between different components of a program. ACG can also be used to recognize programs that are never invoked. In this paper, we present an ACG framework for detecting malicious software that uses API hook

attacks based on the synthesis of static and dynamic analysis technique. The theme of this paper is discussed as follows:

Static and dynamic analysis methods are used for the identification and extraction of API invocation calls and its associated parameters of an executable.

The API system call-dependent graph algorithm is devised to generate graphs from the extracted information.

Finally, ACG algorithm is implemented to compare all data-dependent graphs which can identify whether an API call made by the executable is either legitimate or malicious hook attack.

The arrangement of this article is structured as follows. Section 2 presents the existing techniques to detect malware attacks using a graph model, and Sect. 3 explains about the proposed system to optimally detect malware attacks. Experimental environment and the evaluation results are analyzed in Sect. 4. Section 5 lists conclusion.

## 2 Related Works

Graphs can be used to reflect the execution flow of an executable file through nodes (vertices) and edges (links) that, respectively, denote API function calls and relationship between API function calls. Almost all recent malwares are being developed from its predecessor by incorporating new features. The operations to be invoked by a system call can be traced and modeled as a digraph that is composed of nodes and edges, where each node signifies a function call and each edge denotes calls between functions. Such a graph is referred as a call graph.

Malicious rootkit that uses API hook technique continues to be an advancing hazard to current computing technology. With the ever-growing explosion of these kinds of threats, it is required to build up a new method to combat them. Though many antivirus programs are available to classify files as being either malware or benign, they suffer from two limitations. First, they rely on signature-based approach which cannot identify unknown malware signature. Secondly, antivirus programs cannot deal with malware that uses API hook technique. There are many graph-based approaches that have been proposed in the past to dynamically analyze malware attacks. The n-gram approach was one of the first methods to spot malware activities especially identifying polymorphic and obfuscated viruses [6–8]. The uniqueness of our work is to identify API hook attacks in a novel way which utilizes a graph-based approach.

A graph is an attractive tool for analyzing malware hits efficiently [8, 10]. In order to investigate malware-based attacks in the Internet, Red team manually generating graphs. But their work has either false positive or difficult for a malicious malware that implements API hook technique. So, researchers are using different technique code graph or call graph to build and analyze malware attacks [4]. Guo et al. [9] proposed a binary translation approach to analyze and detect malware execution. The authors generated control flow graph based on malware's behavior, and then

another API subgraph was generated to compare its activities. The authors in paper [5] presented a graph-based malware inference model that relied on system call information which can be invoked at the time of execution in a victim computer. This method offered improved detection rate and avoids scalability issue. Many works published in the past stress the importance of concern machine learning and statistical methods to discover the presence of a malware. Nath and Mehtre [11] proposes a mixture of different data samples which can be created from malicious malware trials for detecting malware, like n-grams, instructions, and unique byte string.

Bio-sequence-based comparison methods also exist [12] for evaluating genetic trails which relies on genetic chain, to detect legitimate executables. Cuckoo sandbox [13] is a most popular malware analysis tool. This open-source tool can be used to automatically analyze many different files like emails, executables, etc., and infer informative data. These data summarize the flow direction of execution of the malware and collect information about API function calls, registry file, and flow of network traffics. Pirscoveanu et al. [14] utilized cuckoo to achieve improved classification rate. Elhadi et al. [15] developed an API call graph model using dependency relationship and profile of function calls to discover malicious operations. This model uses past history of known discovered malware samples to identify unknown malware attacks. However, polymorphic packed malware would make detecting zero-day attacks very multifarious. Mehra et al. [16] proposed a combination of control flow graph (CFG) API call graph (ACG) and histogram technique to classify a system as wither benign or malicious. This method uses two different algorithms: one for removing unwanted data and to manipulate a CFG and another algorithm for generating ACG and its features.

The modified longest common subsequence algorithm (m-LCSA) [16] is utilized to find out the similarity linking two strings using the longest subsequences that are common to all input strings and determine best subgraph. Khodamoradi et al. [17] applied the decision tree method to infer statistical information on opcode from disassembled code and then build threshold values. The opcode statistic extractor tool is used for examining disassembled code to calculate frequency value of the opcode which was then considered to check whether malicious code is present. Mosli et al. [18] proposed a machine learning-based malware detection approach using support vector machine. This method extracts different features like API function calls, registry access, and import/export library functions from malware accessed memory area.

An existing method [19] deployed hybrid solutions that apply various stemming techniques and algorithms to optimize detection accuracy. Kane et al. [20] proposed an optimized opcode method for discovering obfuscated malicious executables. In this work, first, support vector machine technique was applied to categorize different type of files. Then, a histogram-based opcode density extraction procedure was exercised to create opcode set during application execution. Salehi et al. [21] presented a study on generating important features of argument return values about API function call lists. The experimental results indicate that this research work obtained detection rate of 99.9% with negligible false positives. Techniques for comparing nodes and

structures of two different call graphs and their similarity level will be exercised to detect malware in this paper. We anticipate system call traces of a function call to be very similar with similar structures [23]. In addition, unrelated system calls should invoke some API function calls with dissimilar structures. Few existing research papers [24] also impose authentication system during validation of system calls of different applications.

## 3 Proposed Graph-Based Model

We assume that most malicious malwares are developed by inheriting characteristics from its previous version. For example, the various versions of TDSS rootkit are as follows: TDL1 was implemented to load and run at the time of booting the operating system which was designed with the intention of infecting drivers. TDL2 appears to be same as TDL1. However, it includes different names with random string and also imports new technique to avoid detection and removal. In order to obtain control over the victim computer, TDL3 patches the disk controller driver. Some features of TDL2 were updated to make detection and removal more difficult. The aim of TDL4 variant is the same as that of TDL3. However, patching Master Boot Record is done which makes infection of 64-bit systems also possible.

A directed graph $G$ is a call graph, $(V, E)$ in which $V$ signifies a set of nodes that represent a function of the executable program and $E$ is a set of ordered pairs of elements, E_VxV [14]. A directed edge $(u, v)$ in $E$ represents a function call of the program, $u > v$. The proposed idea attempts to optimize the accuracy of malicious code API hook attack detection using API call graph. An API call graph is constructed using data-dependent plot in which each node represents an API call and each edge denotes the dependencies between two calls.

The modified LCS graph matching algorithm is applied to identify common subgraphs and their similarity. The overall picture of our system is given in Fig. 1, which includes two important stages which are referred to as preprocessing stage and post-processing stage.

### 3.1 Preliminary Processing Stage

A function can be invoked or called itself to accomplish certain task. An API-based call graph (ACG) is generated to show the relationship between callees and callers. An ACG acts as a vital source to extract important features. Important function types that can be exercised to generate necessary resource of an ACG can be classified as follows.

nlFun: the API functions which do not reside in the system's dynamic link library (dll) and can automatically generate function names.
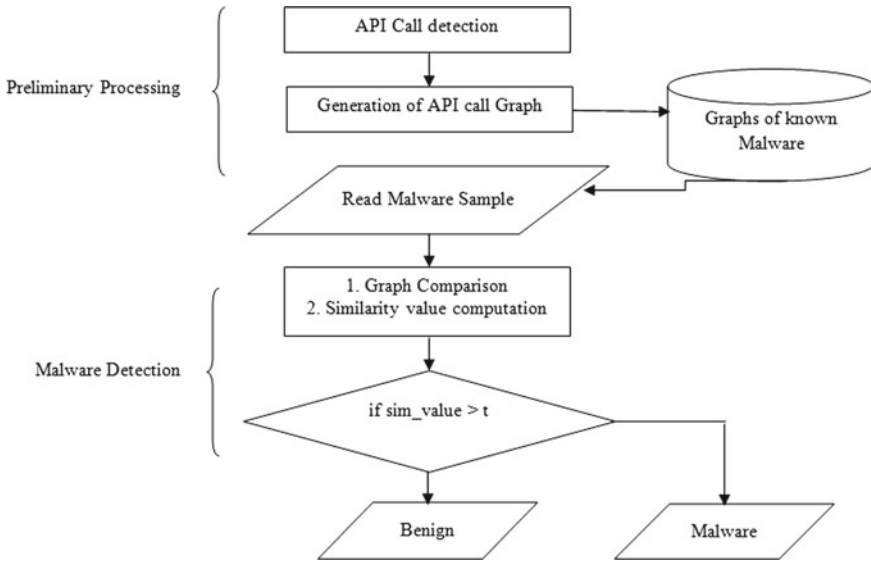
**Fig. 1** Structure of the proposed system

lFun: the API functions which resides in the system's dll file.

imFun: the API functions which are imported from the system's dll file.

xFun: the API functions which are not identified as library API functions but use jump instruction to execute a detoured code indirectly.

There are few malicious hooks which do not follow any of the four aforementioned API function calls, and discovering such hooks is out of the scope of this article. All the nodes and edges of an ACG are extracted from the aforementioned API functions. An edge with some cost for a pair of nodes can be produced using two API-based calls associated with it. To construct an ACG, all the functions associated with an executable will be identified by referring the system tables, namely Import Address Table and Export Address Table. Then each function is verified to determine whether it is a system call or not. If it is a system call, its corresponding function name and its parameters are used to construct a call graph. An ACG is generated in which each node contains the function name and an edge is established using its parameters list. If two parameters are available in list that are redundant, then they reflect the dependence between the recent and preceding API-based call.

## 3.2 Malware Detection Stage

Today, a malware writer can develop a malware by updating new features and techniques with its predecessor rather than coding from scratch. This information helps us to reduce the complexity of considering all kinds of addiction while inquiring the

**Table 1** Important features mined from ACG

| Feature | Comment |
|---------|---------|
| Node | API function to be invoked through system call |
| Edge | Relationship between two API function calls |
| Start node | Start node in the ACG |
| Isolated node | Function which does not call any other function |
| Subgraph | An undirected subgraph of the ACG |
| Type of a node | A node belongs to any of the function type (nlFun, lFun, imFun, and xFun) |

data graph (DG). The objective of the malware detection stage is to generate a subset of the DG by referring query graph (QG) and extraction of few important features of such graphs. The important predefined features that are used to detect a malware sample are given in Table 1.

**Definition 1** A subgraph Gx = (Vx, Ex) contains both start node and the last node recently visited and the edge between these two nodes. A subgraph does not contain a new subgraph Gy = (Vy, Ey) but Vy ⊆ Vx, where Vx represents the collection of nodes and Ex refers to the collection of edges.

**Definition 2** A best subgraph includes nodes of all the recently generated subgraphs. The central idea of graph similarity is to generate a subgraph of DG by best matching the QG. To apply m-LCSA, the data-dependent ACG is required to be transformed into sequence of a string. The desired algorithm then maps a path of QG against the path in the DG using m-LCSA. The pseudocode of the m-LCSA is given in Algorithm 1.

---

**Algorithm 1**. Algorithm for matching call graph(s)

1. **Input:** Query Graph (QG) and Data Graph (DG)
2. **Output:** Similarity Matching
3. procedure SIMMATCHING(QG;DG)
4.     rval ← 0
5.     Extract paths of P1 and P2
6.     Iu ← list of items rated by Ui
7.     **if** (Paths of P1 and P2 has same label in every edge) **then**
8.         **for** (every path find similarity using LCSA) do
9.             rval ← rval + LCSA(P1; P2)
10.            node ← function_name
11.        **end for**
12.    **end if**
13.    p ← paths_in_QG
14.    r (QG;DG) ← r |p|
15.    **if** (rval(P1) == rval(P2)) **then**
16.        'Malicious API call'
17.    **end if**
18. **return rval**
19. **end procedure**

---

A malware detection scheme is proposed to discover unknown malicious executables using two stage procedures. First, API function calls to be invoked are modeled as an ACG. Then, few important features are extracted from the ACG which can be used for training the proposed scheme. Finally, the presence of a malware sample is discovered using features extracted from the ACG.

## 4   Experimental Results and Discussion

We focused on detecting malwares that execute PE executables on Windows platform. As there is no standard yardstick exists for comparing two graphs to detect a malware attack, many researchers are using their own malware datasets against various assessment techniques. We have collected a malware samples dataset that contains 250 worms, 250 viruses, 250 Trojans and 250 benign legitimate programs that uses an API hook technique. Benign programs have been collected from a computer that runs a fresh copy of Windows 7 and Windows XP. We have run each malware sample in an isolated environment to identify and extract AP calls and its parameters using API monitoring tool. The API calls of an executable are identified by analyzing binary files statistically using tool like IDA Pro [18] or by executing the binary files dynamically in an isolated environment using a tool like API monitor [19]. Though API-based calls can be analyzed through dynamic investigation, the malicious binary must be executed several times to spot various execution flows.

To dynamically analyze a malicious executable files, the following three operations are performed. First, the obfuscation cover is removed. Secondly, unpacking and decryption are performed over the executable. Finally, functions are extracted which are later assigned with a unique symbolic name. Using this extracted information, a graph is generated for each API call. We utilize different techniques like random forest and data mining classification techniques to produce appropriate classifiers. In order to verify the usefulness of our method in detecting the presence of a malware, different malware samples with cross-validation method are applied. The test dataset is partitioned into ten different sets—a set on the average consists of 75 malware samples and 25 benign programs. Then the proposed framework has trained on nine sets, and the last set is taken for testing it.

In order to utilize call graphs to exactly locate API hook attacks, it is necessary to compare a call graph that reflects the API hook behavior against those that reflect benign behavior. To compare two call graphs, we used a graph matching Algorithm 1 to determine its similarity by matching data graphs with query graphs. When two graphs have the same number of nodes, then it is said to be exact matching. All experiments are tested on machine runs Windows 7 operating system. For every system call, its equivalent DG is generated. Then it is compared with QG. By analyzing numerous root malware attacks, we set a similarity threshold value of 95% to determine whether a generated graph impersonates malicious operation or not. Suppose the determined similarity cost of a malware surpasses the predefined threshold similarity value, then it is suspected as a malicious malware that uses API hook attack.

## 4.1 Discussion

Table 2 lists the overall detection accuracy rate of different graph-based approaches considered for malware detection. The random forest graph-based approach attained detection accuracy rate (worm) of 97.5% which is only less than 0.4% compared to detection rate of Trojan. Although worms and Trojans used different kinds attacking strategies, the detection accuracy rate looks approximate. We came to the same conclusion from the outcome obtained from the next classifier, data mining. However, the proposed method attained approximately 99% of detection accuracy and outperforms other methods. All the methods listed in Table 2 also obtained nearly the same detection accuracy rate when different dataset has been used, and this can confirm the consistency of the proposed model.

The accuracy of our method is appraised by using parameters such as false positive (FP) that occurs when the test spots the legitimate programs to be malicious, detection rate (DR), and accuracy rate (AR). The percentage of programs classified as malicious is measured as false positive rate (FPR) that is determined using the following formula. FPR = FP/(FP + TN). Figure 2 shows the ROC curves of all detection of all techniques that have taken for analysis and comparison, and Table 3 depicts the AUC values of each technique.

The small twisted in curve of data mining reveals that data mining-based malware detection suffers from more false positives. As the AUC values of both random forest and data mining almost same, their ROC curve almost overlaps. The simulation results of the proposed method achieve better AUC value, i.e., 99% in all cases of malware samples than the rest of two techniques with minimal false positives. The same training and testing datasets are employed in bigrams and graph edit distance-based approach [22], and its comparison with our approach is presented in Table 2. In order to test the robustness of the proposed scheme, a small dataset (1%) has been randomly chosen for training purpose which will discover the remaining 99%. Figure 3 demonstrates the performance of proposed malware detection approach, and its detection accuracy is compared with the bigrams and graph edit distance-based approach.

It can be inferred that the detection accuracy of the proposed method achieves 98% when the size of the dataset is 9% of the entire dataset, and 99% can be reached constantly when the dataset is increased from 10%. The malware detection of the bigrams and GED-based method has achieved below 95% when the dataset is 1%

**Table 2** Detection accuracy rate of different graph-based approaches

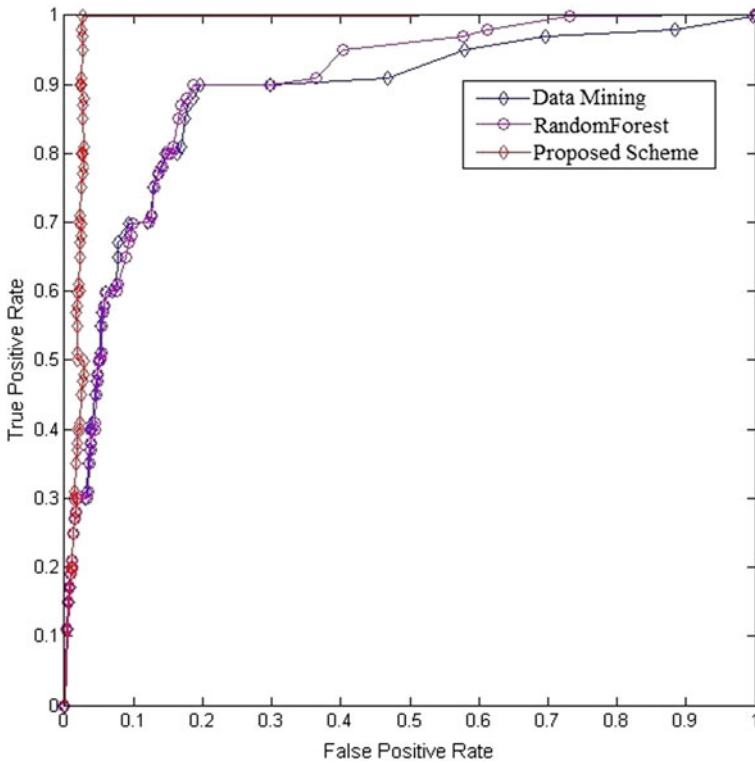| Approach | Detection accuracy (%) | | |
|---|---|---|---|
| | Worm | Virus | Trojan |
| Random forest | 97.1 | 97.3 | 97.5 |
| Data mining | 96.1 | 96.6 | 95.5 |
| Proposed approach | 98.9 | 98.7 | 98.8 |
| Graph edit distance (GED) | 97.6 | 96.7 | 96.2 |

**Fig. 2** ROC curves of random forest, data mining, and proposed test results

**Table. 3** AUC values of random forest, data mining, and proposed test results

| Approach | Worm | Virus | Trojan |
|---|---|---|---|
| Random forest | 0.984 | 0.985 | 0.987 |
| Data mining | 0.987 | 0.981 | 0.982 |
| Proposed approach | 0.992 | 0.993 | 0.994 |

and attained overall malware detection rate 97%. There are two reasons for variation in detection accuracy. First, different malware dataset is used for training and testing purpose and second, the bigrams and GED-based method for dependence on the features of known malware samples.
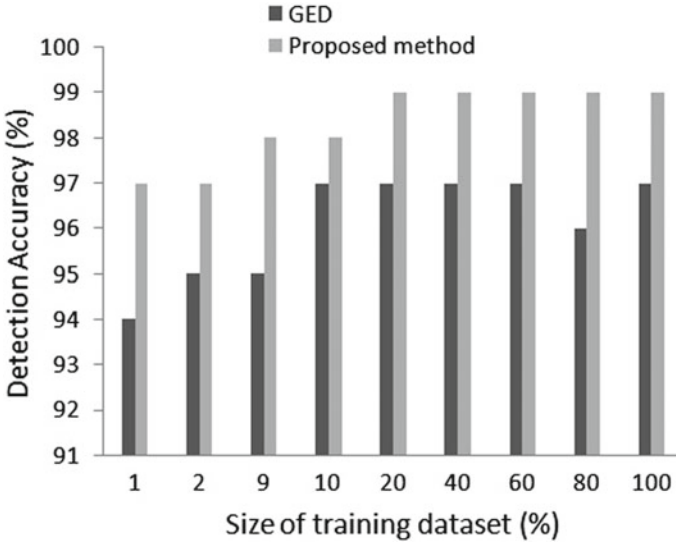
**Fig. 3** Performance comparison of the proposed method

## 4.2 Limitations

The proposed API call graph malware hook detection approach assumes that the model graph of malware samples might be from the same malware family if the calculated similarity value becomes high. However, more advanced kernel level malwares use an effective obfuscation technique to evade detection which can affect the overall effectiveness of the proposed approach. Next, polymorphic malware with advanced packing poses a serious challenge when executing and extracting all its associated parameters. Finally, few malwares can mimic the name of various operating system resources; as a result, exploring the similarity value between two legitimate operating system resources is a challenging task. We point this issue as a possible research direction.

## 5 Conclusions

Today, most malware authors have integrated API-based hooking method to avoid detection from antivirus measures. This article presents a method that uses graph as a tool to discover API hook-based attacks which are based on mistrustful system call traces and its relationship among them. In turn, system calls are represented as a call graph and comparing graph comparison is applied. Lastly, the system discovers the similarity value to determine the presence of a malware. The experimental evaluation results over the testing malware samples prove that our method incurs an average

of 99% detection rate over the existing schemes. In addition, our method fabricates better space complexity. In future, we plan to incorporate recent technology like machine learning technique to automatically predict the occurrence of any attack that targets exploiting system resources.

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## FIFTH INTERNATIONAL CONFERENCE ON SMART TECHNOLOGIES IN DATA SCIENCE AND COMMUNICATION (SMART DSC-2022)

*Certificate of Participation*

Presented to

### P.Pandiaraja

Department of Computer Science and Engineering, M.Kumarasamy College of Engineering, Thalavapalayam, Karur, TamilNadu, India

*Presented Paper entitled*

E-Health Care Patient Information Retrieval and Monitoring System Using SVM

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*Conference Chair, SMART DSC-2022*

Dr. Venkatram Nidumolu
*Pro-Vice Chancellor*

Prof. G P S Varma
*Vice-Chancellor*

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# Contents

# E-Health Care Patient Information Retrieval and Monitoring System Using SVM

K. Sumathi and P. Pandiaraja

**Abstract**  In healthcare, the modern technologies and the smart devices have brought an excellent results. In Intensive Care Unit, these technologies brought a more facilities to take care of patient health. The Internet of Things helps the gadgets to fit with Internet. This provide a conjoin between the care taker and sick people which leads to the duplex communication. The aim of the patient surveilling device is to protect the patient in the intensive care unit. This system is used for analyzing the patient essential movements and sends the report continuously to the doctor through the help of the cloud. With the help of support vector machine algorithm, the data get compared with available dataset. If the compared value gets reached above its threshold value or below its threshold value the precaution message is send to the server. The server sends the notification message to the care taker and provides guidance for giving first aid. To collect these vital information, we need some sensors. These sensors sense various body parameters such as the blood pressure, temperature (body heat), heart rate, and sugar level. In addition, our system also analyzes the comma patient movement with the help of three-axis accelerometer sensor. The heart rate is measured by using the pulse oximeter sensor; blood pressure is monitored by blood pressure sensor. These sensors generate the report frequently. This system mainly helps the patient by sending the message not only in emergency case it also provides the precaution message if the value reached above or below its threshold. The surveilling system helps the care taker and reduces the work pressure and also this system overcomes the nursing staff's shortage problem. The biomedical data of the patient send through the server with the help of wireless communication network and the data will be displayed on the mobile phone as well as laptop using

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web browser. This multitasking implementation in our system helps the health care especially in Intensive Care Unit.

## 1 Introduction

The patient surveilling device is used for observing the patient sensual signs. In day-to-day life people are get suffered by many diseases. The hospitals are not even having sufficient nursing staffs to monitor the patient especially in Intensive care unit. The Internet of Things is the current growing technologies which helps the people in medical field. It digitalizes the nursing care with the help of our device [1]. This device is connected with the sensor and if any symptoms are observed by the sensor, it passes the message to the doctor with the help of server. This system is not only specially made for any age group, it can be used by everyone who is admitted in intensive care unit [2]. The wireless sensor networks are used for transferring data from transceiver to receiver wirelessly. The main objective of the system is to act as an intermediate in the situation, where the doctor is not available in the hospital but even he or she can monitor their patient by getting details with the help of this system [3, 4].

The Arduino microcontroller is used in which the sensors are getting connected. The Arduino board continuously reads the input from the various sensors. It uses the cloud database to store the data. The sensed information is transmitted to the cloud with the help of Arduino [5, 6]. The GSM technology is used for location tracking by which it can send the analyzed report of the patient to the doctor [7]. E-medicine plays a vital role in intensive care unit for the fast record of patient details. The support vector machine algorithm is used for analyzing purpose where the data sensed by the sensor is compared with the ideal data. When it identified any problem, it automatically send message to the consultant person with the help of the server, this saves the patient life [8]. The display devices are used in many fields. But, particularly, it is very useful in medical fields. The display device must be very accurate because of predicting disease [9]. Generally, LCD displays are used. The resolution of image is very important. The high-resolution of ideal information is efficient for the further treatment and diagnostics. The LCD display is composed of constant number of pixels which helps to display the information on the screen [10]. The LCD obtains the good quality image. Today's scenario, most of the health care units are built with audible alarm. The alarm is the spontaneous warning device which helps in hospitals to alert and convey the message quickly and effectively. Alarms in sensitive care unit that are enacted from many number of devices.

## 2 Related Works

The patient surveilling device is used to collect the data from the sick people in intensive care unit with the help of Internet of Things. These information are sensed through various sensors. Generally, the patient surveilling device helps to reduce the works of care takers and it also saves the patient life [11]. This system works with the help of IOT device like Arduino board or Raspberry Pi. The board consists of various signals like analog or digital [12]. Each sensor connected with the Arduino board to send the sensed information to the concerned person. The sensed information is used to analyze for decision making and further to predict the diseases. The system is classified into three stages. At first Stage the biosensor are used to predict the disease [13].

The sensor like heart rate sensor, temperature sensor, and blood pressure sensor. They are used to analyze patient daily status and send the sensed information to the IOT device like Arduino or Raspberry Pi [14]. In this technical world, everything was smart. In this smart world the smart devices like Arduino or Raspberry Pi are interconnected with the objects around the environment. In medical field, Internet of Things plays a major role, and it is more helpful to monitor and track. In second stage, the sensed information is transmitted through server [15, 16]. To operate this device, we need Wi-Fi connection. The Arduino board need to connect with the Wi-Fi network using Wi-Fi module. Then only the information can be reached to the doctor or the care taker [17]. Once the information is reached, it helps the care taker or doctor for further treatment. At final stage, the system triggers alarm in case of emergency situation. So that the care taker gets alert and pass the information to the doctor. In this system, the main component is microcontroller board [18, 19].

The Arduino board consists of microchip, analog, and digital pins. It also consists of USB port which makes us to connected with the laptop/pc's. The board consists of transceiver and receiver and also some light emitting diode. The Arduino uses the USB port or external power supply to draw power automatically. In this system, they applied support vector machine algorithm used for data classification [20]. The patient-trained dataset is stored in the network, where the database gets updated. The support vector machine algorithm checks the data's threshold value; either it is above or below; and during emergency case, it sends the message to care taker [21]. Then the messages pass through the mobile or display device like monitor/pc. The display device mainly uses liquid crystal displays. Generally, the LCD is used for high-resolution image processing [22]. If the resolution of the image is high, then it is very helpful for the doctor to predict the disease very easily and the diagnostic takes place in efficient way. The medical parameters value such as heart rate, blood pressure and temperature are send to the care taker and doctor in digital form [23, 24]. So that they can analyze these values and monitor the patient in more precise way in Fig. 1.
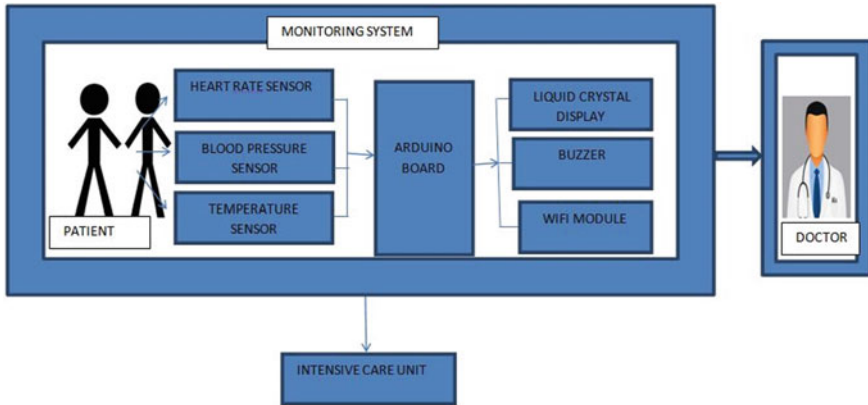
**Fig. 1** Existing system for patient health monitoring

## 3    Proposed Model in IoT

### 3.1    Microcontroller

Esp8266 is called as a Wi-Fi module, but actually it is a microcontroller. Esp8266 is used to work with two ways. The first way is by using AT commands. Another way is by using Arduino IDE. The AT commands is used to send the data from Arduino to ESP. The Esp8266 module has eight pins which are used to perform various functions. The maximum input voltage for Esp8266 is 3.3 V. If the input voltage is greater than 3.3 V which causes damage to the module. Node MCU is an open source LUA-based firmware. The development board of Node MCU V3 which is used to run on Esp8266. The features of Node MCU are which has 4 MB flash memory and 50 K usable RAM. The Node MCU consists of 30 pins. While 15 pins are at the left and the other 15 pins are at the right. It has 16 pins for general purpose input and output. Out of this, 16 pins for digital input and output 10 pins are used, and 1 pin is used as the analog pin in Fig. 2.

**Fig. 2** Node MCU with ESP8266

## 3.2  Sensors

A sensor converts the impulses such as light, heat, sound, and motion into electrical signals. These sensed information are gathered and sent to the interface which converts them into a binary code then this binary information sent to the computer for further process. There are two types of sensors; they are blood pressure and temperature sensor.

## 3.3  Blood Pressure Sensor

Blood pressure is defined as pressure exerted by blood vessels while circulating the blood. It is expressed in the ratio of systolic and diastolic pressure. Blood pressures are measured by using sphygmomanometer but the blood pressure sensor itself measures the artery without using mercury. In blood pressure sensors non-invasive method is used to measure the blood pressure the normal blood pressure range is about 120/80 mmHg. When the range is above 180/120 mmHg means the person is in serious condition.

## 3.4  Temperature Sensor

There are several types of temperature sensors they are thermocouples, resistance temperature detectors, thermostats, infrared and semiconductor. To monitor the human body temperature uses the thermocouples and resistance temperature detectors. The normal body temperature for a person is about 37 °C.

## 3.5  Three Axis Accelerometer Sensors.

This three axis accelerometer is used to monitor the coma patients. This sensor measures the acceleration of the body and compares the result with normal person.

## 3.6  Display Device

The display devices are used to collect the signals and display them on the monitor or screen. In general the LCD displays are used in medical fields. Because the produce good resolution of image and the doctor can easy to predict.

### 3.7 Alarm System

The alarm system is used to alert the people. Normally, the alarm system is used in industries to alert the workers in case of emergency. This alarm now a day's used in many organizations and even in hospitals to protect the person's life. In medical field, the alarm is used to save the patient life by alerting the care taker. Normally, in hospital, mild alert sound is used in order not to disturb the other person in the hospitals.

### 3.8 SVM Algorithm

In this system, the support vector machine algorithm is used. The SVM algorithm is a supervised learning algorithm. This algorithm is used to compare the data with the help of hyper plane. The SVM works by mapping the data objects in the multi-dimensional space. The SVM is classified into two types. The linear SVM is used to draw a linear straight line, and it is used to find the difference between two classes. In nonlinear, SVM we cannot use two dimensions to find the data's. We need one more dimension to identify the classes in Fig. 3.
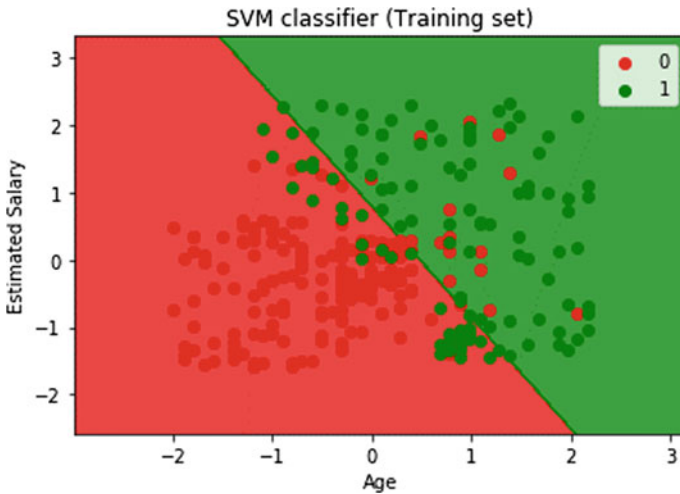


**Fig. 3** Support Vector Machine classifier algorithm

### 3.9 Cloud Server

Cloud server is considered to be a physical or virtual server the data's get collected, stored and hosted through the internet which runs on the cloud computing platform. The cloud stores the data in the cloud storage in which the computer data's and the digital form of data are stored in the large logical pools. And, it is safe to store the data's in the cloud that can be easily retrieved or get accessed anywhere from anytime through the internet server. It is impossible to delete all the data's from the cloud. In our surveilling device the sensed information get stored in the cloud. These collected data are run through the cloud computing platform that send the notification or any other messages to the particular doctor or the nursing staffs. With the help of web portal address the sensed information get viewed.

## 4  Proposed Work

Our proposed system is used to protect the patient in intensive care unit. This system helps the doctors and nursing staffs to reduce their stress level and also protect the patient's life. The surveilling device collects the patient blood pressure level, pulse rate, and also body temperature with the help of sensors. The sensed information from the sensor is connected to the node MCU Wi-Fi module. With the help of the Wi-Fi module the collected data get compared with the dataset with the help of support vector machine algorithm. The collected information get compared with the available data and display the message through the help of cloud server. When the compared data is above or below the threshold value, the notification is passed to the doctors and nursing staffs. In normal system, it only pass the information during emergency case. But in our system, we fix the threshold and pass the message during emergency case and also pass precaution message. In addition, our system helps to monitor the coma patient with the help of the sensor. The compared data pass on the cloud which helps the doctor to access the report from any location and also it is very helpful for the doctors to diagnosis the patient condition without reaching the health care center in Fig. 4.

## 5  Results and Discussion

The modular system is used which helps to analyze the patient vital signs and also this support vector machine algorithm works better to provide the results. To analyze the body parameters by using various sensors which is connect to the cloud to diagnosing the patients continuously in intensive care unit by monitoring through sensors and also by using three-axis accelerometer sensors to monitor the coma patient movement. The following figure shows the use case diagram of our proposed work and it is
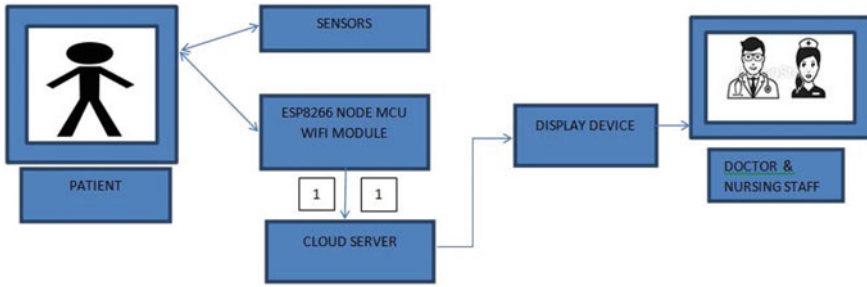
**Fig. 4** Proposed system for patient health monitoring

divided into three modules Analyzing body parameters through sensors, diagnosing patient in intensive care unit and sending notification through cloud in Fig. 5.

The different wearable sensors are used to measure the coma patients body parameters like body temperature, muscle activity, pulse rate, and glucose level in the blood. These tiny sensors are direct contact with skin of the patient and it can be used to find the several diseases like fever, blood pressure, and sugar level. Then, numbers of physiological parameters collected from these sensors are most preferred by the doctors due to its accuracy.

A small hardware is used to preprocessing the acquired data and transmits desire result to the other device through communication software. Normally, sensors are small in size, light weight, and disconcerting mobility and movement of the patients. The energy efficient components are used to operate the sensors and these components may be working continuously without charging and replacement. The accurate and secure recorded information of the coma patient in any location is reported to the
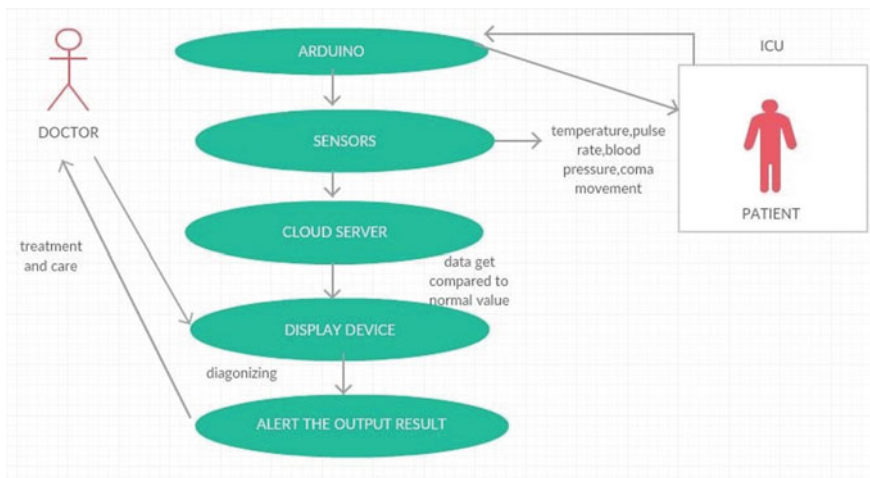


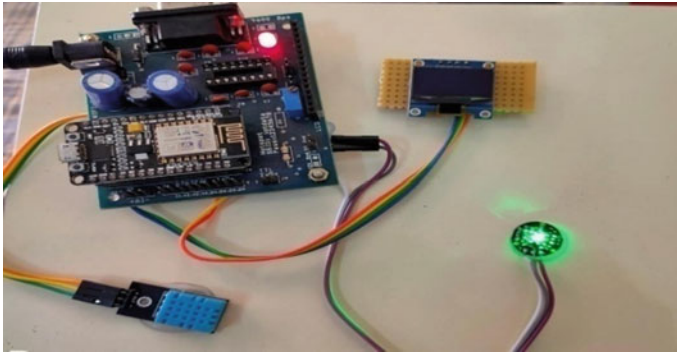**Fig. 5** Use case diagram for proposed model

**Fig. 6** Analyzing body parameters through sensors

doctors using the data transmission system present in the communication software. The result of this module is represented in the Fig. 6.

### 5.1 Diagnosing Patient in Intensive Care Unit

Remote monitoring of patients target several sub-groups of patients, such as patients diagnosed with chronic illnesses, patients with mobility issues, or other disability, post-surgery patients, neonates, and elderly patients. Automated health care services are essential for our society and it reduces the burden of the nursing staff. The transparency of this system increases the trust level of the patients. During the emergency conditions, the buzzer and LED (Fig. 7b) present in alarm system alerts the doctors, and she/he can act more quickly and handle the situation easily. The general steps in diagnosing patient in ICU are represented in Fig. 7a.

### 5.2 Sending Notification Through Cloud

The real-world application challenges are solved by using the proxy-based approach for end-to-end communication between the IoT-enabled living systems. It's a challenge for large organizations to find cloud monitoring solutions [21–24] that provide support in identifying emerging defects and troubleshooting them before they turn into major issues. A sink node collects the signal from the sensor and forwards that information to cloud via Wi-Fi or Bluetooth. The data stored in the cloud is further processed whenever necessary. After processing the data and find out any emergency then notification is send to the doctor using cloud enabled smart phone which is depicted in Fig. 8.
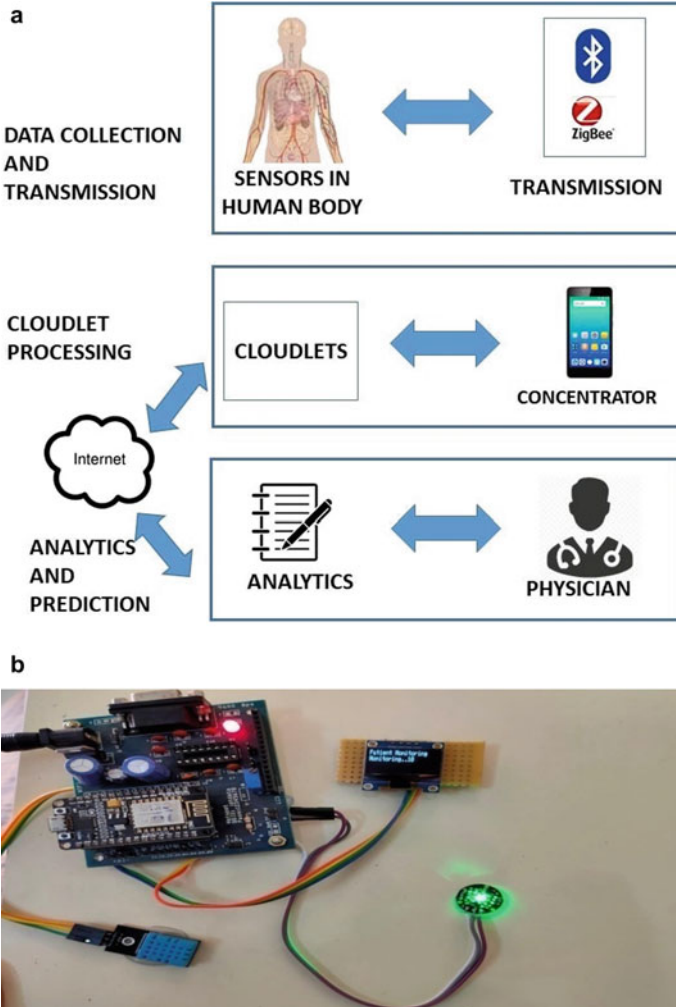
**Fig. 7** **a** Steps in diagnosing patient In ICU, **b** Diagnosing patient using LED display

## 5.3 Support Vector Machine

Support vector machine or SVM is one of the most popular supervised learning algorithms, which is used for classification as well as regression problems. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future.

This best decision boundary is called a hyper plane SVM chooses the extreme points/vectors that help in creating the hyper plane. These extreme cases are called

| S.NO | DETAILS | DATE & TIME |
|---|---|---|
| | HEALTH MONITOR | |
| 1 | T:23.93.75.07 HB:0 BP:94 | 15.02.2020 06:55:44 AM |
| 2 | T:25.39.75.70 HB:0 BP:94 | 15.02.2020 06:55:00 AM |
| 3 | T:24.41.75.95 HB:0 BP:94 | 15.02.2020 06:54:10 AM |
| 4 | T:33.69.92.64 HB:117 BP:171 | 15.02.2020 06:53:20 AM |
| 5 | T:23.93.75.07 HB:88 BP:171 | 15.02.2020 06:52:443AM |
| 6 | T:32.71.90.89 HB:120 BP:171 | 15.02.2020 06:52:07 AM |
| 7 | T:23.44.74.19 HB:120 BP:171 | 15.02.2020 06:51:11AM |
| 8 | T:26.86.80.34 HB:80 BP:123 | 15.02.2020 06:50:14 AM |
| 9 | T:23.93.75.07 HB:34 BP:92 | 15.02.2020 06:49:35 AM |
| 10 | T:30.76.87.37 HB:100 BP:157 | 15.02.2020 06:48:58 AM |
| 11 | T:25.39.77.70 HB:14 BP:94 | 15.02.2020 06:24:58 AM |
| 12 | T:23.44.74.19 HB:0 BP:94 T:23.44.74.19 HB:0 BP:94 | 15.02.2020 06:23:30 AM |
| 13 | T:25.39.77.70 HB:0 BP:94 T:25.39.77.70 HB:0 BP:94 | 15.02.2020 06:22:49 AM |
| 14 | T:24.90.76.82 HB:0 BP:94 T:24.90.76.82 HB:0 BP:94 | 15.02.2020 06:22:09 AM |
| 15 | T:24.41.75.95 HB:0 BP:94 T:24.41.75.95 HB:0 BP:94 | 15.02.2020 06:21:28 AM |
| 16 | T:24.90.76.82 HB:0 BP:94 T:24.90.76.82 HB:0 BP:94 | 15.02.2020 06:20:447AM |
| 17 | T:24.41.75.95 HB:19 BP:510 T:24.41.75.95 HB:19 BP:510 | 15.02.2020 06:20:06 AM |
| 18 | T:24.41 HB:0 BP:510 T:24.41 HB:0 BP:510 | 15.02.2020 06:02:01 AM |
| 19 | T:24.41 HB:0 BP:511 T:24.41 HB:0 BP:511 | 15.02.2020 06:01:05 AM |
| 20 | T:24.41 HB:0 BP:511 T:24.41 HB:0 BP:511 | 15.02.2020 06:00:25 AM |

**Fig. 8** Sending notification through cloud

as support vectors, and hence algorithm is termed as support vector machine. SVM works by mapping data to a high-dimensional feature space so that data points can be categorized, even when the data are not otherwise linearly separable. A separator between the categories is found, and then the data are transformed in such a way that the separator could be drawn as a hyper plane in Fig. 9.

The comparison of various approaches in naïve Bayes, decision tree, zero R, and support vector machine for true and false classification approaches are mentioned in Table 1 and its performance represents in Fig. 10.

Accuracy and precision of the different classification algorithms are calculated by using the following formula

$$\text{Accuracy} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}} (\%)$$

$$\text{Precision} = \frac{\text{TP}}{\text{TP} + \text{FP}} (\%)$$

The comparison of accuracy and precision of various approaches such as naïve Bayes, decision tree, zero R, and support vector machine are mentioned in Table 2 and its results are represented in Fig. 11.
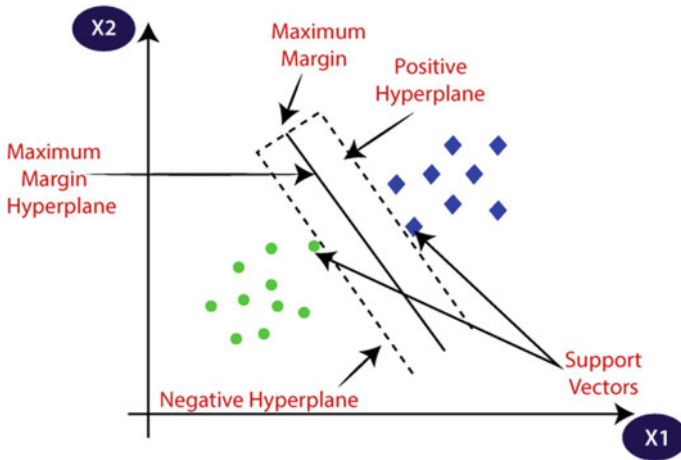
**Fig. 9** Support Vector Machine decision boundary algorithm

**Table 1** Comparison of true and false classification approaches

| Approach | Coma patient data (%) | |
|---|---|---|
| | True classification (%) | False classification (%) |
| Naïve Bayes | 84.13 | 15.87 |
| Decision tree | 67.89 | 32.11 |
| Zero R | 97.87 | 2.13 |
| SVM | 86.87 | 13.13 |

**Fig. 10** Comparison of true and false classification model
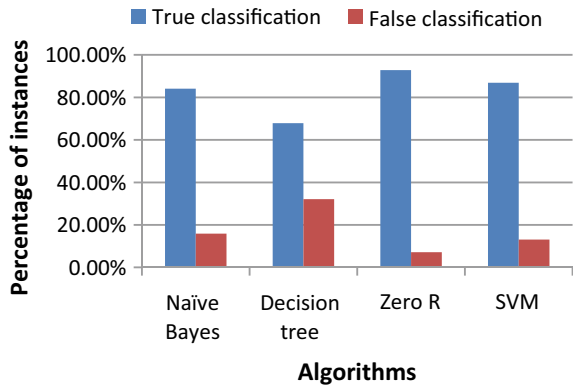
**Table 2** Comparison of accuracy and precision of various approaches

| Comparison of accuracy and precision | | | | |
|---|---|---|---|---|
| Approach | TP | FP | Accuracy | Precision |
| Naïve Bayes | 0.833 | 0.339 | 92.411 | 71.075 |
| Decision tree | 0.962 | 0.019 | 98.137 | 98.063 |
| Zero R | 0.992 | 0.012 | 99.602 | 98.805 |
| SVM | 0.868 | 0.142 | 93.866 | 85.941 |

**Fig. 11** Comparison of accuracy and precision
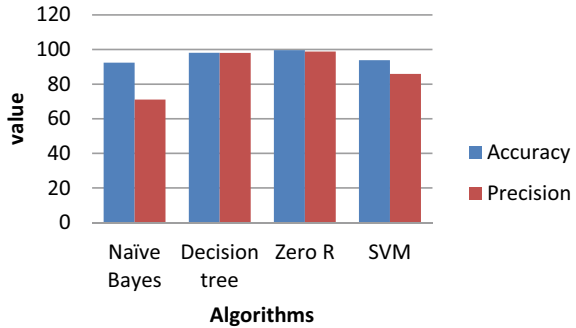


## 6  Conclusion

This system helps the ill people and also the doctors to detect the patient physiological signs and provide the doctors the best report and reduces their work. Our system overcomes the disadvantages of existing system. The support vector machine algorithm is used which helps to analysis the patient vital signs and also this algorithm works better to provide the results. The main idea of our system is we use the cloud server to pass the data and also we use three axis accelerometer sensor to monitor the coma patient movement. This system provides the efficient and good health services to the patients. The feature of the system is to examine the patient from anywhere and anytime. In our system we used future technologies and also we use various sensors and it is easy to use.

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# EDGE-OF-THINGS IN PERSONALIZED HEALTHCARE SUPPORT SYSTEMS

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# Edge-of-Things in Personalized Healthcare Support Systems

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Cognitive Data Science in Sustainable Computing

# Edge-of-Things in Personalized Healthcare Support Systems

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# CHAPTER 2

# The architecture of smartness in healthcare

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## 2.1 Introduction

The traditional healthcare industry transforms into e-Health due to the development of the internet and its related applications as stated by Qi et al. (2017). The entry of inexpensive devices like sensors, wearable, and mobile devices fasten the development of internet of things (IoT)-based healthcare industry, and these are internet enabled. According to Sangeetha et al. (2018), in healthcare, IoT is already available in the form of smart equipment that can be worn by patients to collect information like blood pressure, heartbeat, and other metabolic–based data. The IoT uses information and communication technology as its backbone along with pervasive computing, ubiquitous communication, and intelligence which facilitate faster growth of the IoT industry as given in Kühner and Daniel (2007). The IoT can operate by closely integrating with its environment and can establish communication to its near and far peers. In most scenarios the devices are equipped with intelligence and such objects are called smart objects as coined by Information Society Technologies Advisory Group ISTAG (2009).

The concept of integrating various resources through the internet under the common infrastructure is the widely used definition for IoT as given by Shamila et al. (2019). This common infrastructure provides better solutions for business and scientific researches. The IoT will be part of the next industrial revolution and future healthcare according to Ibarra–Esquer et al. (2017), Dang et al. (2019). The IoT device is mostly resource scare devices that is they depend mostly on the cloud for various computing activities, the growing number of IoT in the current scenario will

directly impact the performance of cloud so to scale this situation Fog computing is employed. The Fog is an architecture which acts as a mini cloud and it can be deployed in IoT denser areas that reduces the communication cost and improves the response time considerably. Edge computing still improves the performance of the IoT ecosystem by taking the computing capability to closer to IoT, that is, most of the processing is done at the location where the data is generated.

## 2.2 Healthcare

### 2.2.1 Internet of things-based healthcare

The IoT model mostly works with any device that it connects as stated by Neill (2013), IoT can connect people, any network, and any service at any time. Then more specifically the connection of devices is mainly done through the internet as given in Meola (2019). The connectivity is simple and they are similar to connecting a smartphone to smart TV as given in Chiuchisan et al. (2014). Then more specifically the connection of devices is mainly done through the internet as given in Meola (2019), they are similar to connecting a smartphone to smart TV as given in Chiuchisan et al. (2014).

The popularity of IoT is because it changes the web-based virtual cyberspace to a network of physical commodity devices and the characteristics such as,

- ability to create a new network with customized infrastructure
- it can provide and utilize new services in a heterogeneous environment
- machine-to-machine communication is one of the popular characteristics of IoT as given in Gigli and Koo (2011).

In the healthcare ecosystem, the data produced by the devices are collectively sent to the data collecting centers which are maintained by a healthcare organization, and these data are utilized by the medical practitioners to meet their goal. Then to make the ecosystem more pervasive Electronic Medical Records (EMRs) are integrated with the cloud as given in Bates et al. (2003). The EMRs mostly consist of data related to health and personal information about the patient. The integration of IoT with EMRs will improve the quality of care, reduce the cost for accessing the data, and provide the necessary care as given in Kulkarni and Sathe (2014). According to Pang (2013), healthcare is one of the gorgeous application areas of IoT and it gives rise to remote healthcare, fitness activities and elderly care, chronic diseases. The treatment and medication

which are provided at home with the help of various medical devices, sensors, and imaging and diagnostic devices will form a core part of IoT–based healthcare.

IoT–based healthcare provides many benefits that reduce cost, increase quality of life and enhance user experience. In the view of healthcare providers, the IoT provides effortless communication between individual patient and the clinics or healthcare organizations which reduces cost and failure rate. The wireless technologies enable the healthcare network to be alive always so the information generated in this network is always up–to–date. This network can be utilized to provide expert support to chronic diseases, real–time monitoring, early diagnosis, and medical emergencies. The medical industry is well equipped with various biological sensors, these sensors are collectively used to form a Wireless Sensor Network (WSN) as given in Ko et al. (2010). The WSN is the initial stage of IoT–based healthcare and the adaptation of an IP-based network for sensor networks facilitates the faster growth of IoT.

### 2.2.1.1 Layered internet of things architecture

The physical objects which are located near and far allowed to connect to gather, analyze, and monitor information is a typical IoT network. The layered architecture as shown in Fig. 2.1 is adopted for this type of network to facilitate seamless management and according to many researchers the IoT network consists of three layers such as,
- perception layer
- network layer
- application layer
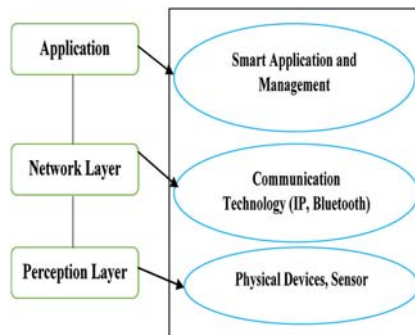


**Figure 2.1** Internet of things layer architecture.

#### 2.2.1.1.1 Perception layer

This layer act as the information collector from the things which are deployed in the environment, the things are identified by their unique identifiers as given in Silva et al. (2017). The collected information is mostly passed to the higher layer for processing through the network layer.

#### 2.2.1.1.2 Network layer

This layer act as the brain for any typical IoT architecture and the main function of this layer is to collect information from one layer and propagate it to other layers. Logically this layer is the combination of internet and communication technologies. This layer incorporates many connecting technologies like 4G, Bluetooth, WLAN, and gateway nodes for interoperability. The IPv6 low power Wireless Personal Area Networks 6LoWPAN is a technique that applies internet protocol to low power devices which enables their communication capability.

#### 2.2.1.1.3 Application layer

The application layer act as an interface between end-user and IoT, the user can utilize the data and manage the device through the set of application that runs in this layer. This IoT layer can be tailored according to the requirement and it is possible to run a high-level smart application in this layer.

As given in Suo et al. (2012), the bottom perception layer is called as *object layer* and it's responsible to collect information from all available heterogeneous IoT devices like a mobile phone is used to collect information from various sensors deployed in the patient body or simply from Wireless Body Area Network. The application layer is also classified into three-layer such as *Service management layer*, *Application layer*, and *Business layer*. In this, the service management layer takes responsibility to process the information, decision-making, and taking care of service requests, and the business layer is used to run business logic. The more interesting development in the IoT architecture according to Loiselle and Ahmed (2017), is the addition of a *support layer* which is placed in between the network and application layer. In the support layer, the technologies which facilitate the effective processing of information like cloud, intelligent, Fog, and Edge computing are employed. Then to make the application layer simple, data accumulation layer is used to store the vast amount of data produced by IoT.

## 2.2.2 Healthcare ecosystem

The traditional medical industry followed the practice of making the patient visit the hospital. This kind of practice is not suitable in some situations like in the battlefield, emergency, and the healthcare of the elderly. In this situation the medical service will not be available immediately. In the olden days radio communication was employed to assist the medical–related service at the battlefields and sailing ships, this paved the way for telehealth. The growth of telehealth technology leads to the concepts of connected health as given in Sharma et al. (2017). Connected healthcare employs smartphone and mobile applications along with other communication technologies. It leads to the development of smart health in which wearable medical devices such as blood pressure monitors, smartwatches, smart contact lenses, and other IoT devices that enhance the availability of medical service on time as given in Johri et al. (2014).

The devices in smart health are equipped to measure biological signals from the human body and these data are sent to a remote destination. The collected data are actively stored in the database which is maintained in the cloud and these data are used by the physicians for real–time monitoring and analysis and in research view, these data are used to study the nature of health, diseases, and other biological conductions around the various parts of the world. The amount of data contributed by smart health devices and IoT is huge and they are referred to as big data. Big data are mostly helping to provide meaningful information when processed as stated in Johri et al. (2014).

### 2.2.2.1 Internet of things-based healthcare network

The network is the collection of nodes that can be configured based on requirements like the IoT-based healthcare network has to be configured accordingly. As the network consists of *topology*, *architecture*, and *platform*. The topology is used to arrange the various medical equipment according to the requirements. The network is populated with heterogeneous devices such as laptops, smartphones, and medical terminals, various sensors devices like blood pressure monitoring devices, electrocardiograms (ECG) which are configured as hybrid grids as given in Viswanathan et al. (2012).

Fig. 2.2 shows a typical case in which a patient in emergency condition is being taken to a hospital in an ambulance equipped with IoTs, the vital signature are captured and sent to caretakers to act accordingly.
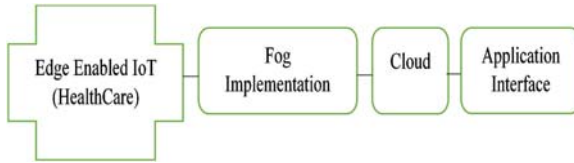
**Figure 2.2** Internet of things smart environment.

The network topology will incorporate devices based on the scenario like the healthcare IoT collected ultrasound images or videos then the network should include high-speed networking devices like 4G, or satellite network to stream the data. The cloud can be a part of this topology which is to provide storage facilities and processing capabilities as given in Doukas and Maglogiannis (2012). The architecture is mostly designed like layers and the layer according to Zhang et al. (2012), are physical, adaptation, network, transport, and application layer.

- The link and physical layer deal with the physical components and their connectivity using IEEE 802.15.4 standard.
- The adaptation layer provides support for data transmission using IPv6 and 6LoWPAN.
- The sensor nodes use User Datagram Protocol.
- The application layer runs the required application and this application communicates using HTTP, SSL, and other application-level protocol.

The IoT healthcare platform specifies the various entity that required to execute the network and application seamlessly, like providing various software packages, Application Program Interface, networking tools to build and maintain the networks. The network mostly consists of heterogeneous nodes so whatever thing that gets inside the network must interoperate with all other devices so as stated in Rasid (2014), some set of standardization is required.

The IoT–based healthcare solutions are provided by using the following three configurations, sensor-based healthcare solutions, smartphone, and microcontroller-based solutions. In the early stage of healthcare, environment sensors are used to monitor human biological vital signals. The body temperature sensors (Max 30205), pulse rate sensors (BME 680) are the commonly used sensors as given in Tsakalakis and Bourbakis (2014). The authors, Ahouandjinou et al. (2016), developed a blueprint that includes humidity sensor, biochemical sensing sensor like glucometer, body movement detecting sensor, $CO_2$ level sensing device, and respiration monitoring sensor, these sensors can be baked according to the requirement as a

wearable device and they form a Wearable Body Area Network. Radio-frequency identification is used to develop a smart real-time Intensive Care Unit system as shown in Ahouandjinou et al. (2016). Grossi (2018) points out that the modern smartphone consists of various useful resources that is they contain 15 or more sensors. These sensors can be used to monitor biological events and the collected data are used to make the decision. The modern smartphone comes with more storage space and high-speed internet connectivity, which makes it an ideal healthcare solution. According to Kumar et al. (2017), smartphone is used to measure the ECG and these data are used to raise the alarm if any variation is seen in ECG. The micro-controller is more power full device that can process raw data faster, as shown in Wang et al. (2004), the Arduino-based health monitoring system is used to measure the body temperature and pulse rate.

### 2.2.2.2 Healthcare services based on internet of things

The IoT-based healthcare services are limited and they vary based on the requirements, each service will provide some set of healthcare solutions. The internet of mobile health is the simplest service that is provided with the help of mobile, medical sensors, and communication technologies. The smartwatch monitors the temperature and heartbeat rate and they are communicated to the paired mobile as shown in Pang, Chen, et al. (2013). In Istepanian et al. (2004), some of the challenges are discussed to some extent. The drugs which are prescribed will sometimes lead to some adverse reaction due to the patient conduction, to tackle this problem in Istepanian (2011), proposed an iMedBox which scans the NFC enabled medicine when they are brought from the medical shop and it will be compared with the patient medical record and based on the results the medicines are allowed to be taken by the patient as given in Yang (2014).

An Ambient Assisted Living (AAL) is a kind of environment that integrates the various sensors and services they are used to provide medical support to elderly and special need people. The AAL becoming mandatory in the modern world where the life of human beings increases as the result elder population goes up. This situation leads to the requirement of cost-effective solutions to provide healthcare solutions to those elder populations. The ambition of the AAL is to provide wellbeing and safety to elderly people and based on this various applications are developed such as safety and security, social contacts, telehealth, sleep pattern monitoring, and tracking the daily life activities for better improvement of health. The data produced in this industry is becoming a more valuable

asset for the scientific community and in the recent time domain, the IoT is moving towards AI to make the environment smarter.

## 2.3  Technology based smartness

Medical science has begun to embed with digital technology as a result of collected and stored information increasing in huge amount. These data are processed in some statistical way to dig out more useful information that can be used to bring out various enhancements in medical science. The IoT device is not resource-rich, so they depend on some platform for the processing and storage of information. The Quality of Service (QoS) is one of the main requirement of digital–based medical service such as real–time patient monitoring system should not experience any delay or jitter. The application that requires QoS demands dynamic allocation of resources during its operation in the cloud which has been a cheap and scalable platform that can be used flexibly to support the demand made by the application.

### 2.3.1  Integration of artificial intelligent

The way in which information is processed and utilized is changed from normal traditional algorithm to AI-based algorithms. The Internet of Medical Things (IoMT) is beginning to transform into smart medical sensors which are operated intelligently, for example, the smart heartbeat wearable smart device can automatically make a warning about the irregularity that happens in the heartbeat rate, and it can alert the user based on the users' walking pattern which leads to heartbeat irregularity. The IoMT which is attached to a blind person to facilitate to guide him is one kind of AI-based device, it used Wireless Body Area Network which is the collection of sensors attached with the person. The motion sensor will monitor the movement of the persons and the direction of the location of are pinpointed with the help of GPS devices and high–resolution camera which act as eyes will capture images in real-time and process it in association with other sensors and the results are input to the person as audio information and in some cases vibrations are used. If the AI wants the person to turn left side means the vibrator in the left hand vibrates and right one for the right direction, if the both vibrator vibrates then it indicates the presence of the object in the path or the person may taken the wrong direction.

In Jara et al. (2010), real-time IoT-based ECG remote monitoring is proposed. In which an intelligent algorithm is deployed in the smartphone which gets input from the wearable devices and makes real-time evaluation and produces an efficient suggestion about the healthiness of the heart based on his physical activities, the AI algorithm can acquire knowledge from the historical data available in the cloud. The IoMT can be deployed in two different ways such as static monitoring and dynamic monitoring. In static monitoring, the data, the patient, and the associated devices will not move such as home, hospital, and the dynamic monitoring is done at any place, that is, the patient and associated devices are in motion. The static and dynamic model of operation requires a different type of computing and communication requirements and to manage this different types of processing architecture are employed as stated in Satija et al. (2017). The different levels are Edge, Fog, and cloud computing.

- The cloud process processing and data storage support as remote support.
- The fog is the small framework of the cloud and it operates near the IoMT deployment area which aims to reduce communication cost and load on the network.
- The Edge in which the processing capability is provided to the device or placed at the gateway server, smartphone, advanced sinks, etc.

The three architecture can be used collaboratively, for example, in a static monitoring environment the data from the sensor devices are collected by fog nodes, these data can be sent to the cloud for processing and they can remain in the fog database. In dynamic monitoring, environment fog is replaced by edge devices that would directly interact with cloud services. In IoMT the data collected by the monitoring device are allowed to reach the end-user through the cloud. The cloud is a more congested environment where the response time will not be guaranteed since much medical-related application requires timely delivery of information, so to tackle this case the mini cloud is developed which are termed as fog, that acts like a real cloud. When a temperature monitoring system is integrated with the fog, the fog will gather information continually and this information is aggregated. These aggregated values will give a meaning full messages and it is sent to the cloud, this will reduce the load on the cloud and the application does not experience any delay in getting responses. The cloud and fog are used to balance the processing capability and to increase the response time, but some critical healthcare application requires immediate responses such kind of application are pushed to the edge.

### 2.3.1.1 Edge computing in healthcare

The era of edge begins with the entry of active and wearable sensors as given in Al-Fuqaha et al. (2015), and it also presents an application in which the twelve kinds of human behavior are gathered by the devices and sent to fog where an Long Short-Term Memory (LSTM) based algorithm is used to analyze the data and can be used to make any prediction related to health. The machine learning (ML) techniques can be applied with the physiological data and they can be used to detect the anomalies in the physiological parameter as given in Al-Fuqaha et al. (2015). The performance of this ML-based application can be improved with the integration of edge. As given in Poniszewska-Maranda et al. (2019), the Hierarchical Temporal Memory algorithm which is distributed across the edge nodes is used for analysis.

In Sood and Mahajan (2017), a fog-based system is described in which the system analyzes the environment and health symptoms which are used to predict the presence of the virus and makes use of it to alert the people in that particular location. The users of smartphones can find the risk level of diabetic patients using a decision tree classifier as given in Devarajan et al. (2019). Thus the AI and ML-based approaches are useful to detect anomalies, predictive risk monitoring, decision, and treatment support. The limited capability of an edge can be overcome by properly dividing the functionality among edge, fog, and cloud.

## 2.3.2 Semantic objects

Semantics is the concept that deals with connecting entities based on their relationships defined by some concepts. In a different concept, the entities will combine differently, for example, an entity like blood pressure will have a relationship with the heart, since blood pressure and heartbeat are related to each other. The AI has the capability of learning and doing things in a better manner, but the AI has a shortfall in making things better when there is no appropriate data that is the quality of data is very low. In such a case the semantic and AI can be combined to get better results when applied to classification and recommendation systems. The semantic knowledge will act as the brain for AI so that it will provide quality outcomes.

The knowledge processing based on semantic will enrich the measured data and gives out more fine-grain information. The method described in Wang et al. (2004), Web Ontology Language (OWL) encoded context ontology is the first knowledge-based processing. Table 2.1 shows some of the systems built based on ontology.

**Table 2.1** Ontology-based system.

| Source | Findings |
| --- | --- |
| Avancha et al. (2004) | The process of determining the expected behavior of sensor networks based on conditions using ontology. |
| Matheus et al. (2006) | The various sensor data are gathered and processed to provide service based on the context with the support of ontology. |
| Witt et al. (2008) and Schadow and McDonald (2009) | Sensor Model Language (SensorML) and Unified Code for Units of Measure (UCUM) are the ideal company for ontology-based IoT. |
| Hu et al. (2007) | It is the first proof of concept, which describes the use of web ontology, semantic web, and SensorML in Ontology-based Wireless Sensor Network. |
| Herzog et al. (2008) | Device-Agent Based Middleware Approach for Mixed Mode Environment is shown, in which heterogeneity-based measurements are interpreted based on the device ontology. |
| Bowers et al. (2008) | The measurement data are merged semantically and discovered using Web Ontology Language, Description Logic (OWL-DL). |
| Stevenson et al. (2009) | Antonym-Sensor describes the core concepts of location, time, people, and sensing and integration of these entities based on semantic. |
| Calder et al. (2010) | Coastal Environmental Sensing Network (CESN) uses Marine based sensor data and rule-based reasoning to the hideout the anomalies. |

Most AI calculations function admirably either with text or with organized information, yet those two sorts of information are seldom joined in most cases. Semantic information models can overcome this issue. Connections and relations among business and information objects of all configurations like XML, social information, personal health record, and unstructured content can be made accessible for additional examination. This permits us to connect information even across heterogeneous information sources to give information objects as preparing informational indexes which are made out of data from organized information and text simultaneously.
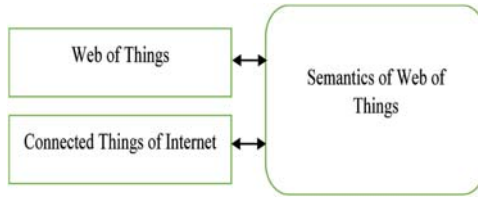
**Figure 2.3** Semantics of things.

Semantic AI is the cutting edge Artificial Intelligence. AI can assist with expanding information diagrams that is the corpus and consequently, information diagrams can assist with improving ML calculations. This coordinated methodology at last prompts frameworks that work such as self-streamlining machines after an underlying arrangement is made and it is transparent to the basic information models as shown in Fig. 2.3.

The concepts in semantic can be devices, sensors and the communication channel, workstation, data storage servers. The semantic will decide which concepts are related together and the data are collected from only such concepts and they are given to AI for processing. The semantics will enhance the processing of the data concepts using rule-based and logical interpretation, like when the human pulse rate falls below a certain level then other parameters which are related to heartbeat are measured so that correct response action can be taken immediately. The semantic-based AI model will pinpoint the required service which will enhance the treatment given. The adoption of semantic comes with certain difficulties which are given below:

- The generation of semantic information at the sensor level is not practically possible.
- To specify which concepts are required to be grouped to perform a particular service in a heterogeneous environment is difficult.
- The integration of different domains is done by mapping the semantic concepts and there is a question when this integration is needed and why.
- The integration of semantic with AI will consume time, which are not suitable for time sensitive applications.
- The development of sharable model for the semantic is highly complex work.

The following are the semantic technology that are used to interconnect the IoT platform to the operation domains.

- Hypercat (Lea, 2013), provides format and API for interacting, gathering, and searching IoT entities. The Hypercat provides APIs that are

build using universal adapter language and it can access any resource using the URL.

- OpenIoT is the technology that enables the connection of sensor devices to the software to facilitate context and semantic discovery. The OpenIoT uses the Hypercar API for interoperability and it can be used as Sensing-as-a Service as given in Kim and Lee (2014).
- In Fortino et al. (2018), Generic Ontology of IoT platform is developed which solves the problem of semantically integration of devices, middleware, and data to ensure efficient interoperability.

### 2.3.2.1 Healthcare with semantic

The ambient living environment is mostly used to detect the health conduction of any individuals that is to check they are healthy or not, but they are not able to predict the development of disease or disorder. This is addressed in Devarajan et al. (2019), where the Activities of Daily Living (ADL) of over 60 years are used to study the nature of occurrence of diseases like neurodegenerative diseases and other genetic disorders. This ADL data analysis can be integrated with the IoT to automatically detect disease or disorder alert system as given in Katz (2019), Wu (2019). The ADL, when integrated with IoT-based healthcare, will enhance the ambient healthcare ecosystem as given in Zgheib (2019), in which a continuously reducing activity level of an individual will indicate fatigue. The author showcased the integration of semantic interoperability with the IoT system with the help of ontologies. As given in Sareen (2017), given a Disease Ontology which has the description symptoms and disease in an IoT environment.

The development of any system should be scalable and for all time the chronic diseases are more frequent among elderly people and children living in close proximity as given in Schriml (2020). The environment is very vigorous that it spread the infections among those living in such closed proximity due to the sharing of air, food, water, and healthcare facility from the common source which is seen today in the case of COVID-19. As in Ziakas (2011), the epidemic outbreaks of infectious disease will increase the mortality rate so an early warning system based on the IoT and ADL will provide a better result by analyzing the present disease spreading pattern with the help of IoT and the support of ADL data. The activities of human are studied at various levels, that is, they can be done by simply analyzing the person's physical conduction and analyzing the various biological activities which take place in a human body as given

in Abdallah (2018). The ADL will use to detect the habit of eating, grooming and drinking, and taking medicine.

The next level of activity involves active detection by involving analyzing capability of IoT-based semantic system. The high level of understanding the human behavior will narrow down the time to classify the normal and abnormal human behavior. To support the integration of intelligence to IoT, Perriot (2014) proposed an algorithm to classify the physical and abnormal activities in a chronic obstructive pulmonary disease patient. The smart environment is assisting to identify the development of neurodegenerative disorders such as dementia and Alzheimer's by examining the activities with the support of ADL as given in Sareen (2017). The semantic and AI plays an important role in healthcare analytics and it increases the knowledge of medical practitioner's knowledge and with the help of such a system decision are taken with the help of semantic–based AI expert system at the time of any medical emergency.

Smart Appliances REFerence for Health (SA-REF4Health) is developed to handle ECG which is embedded on smart wearable devices. The ECG signals are serialized to ensure they are compatible with healthcare software as shown in Moreira et al. (2018). In Paganelli and Giuli (2011), the ontology-based context management system is used to support a home–based care system. The system uses rule-based reasoning to figure out the risk based on the conduction, alarms, and social conduction and alert the nearby medical facility or caretaker. As stated in Enshaeifar et al. (2018), Technology Integrated Health Management is developed to support home–based dementia care with the help of machine learning–based information extraction and aggregation on environmental and physiological data.

### 2.3.2.2 Internet of things big data and healthcare: a discussion

The concept of Precision Medicine Initiative was launched in the USA in the year 2015. It aims to improve health and disease therapy through altering the treatment and performing preventative action based on the specification of individual patient needs. Every patient will have unique health issues so the doctor will have different types of treatment to best fit the individual. In the cancer ecosystem, the genetic profile plays an important role, that is cancer and many other diseases and disorders are mainly dependent on the genetic profile. Genetic information is huge and comes under the concept of big data and they are collected and maintained in any big data storage architecture. The IoT can be integrated into

a big data environment and it can be used to perform various analysis activities and act as an expert system.

## 2.4  Security

The internet acts as the backbone for IoT and other real-time monitoring devices and since the internet is an open environment, security-related problems will occur and the IoT devices are mainly small battery-operated devices in which it is more complex to execute any security-related modules, so the problem of providing security is a major research challenge. The fast detection of potential security threats remains a challenge because of the number and complexity of emerging software and hardware vulnerabilities. This issue is getting worse as an increasing number of devices are being connected to the Internet. Today, default authentication remains prevalent, and insecure web-based interface access further increases the attack surface. Additionally, we have also seen a surge in the proliferation of wearable devices (including different types of embedded sensors and implanted medical devices) in recent years. The lack of security standards for the devices along with the availability of powerful search engines such as which is possible to locate the internet-connected devices make these wearable devices vulnerable to all kinds of attacks. The following are the common type of attacks that are possible in the IoT ecosystem:

- An attack that challenges the information distribution, which includes interruption, modification, and replay.
- The attack compromises the host system by attacking any one or more of the following system components like hardware, software, and user.
- The attack that happens through the networking side such as altering the standard protocol, and network stack attack.

Dimitrov and Dimite (2016) detail the application of big data and medical IoT healthcare industry-based security glitches. The sensors, manufactured by different manufacturers, are the heart of IoT which collect data and these data are transmitted to the servers for further processing. These heterogeneous types of sensors use a different type of communication techniques to send information which implements common security service. In Kang et al. (2019), the problem of security enhancement is narrowed down to a specific location, that is, the digital hospital is divided into three categories such as patient, worker, and medical environment. In this category the securing of devices that perform a vital biological signal

measurement, transmission, and processing are more important than other areas. Agrawal (2014) demonstrates privacy mechanisms such as encryption, secure routing, and secure authentication in the healthcare industry. The use of traditional encryption techniques depends on the efficiency of key management, and it's important to make it a hotspot for the attacker. To overcome this vulnerability homomorphic encryption is used.

Three areas need to be secured for a threat-free environment, like network, data, operating system (OS), or the system software, and the security to these areas are provided by the means of security services. The author highlighted the possibilities of gaining access to the IoT devices remotely through networking interfaces and protocols and the possibilities of eradicating are to use Virtual Private Networks which encrypts the data traffic that passes through it. The data integrity can be ensured by using encryption but at a high cost since the IoT, the environment is a heterogeneous one with different types of devices with a different configuration. The OS is a prime target for the attackers, the applicability of security to OS is the learning and enhancing process, which is an early version of OS will come with some basic security, and it will be patched with solutions when new threats are learned from smart attackers. The Denial of Service attack is the more serious and commonly taking place in IoT environment, this can be overcome by limiting the use of various nodes, network ports, and serviceable interfaces.

## 2.5  Conclusion

The IoT is becoming a part of everyday life in all most every field of science and technology, in which medical science is one of the most important areas where the IoT enters the field from simple monitoring devices. The demand for quality of life is increasing due to the degradation of the environment and increasing of population along with pollution makes the necessity of technology to be embedded with the medical field. The IoT is an cost-effective one so it is widely adopted in the medical field. The healthcare based wearable entities and small monitoring devices are widely popular in e-health care sectors. These devices are connected which enables timely response to take place in case of an emergency and the integration of these IoT with the intelligence system makes the environment more sophisticated. The intelligence helps to identify the diseases or the disorder by acting as the expert system and assist the healthcare provider. Improvement in the security area will help the IoT-based healthcare industry grow faster.

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# EDGE-OF-THINGS IN PERSONALIZED HEALTHCARE SUPPORT SYSTEMS

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RAJESWARI SRIDHAR, G. R. GANGADHARAN,
MICHAEL SHENG, AND RAJAN SHANKARAN

*Edge-of-Things in Personalized Healthcare Support Systems* discusses and explores state-of-the-art technology developments in storage and sharing of personal healthcare records in a secure manner that is globally distributed to incorporate best healthcare practices. The book presents research into the identification of specialization and expertise among healthcare professionals, the sharing of records over the cloud, access controls and rights of shared documents, document privacy, as well as edge computing techniques which help to identify causes and develop treatments for human disease. The book aims to advance personal healthcare, medical diagnosis, and treatment by applying IoT, cloud, and edge computing technologies in association with effective data analytics.

## KEY FEATURES

- Provides an in-depth analysis of how to model and design applications for state-of-the-art healthcare systems
- Discusses and explores the social impact of the intertwined use of emerging IT technologies for healthcare
- Covers system design and software building principles for healthcare using IoT, cloud, and edge computing technologies with the support of effective and efficient data analytics strategies
- Explores the latest algorithms using machine and deep learning in the areas of cloud, edge computing, IoT, and healthcare analytics

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HANDWRITTEN SIGNATURE VERIFICATION USING OPTIMIZED COYOTE ALGORITHM

in the, *International Conference on Clinical Diagnosis and Biomedical Devices – ICCDBD 2022* Organized by the Department of Biomedical Engineering of Sri Shakthi Institute of Engineering and Technology, Coimbatore, Conducted on 11th and 12th November 2022

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# HANDWRITTEN SIGNATURE VERIFICATION USING OPTIMIZED COYOTE ALGORITHM

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## ABSTRACT

Handwritten signature verification plays a major role in office document verification. The person's signature can be forged using many techniques. Intelligent forgery identified by optimized feature identification and well used deep learning techniques. Several deep learning algorithm implemented to improve the accuracy of the output. In this paper, optimized coyote algorithm implemented to equip the accuracy of the output. The output analyzed with two parameters are False Rejection Ratio and False Acceptance Ratio. 97% percent of accuracy achieved in this method.

*Keyword: Handwritten signature, feature extraction, coyote algorithm, deep learning algorithm.*
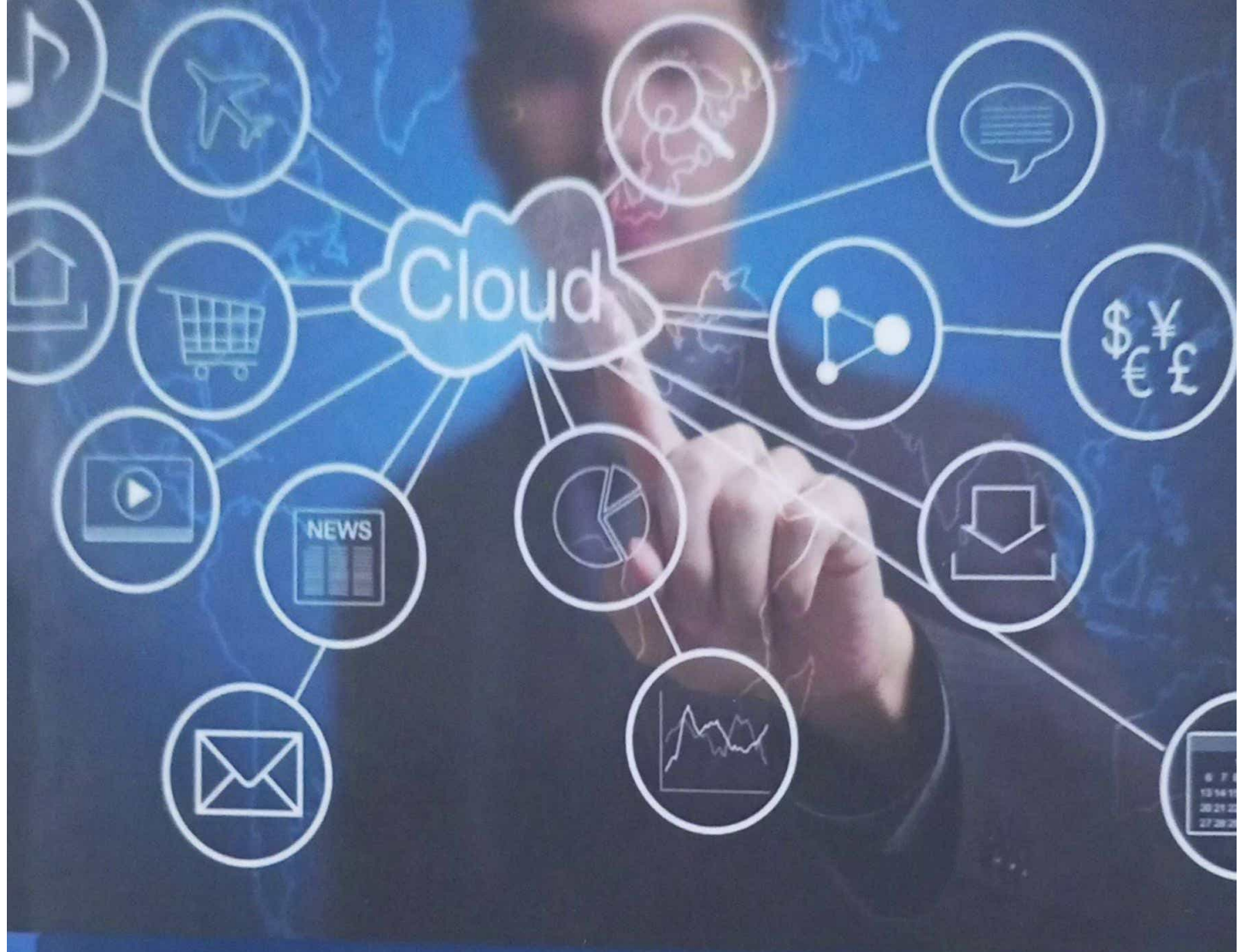
A Text Book of

# HYBRID CLOUD
# COMPUTING

Dr. R. Jegadeesan

Battula Sowjanya

Dr. Srinivas Dava

A. Durai Murugan

# Hybrid Cloud Computing

Dr. R. JEGADEESAN

BATTULA SOWJANYA

Dr. SRINIVAS DAVA

Mr. A. DURAI MURUGAN

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# UNIT-1

# Introduction to Cloud Computing

## Introduction

- Over the last three decades, businesses that use computing resources have learned to face a vast array of buzzwords like grid computing, utility computing, autonomic computing, on-demand computing and so on.

- A new buzzword named cloud computing is presently in state-of-the-art and it is generating all sorts of confusion about what it actually means.

- In history, the term cloud has been used as a metaphor for the Internet.
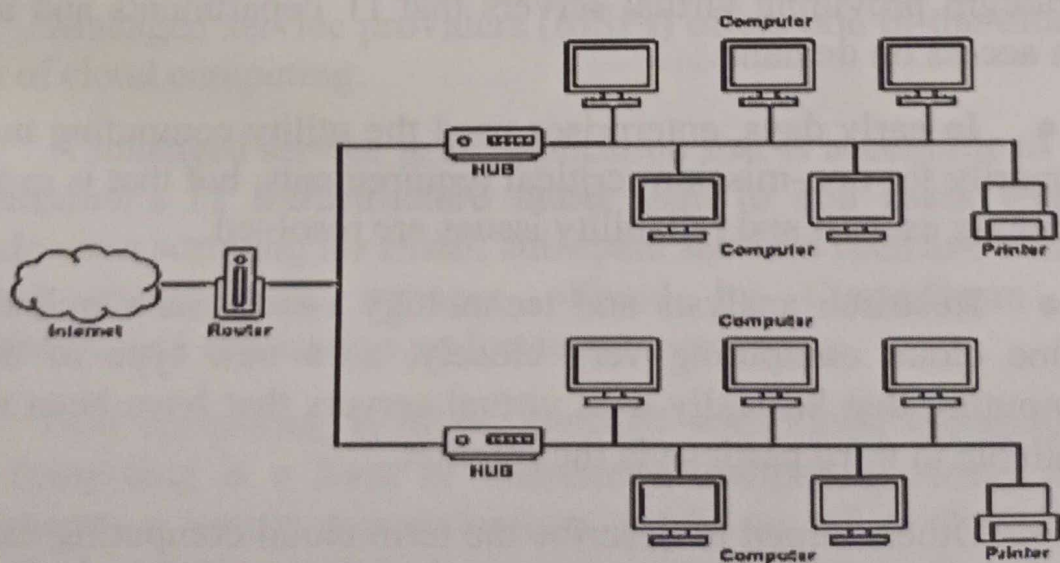
Figure 1.1 illustration of network diagram

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# SEMICONDUCTOR DEVICES AND TECHNOLOGIES FOR FUTURE ULTRA LOW POWER ELECTRONICS

Edited by

**D. Nirmal**

**J. Ajayan**

**Patrick J. Fay**

# Semiconductor Devices and Technologies for Future Ultra Low Power Electronics

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# Health Monitoring and Integrated Wearables

S. Sivaranjani ✉, P. Vinoth Kumar & S. Palanivel Rajan

## Abstract

In today's highly competitive world, balancing work and fitness has become a major worry for the majority of individuals. Waiting long times in hospitals and mobility surveillance are well-known problems. The problem necessitates a health monitoring system that can smoothly monitor normal schedule health metrics and heart rate monitoring and communicate the results to the appropriate person using a GSM module. With the advancement of technology, numerous monitoring systems have emerged, providing convenience to individuals. The current state of health research and development is depicted in this chapter. Different wearable sensors systems have been explained such as biosensors, Implantable sensors, Power generation sensors and reviewed in order to determine which and what may be done to improve throughout over present

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8–31.

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# Augmented Intelligence: Deep Learning Models for Healthcare

M. Paranthaman & S. Palanivel Rajan ✉

Chapter | First Online: 20 April 2022

**44** Accesses

## Abstract

Actionable insights and learning from a highly complex biomedical dataset is a key challenge in smart healthcare. Traditional data processing algorithms fails to provide the better results with complex data. Recent advancements in artificial intelligence methods introduced an end to end complex learning models called deep neural networks often referred as deep learning models. In this chapter, we reviewed recent advancements of deep learning models and its applications related to healthcare. We also discussed the challenges and opportunities faced by the deep learning models.

## Keywords

## About this chapter

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Prof. Dr. Khaled Shaalan

# Sensors for Next-Generation Electronic Systems and Technologies

Edited by

K. Venkata Lakshmi Narayana

P. Uma Sathyakam

Chapter 1

# Fabrication and study of fluidic MEMS device for toxic heavy metal ion sensing in water

K. Karthikeyan
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L. Sujatha
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## 1.1 INTRODUCTION

The toxic heavy metal ions, such as mercury, arsenic, lead, and cadmium, are extremely dangerous toward the health of humans and the environment. These ions cause a variety of ailments such as heart problems, neurological disorders, and other developmental illnesses. Water of unprocessed sewage, industrial garbage, pigments, gasoline, battery garbage, poor sanitation, garbage from medical refuse, and electronics garbage damage much of the

1

**CHAPTER 3**

# AI role in making IoT-based medical devices a success

S Palanivel Rajan and T Abirami

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Pages 3-1 to 3-20

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## Abstract

Chapter 3 demonstrates the fundamental concept of IoT, AI and ML in medical devices. Interoperability is the major function of AI and IoT to maintain the track of happenings on the devices and to react according to it. It involves a transformation towards an active patient who can be monitored in real time and a more complicated data management strategy.

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# Monitoring of Wireless Network System-Based Autonomous Farming Using IoT Protocols

**D. Faridha Banu** (ID)**, N. Kumaresan, K. Geetha devi, S. Priyanka, G. Swarna Shree, A. Roshan, and S. Meivel** (ID)

**Abstract** Guide watering is actually still largely made use of in the agricultural industry, making use of standard drip and also easy sprinkling. Nevertheless, standard watering bodies are actually unproductive and also inexact, triggering either inadequate or even extreme sprinkling. Additionally, it is actually hard for farmers to anticipate the right amounts at the proper opportunity. Keeping track of the plant industry might additionally bring about individual inaccuracies and also be possibly dangerous for the backwoods. The Internet of Things (IoT) board is actually incorporated along with a pass on and also an RTC component to irrigate vegetation at particular opportunities and is additionally geared up with an easy infrared sensing unit to find intruders around the crop-field. Farmers might screen and also personally manage the watering procedure making use of an Android device to detect temperature, moisture, and humidity. Furthermore, they might personally switch on a buzzer to warn off any type of possible destructive star. The various IoT-based Autonomous Farming Systems using Message Queuing Telemetry Transport (MQTT), Constrained Application Protocol (CoAP), and Hypertext Transfer Protocol (HTTP) protocols are tested and surveyed. The proposed system provides secured and collected data from the agricultural system to analyze the plant vegetation and diseases and analyze provides an improvement in health.

**Keywords** IoT · MQTT · CoAP and HTTP · Cloud server · DHT11 sensor

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# 1   Introduction to Agriculture and Farming Systems

Agriculture' spring times coming from the Latin phrase "Ager" indicates property or even industry, and also "Culture" indicates cultivation. It indicates the scientific research and also fine craft of production crops and also animals for financial function. Horticulture is actually a craft of elevating plants coming from the dirt for the use of the human race. Horticulture is actually the mile stone within the record of individual people, due to the horticulture guy clearing up certain areas. Horticulture is actually one of the earliest and prime tasks of humanity. It is still an essential resource for property. Despite the world's increasing industrialization and urbanization, horticulture still employed nearly half of the working population. In establishing nations, the horticulture field was a significant source of jobs and also added to the economic situation. The essential intention of horticulture is actually to raise more powerful and also more productive crops and also vegetation and also to aid all of them in their development through enhancing the soil and also providing water. Horticulture is actually a foundation of the Indian economic situation. In India, approximately sixty-four percent of the population depends on horticulture for their daily meals. Horticulture tasks are actually carefully handled through bodily elements all over the world. Today, Indian horticulture is actually certainly not an exemption to this. Today, India is actually dealing with two principal problems in horticulture. The first is meeting the growing demand for food, the second is providing agricultural products to an ever-increasing population, and the third is the unequal progression of horticulture and the changing trend of horticultural property use. India attempted to become self-sufficient in horticulture via the Five years strategy. As a result of its unique value, horticulture is becoming increasingly important in every five-year strategy, and top priority is given to the advancement of horticulture in our country. The research of property and also horticulture, from a geographical perspective, obtained more usefulness after 1950. At the start of the 1970s and also eventually, the new reformation brought about significant change in the horticulture industry, resulting in India becoming not only self-sufficient in food grains, but also a little high in quality. The process of horticulture progression is not adequately channelized as a result of unequal rains, a lack of simple commercial infrastructure centers, and unbalanced resource appropriation. The fresh reformation is actually successful just in the region of watering. Regardless of how hard the federal government tries, the small farmers are unlikely to profit from it. This creates a large gap between small and large farmers, as well as an unbalanced environment. To decrease this space, organized organizing is actually needed for this function. It is actually important to have the specifics of the location. In a lot of nations like India, the bulk of the populace relies on farming, and also the nations own nationwide earnings originate from farming. Despite this, or even the fact that modern innovation can be found all over, horticulture.

## 2    Review of Literature

This function created a unit that will definitely immediately screen the horticulture areas. Also, as doing live online video streaming from the web server on its own, via raspberry pi electronic camera, for keeping track of the horticulture industry. The horticulture areas are actually checked for ecological temperature and moisture at a dirt dampness sensing unit. IoT and also cordless sensing unit nodes help to reduce attempts to detect agricultural areas. IoT also prevents the loss of horticulture specifications data source and also spares in the storing tool or even shadow for long life. It also provides continuous monitoring of all areas, including critical areas. Horticulture items depend on the atmosphere of the manufacturing facility, like family member moisture, PH of dirt, temp, and so on. The "popped the question" unit style was actually created so as to get more yields through recognizing the triggers [1]. Weather improvements as well as rain were unpredictable over many years. As a result of this, climate-smart procedures referred to as "brilliant farming" are actually embraced by a lot of farmers. In the current unit, community farmers may have grown the exact same plant for centuries, but over time, survival strategies, soil problems, parasite outbreaks, and conditions have all changed. Through making use of the popped the question unit technique, which detects the local area agricultural specifications, determines the site of the sensing unit, moves the record plant areas as well as performs plant checking. The improved information permits the farmers to deal with or even take advantage of these improvements. Acquiring real-time and historical environmental data is expected to aid in the achievement of dependable data administration/checking and use [2].

In the previous unit, agriculturists used to figure out the ripeness of soil as well as assumptions to create specific kinds of items. They failed to think of the amount of sprinkling, moisture as well as weather problems. Productivity depends entirely on the final stage of the collection on which it depends. They increased the effectiveness of the item in this pop the question unit, which appraises the attribute of the collect. To help compete with the difficulties in the area, IoT is actually made use of in offering reliability as well as traditional cultivation. They also used cordless sensing unit systems in precision farming, dividing the single plant for examination into tens or even hundreds of square feet. Additionally, it made use of various kinds of sensing units such as temperature level sensing units, moisture sensing units, dirt wetness sensing units, sprinkle amount sensing units, and ARM CPU [3]. The farmers are actually still making use of conventional procedures for farming, which causes reduced production of crops as well as fruits. Thus the plant's produce could be boosted by utilizing automated machineries. However, by utilizing IoT, our experts can anticipate an increase in production as well as a decrease in expense by checking the effectiveness of the dirt, temperature level, and moisture checking. In the current unit, they made use of the conventional procedures for the plant's production. Yet in the popped question unit, the mix of conventional procedures along with IoT as well as cordless sensing unit systems may be the key to farming modernization. The built-in unit is actually more dependable as well as favorable for farmers. The use of

such a unit in the area may most undoubtedly aid in evolving the collection of the crops as well as international creation [4].

The carried out structure is made up of various sensing units as well as devices, and they are actually adjoined through remote control communication components. The sensing unit records are delivered as well as obtained from the customer point via a web connection, which was made possible in the Node MCU at the same time. A visible resource IoT system. This unit is actually made use of to keep the optimum functioning of the watering unit efficiently. The records could be looked at on the Point Talk application or even any type of website. The farmer may go over all of the information concerning the degrees, what opportunity they are actually performing, whether any changes are appearing or not, and whether the functions are actually being executed in opportunity. The number one task is actually to display the plant's development making use of electronic means. This will certainly deliver the precise market values of numerous specifications upon which development depends. Besides, this version will certainly aid the farmer in displaying more than one property simultaneously. Checking areas via this unit demands much less manpower. Individuals with bodily impairments may be hired for checking areas [5]. Our experts' purpose is to carry out a brilliant GPS-located remote control car that conducts numerous activities like checking areas to protect against burglaries, terrifying birds as well as pets, noticing dirt wetness material, splashing plant foods as well as chemicals, weeding, noticing dirt wetness, and so on. Brilliant watering will be implemented through the use of optimal amounts of sprinkle, based on the requirements of each plant style and also the soil. Eventually, our experts intend on applying brilliant storehouse administration, along with temperature level as well as moisture noticing for the gain of the items being actually saved, as well as diagnosis of the existence of any type of intruder that aims to take the items from the storehouse. All of these functions will be managed and checked using a remote control brilliant device and an Internet connection, and the functions will be carried out using interfacing sensing units, ZigBee components, and a microcontroller [6].

A lot of research is done in the field of farming, and many of them make use of cordless sensing unit systems that pick up data from various sensing units released at various nodes and also send it out via the cordless method. The gathered records deliver information about the numerous ecological variables. Checking the ecological variables is certainly not the most effective option to enhance the yield of crops. Certainly, there certainly are a lot of other variables that reduce the efficiency. For this reason, automation needs to be carried out in farming to eliminate these issues. In order to deliver an option to such issues, it is actually required to create an included unit which will boost efficiency in every phase. Yet, complete automation in farming is certainly not attained as a result of numerous problems. However, it is actually carried out in the research study amount; it's not provided to the farmers as an item to obtain profit from the information. For this reason, this report packages approximately cultivating brilliant farming using IoT as well as offering it to the farmers. Application of such a unit in the area may most undoubtedly aid in boosting the produce of the crops as well as help to handle the sprinkler information efficiently, thereby lessening the wastefulness [7]. The layout a bot for dispensing the plant

foods for the dirt is based upon the vitamins and minerals quantity existing through assessing the dirt vitamins and minerals through the use of different color-sensing units. The dirt has actually been combined with the appropriate chemical option, and the RBG illuminations have been delivered via the dirt option as well as the mirrored lighting has been absorbed. Based upon the quantity of light mirrored from the option [4], the vitamins and mineral material have actually been evaluated. Yet this approach demands a different chemical option for each and every vitamin and mineral material [8]. The unit made use of an IoT system, including Unit under Review based upon the Agro-Meteorology unit for Viticulture Condition Cautioning. This unit is actually made use of to display the winery by making use of a cordless or even an actuator sensing unit, while the web server sub-system is actually made use of to broadcast records to the web server. An improved approach actually popped the question through writers in [9]. The paper results explain a unit that's built to handle sprinkler circulation as well as electrical power administration for a watering unit. Within this particular layout, the optimum supply of water was actually determined making use of the approximate information of an ambiguous specialist approach. An identical method was used to pop the question by the writers in [10].

This later unit examined an event-based watering unit through the use of tomato vegetation. This approach is actually made use of to decrease sprinkle usage to boost the effectiveness of the unit. Aside from that, a unit popped the question through the writers in [11] that created a unit that made use of sustainable resources, including solar electrical power, to carry out automated watering unit. The major target of the approach is actually to create an inexpensive as well as time-based watering unit. An analogous approach to watering figure was posed by [12], which primarily focused on providing an active present day watering figure (MIS) that relies on humidity command utilized by Arduino Nano along with details of sugar farmstead adjustments. This task can easily reduce sprinkle usage while also protecting crops from harm. The short post in [13] built a figure to display vegetation as well as command the supply of water by means of a cell phone through the incorporation of numerous sensing units to discover dirt humidity as well as the temp of the plant. An identical procedure was performed on the question [14].

# 3 Proposed System

## 3.1 Overview

This section describes the information of the popped question format as well as how it functions. The main point of the task will be specified as well as depicted with flowcharts and obstruct diagrams. ARUDINO presents the general outline of the popped question figure that uses ESP32 NodeMCU as the primary equipment. The microcontroller functions as the human brain of the figure, where the temp as well as moisture, infrared, as well as dirt humidity sensing units supply the electronic

**Fig. 1** Proposed block
diagram
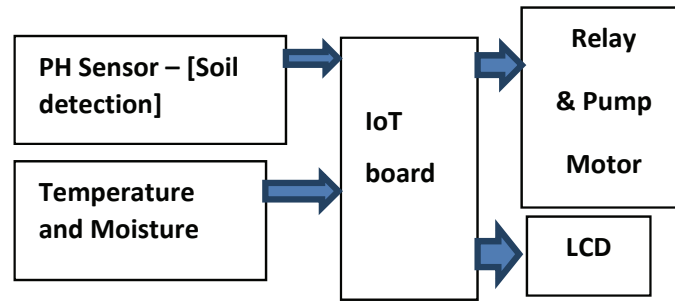


details to as well as where it will certainly process the details. The input from these sensing units will be used to either activate or deactivate the electric motor pump based on the recommended guidelines. The dirt humidity sensing unit is actually placed inside the dirt, which lies close to the plant, to find the humidity of the dirt. The temp as well as moisture sensing units are actually located in the plant and are responsible for determining the temp as well as moisture of the neighboring sky. All the information that has actually been gathered coming from all of the sensing units will certainly be featured in the LCD situated close to the plant area for keeping an eye on reasons. The information gathered will be published to the firebase shadow utilizing a microcontroller, where it will be advised to the web server to be saved in the data bank. Furthermore, the built-in mobile phone application will certainly show the information obtained from the data bank. Customers can easily have accessibility as well as command of their automated watering figures as well as display the plants by means of their smart devices. Utilizing this technique, customers can easily display the plant effectively as well as monitor the actual time information on the health condition of the dirt, temperature, and moisture of the sky-encompassing plant. In addition to that, this figure can easily function as an invasion diagnosis figure, which prevents brows from coming from excess creatures that can easily harm the crops or even the existence of any sort of unapproved person. This could be performed with the assistance of the static infrared (PIR) sensing unit. The PIR sensing unit is actually affixed before the plant area to find any sort of type of invasion. If the PIR sensing unit discovers the invasion, the alarm system will certainly be turned on immediately the figure is designed to deliver the selected indicators to the data bank whenever the figure is in the automated or manual mode. These indicators could be tracked coming from a desktop computer, which functions as the data bank. Figure 1 shown the proposed system setup and Fig. 2 shown overall circuit diagram.

## 3.2 Analysis the Proposed System

This section elaborates on the task's pop the question stream from start to finish. The task could be separated into 4 periods as displayed in Fig. 3, while Fig. 4 presents the obstructed layout of the clever plant keeping an eye on as well as the automated watering body. The microcontroller is actually gotten in touch with an energy source
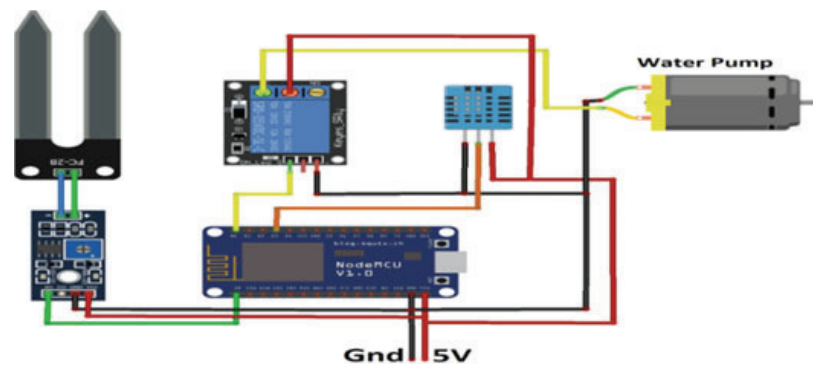
**Fig. 2** Overall circuit diagram

to perform, which is actually after that attached to the numerous input sensing units as well as static infrared sensing units. The result components, which include the communicate, LCD, and buzzer, are actually attached to the NodeMCU to be given an input, thus turning on the sprinkle watering, displaying the current information of the sensing unit, and specifically turning on the alarm system. The microcontroller also has the capability to connect data to the Internet via Wi-Fi modern technology. The observing subsection offers a description of the obstruct component made use of in the figure, including information accomplishment, result, invasion diagnosis, shadow storing component, as well as keeping an eye on as well as evaluation component. The information accomplishment method could be pictorial in Fig. 5. This stage begins through initializing the LCD and is actually the succeeding method after initializing all of the sensing units as well as specifying the RTC. To determine the current information of plant health condition, pairs of sensing units are used. The 1st sensing unit made use of is actually a dirt humidity sensing unit. This sensing unit actions the health condition of the dirt based upon the protection gained due to the dirt's humidity. This sensing unit has a pair of forms of input which are actually analogue as well as electronic. If the value is actually readied to analogue, the customer can easily observe the present voltage get through this sensing unit. Nevertheless, if the customer collects the worth in electronic form, the customer can easily read through the worth in ASCII form, which actually comes from 0 to 1023. The reduced value demonstrates that the dirt humidity is actually completely dried out as well as the other way around. The 2nd sensing unit that's made use of within this particular task is actually a temp as well as moisture sensing unit (DHT11).

This sensing unit acts on the present temperature as well as moisture neighboring the plant. Depending upon the volume of sprinkle of all-organic neighbors, including rainfall, the moisture as well as temperature analysis will certainly be much higher in wet times. Nevertheless, if the health condition is actually completely dried out, the moisture as well as temperature will certainly be reduced. Furthermore, all of the information gathered by these sensing units is actually gathered as well as delivered to shadow via Wi-Fi link. This stage will certainly, after that, remain to the next stage as shown through 'B', which embodies the trespasser diagnosis stage. If the figure discovers that opportunity is actually daytime, the figure will certainly determine the
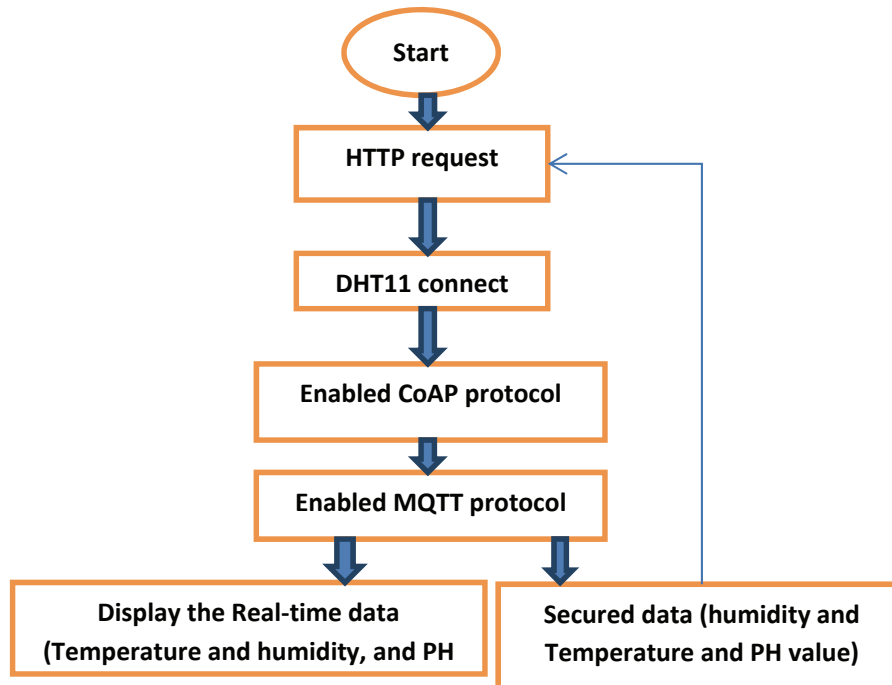
**Fig. 3** Proposed method
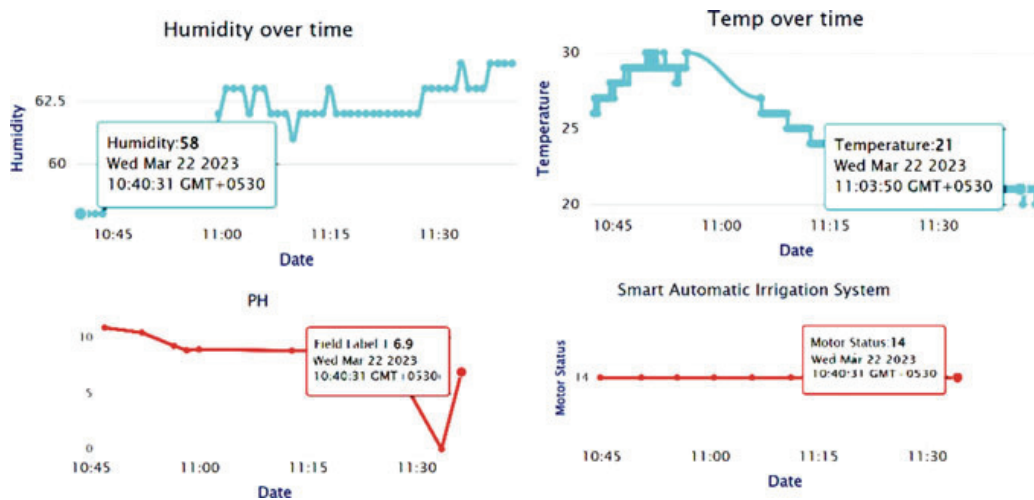


**Fig. 4** Results of Thingspeak.com—cloud server

health condition of the dirt by utilizing a dirt humidity sensing unit. It improves the health condition of the dirt in the course of the day. If the sensing unit finds that dirt resides in a completely dried out health condition, the serial display will certainly show notification "completely dry out" on the OLED, as could be seen in Fig. 8. In this particular circumstance, the sprinkle pump will certainly be switched on for 6 s to irrigate the vegetation utilizing the communicate component.
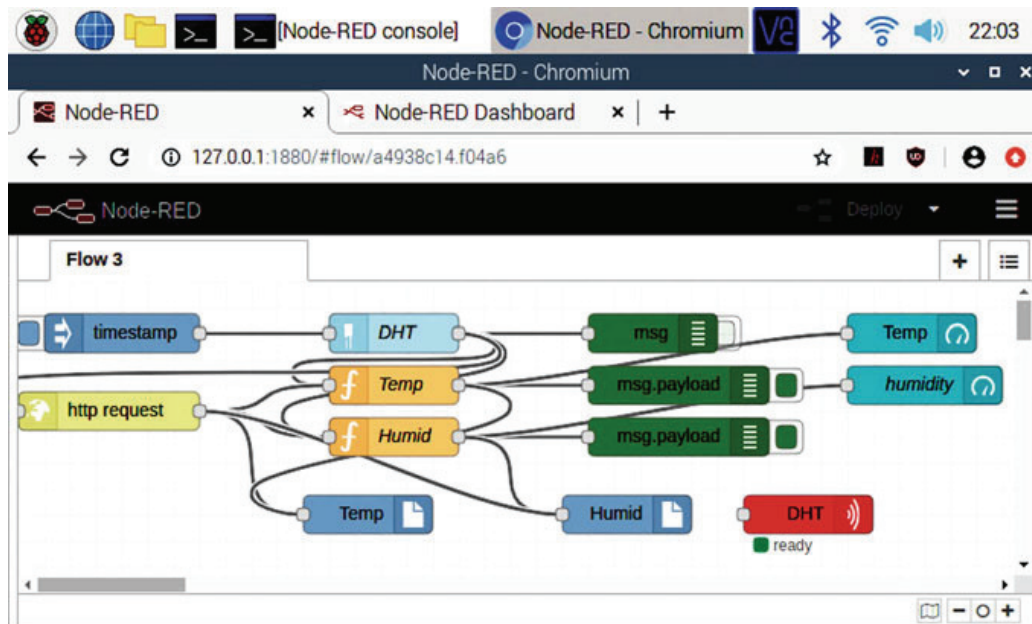
**Fig. 5** Programming of MQTT protocol

## 3.3 Proposed Method

The proposed method is shown in Fig. 4. Nevertheless, if the sensing unit discovers that the health condition of the dirt is actually currently damp, the serial display will certainly show a "damp" notification on the LCD display as well as the sprinkle pump will certainly be switched on for simply 3 secs. The choice to switch on the sprinkle pump in a dirt-damaged condition is actually to guarantee the quality as well as sustainability of the vegetation up till the next sprinkling. Nevertheless, it is very important to note that the volume of sprinkle within this particular health condition may be slow and might merely be a spray. This is actually to stay away from over-sprinkling of the currently damp dirt, which can harm the vegetation. If the sensing unit detects that the dirt is quite damp, or if the sensing unit is placed at ground level, the sprinkler pump will not be activated. Furthermore, if the RTC component detects that the time has changed to evening or that the temperature has risen above 38 °C, the sprinkler pump will not be activated. The clever watering as well as keeping an eye on the figure is actually after that nourished as an input to the RTC component as shown through the 'D' port in the body. The result coming from this RTC is actually nourished into the succeeding stage in 'E'. The information is stored in the shadow, as well as IoT treatment, such as the Firebase Data Bank System. After the information is actually gathered at the details area, the information is actually sent out back to the cell phone as well as various other tools to be displayed by the farmer. The farmer can easily get an alert if the trespasser is actually developed as well as the temperature of the plant area is actually warm. The data transmitted via Wi-Fi by NodeMCU will be routed to a shadow web server located in the vicinity. This shadow web server lies

within the PC. The data collected by the shadow web server will then be broadcast to the Firebase Data Bank System, which will save the data collected by the sensing units. In addition to that, this system can easily show the present information that has actually been broadcast coming from the microcontroller. This shadow data bank could be used to send an alert to the farmer if a specific limit is reached.

### 3.4 Selection of IoT

The IoT device selected based on Protocols and speed of displaying information and battery backup. IoT had low voltage and reprogramming to activate the system or reset the same process. Figure 4 shown the results of Thingspeak.com—cloud server to deliver the ability display readings of DHT11 sensor, PH level sensor, and output of DC motor pumps using relays.

### 3.5 Result of Thingspeak Cloud Server

Figure 4a and b show the results of Thingspeak cloud server conveying the readings of DHT11 sensor, pH level sensor and output of DC motor pumps using relays.

### 3.6 Programming of COAP and MQTT Protocol

Google Firebase is controlling monitoring devices to continuously display the temperature and humidity data. HTTP and MQTT protocols are provided to secure the data using encryption and decryption and all the information gathered and published to Firebase. Figure 5 shows how to prevent the storage of DHT data in a database. The sort of invasion detected real-time data to protect the system, and it built a firewall for the system using IoT protocols.

Figure 5 shows programming of MQTT protocol and Figs. 6, 7, and 8 shown results of Silo_ABC in CoAP device. It is cloud server results from real-time database of Silo A place, Silo B place, and Silo C place.

## 4 Conclusion

The various IoT-based autonomous farming systems using MQTT, CoAP, and HTTP protocols are designed and surveyed. The proposed system provides secured and collected data from the agricultural system to analyze the plant vegetation and diseases, and the analysis provides an improvement in health. The proposed system
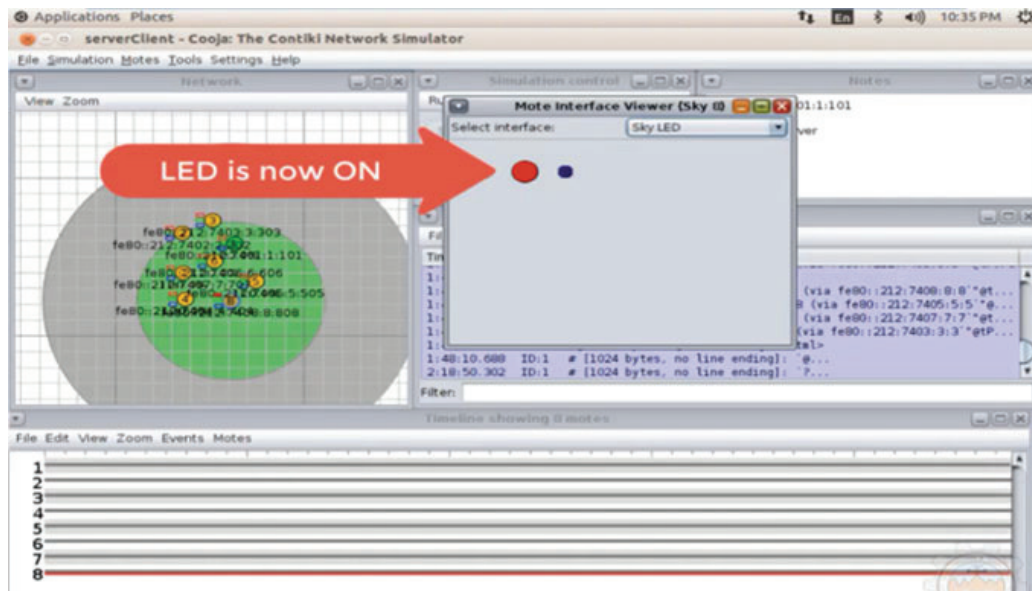
**Fig. 6** Results of Silo A in CoAP devices
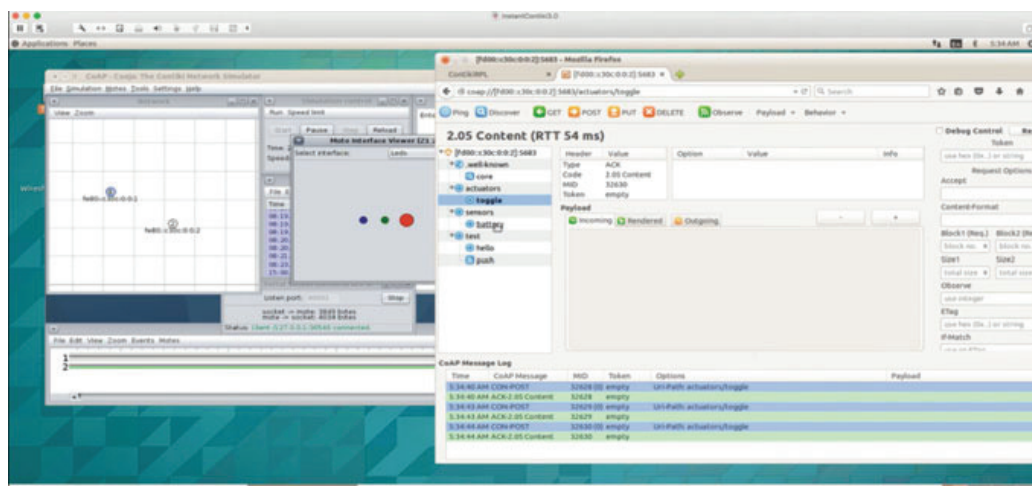


**Fig. 7** Results of Silo B in CoAP devices

can be used as an autonomous irrigation system when it reaches high-priority agricultural parameters using IoT cloud data in real-time. The plant industry requires low-cost products with intelligent irrigation and unmanned systems [1]. The proposed system provided a real-time report to the farmers and users to determine the quality of the plant's leaves, seeds, and fruits. Farmers might screen and also personally manage the watering procedure using an Android device. MQTT, CoAP, and HTTP protocols are surveyed to secure the farming data. Only users have access to this information. Every day, vital plant farming data is stored, secured, and collected. All data is linked to cloud servers and can be hidden using the user's account [5]. When searching the data, the proposed system gave an alert and informed the owners using

**Fig. 8** Results of Silo C in CoAP devices

**Table 1** Comparison of protocols

| Protocols data | MQTT—success rate | CoAP—success rate | HTTP—success rate |
| --- | --- | --- | --- |
| 1 | 6560 data | 7100 data | 938 data |
| 2 | 6530 data | 7050 data | 930 data |
| 3 | 6501 data | 7001 data | 935 data |
| 4 | 6505 data | 6990 data | 931 data |
| 5 | 6505 data | 6850 data | 938 data |
| 6 | 6520 data | 6700 data | 934 data |
| 7 | 6510 data | 6650 data | 920 data |
| 8 | 6500 data | 6600 data | 915 data |
| 9 | 6450 data | 6500 data | 914 data |
| 10 | 6300 data | 6400 data | 910 data |

MQTT, CoAP, and HTTP protocols before tapping the data. The proposed system has successfully addressed the stated problems and achieved the objectives of providing efficient, low power water consumption based on specific conditions. The final results show the success rate of IoT agricultural data. In comparison to HTTP and MQTT success rates, we received the highest CoAP success rate. In Table 1, the success rate provided provisions for the security of data and real-time data on the cloud server for monitoring.

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stations, and retail centers are perfect places to deploy the Smart Bin. Fewer waste collections would be necessary, requiring few labor, fuel, low emissions, and reduction of traffic in the number of waste bins needed. Using data analytics, collection routes and bin placement may be managed more effectively.

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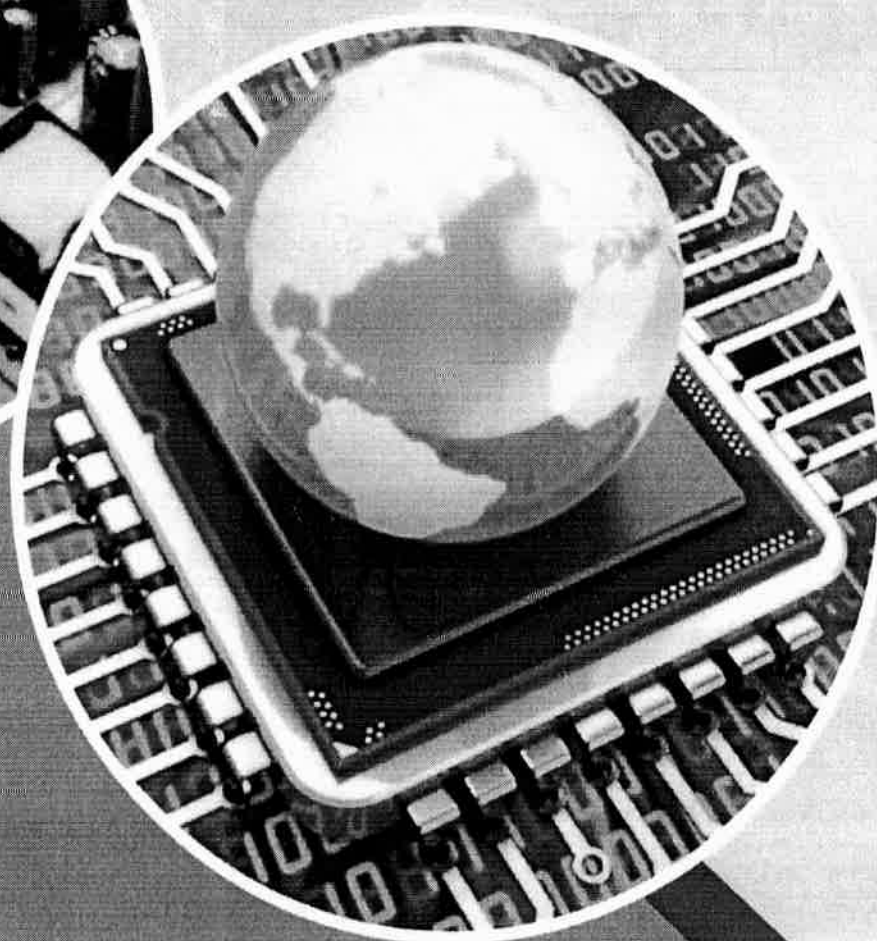
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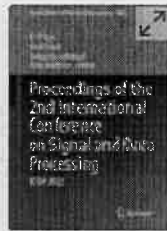
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# Implementation of Solar Photovoltaic System with Switched Inductor Z-Source Inverter

K. Chitra ✉, K. Viji & M. Lakshmanan

## Abstract

The increased energy demand of recent era can be effectively fulfilled by the renewable energy sources. However, the output of the renewable

sources cannot be used directly by the consumers. The converters are playing very important role in the energy conservation system to buck, boost, or to convert from one form to another. This paper presents the solar PV system with the direct boost capability with the help of switched inductor Z-source inverter (SLZSI) which converts the DC into AC and also increases the output voltage. The SLZSI is the family of ZSI, which is specially designed for DC to AC conversion and to boost the voltage directly without using any additional devices. In order to achieve the voltage-enhancing capability, in this paper simple boost pulse width modulation (SBPWM) method is incorporated. The input DC supply to the entire system is given by the solar PV module. The MATLAB simulation results of solar PV-fed SLZSI for the different irradiations are clearly described in the results and discussions.

## Keywords

**Solar PV systems**    **Boost factor**    **Z-source inverter**

**Switched inductor**    **Irradiance**

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In modern-day active filters are an excellent means of stabilizing harmonics in industrial facilities. There are many options available but no standard way to rate the active filters. SAPF's basic principles and theoretical concepts describe the filter and circuit design are allude to The power theory is used to design the PWM filter controller (p-q). A Simulink model was constructed to validate the shunt active filters. Studies have shown that the grid's power quality is verified

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**Abstract:**

Predicting air pollutant concentrations is an important tactic for safeguarding human health and providing advanced warning of dangerous airborne pollutants. Unfortunately, conventional techniques of predicting air pollution concentrations fail to predict long-term dependencies properly and ignore geographical connections. The characteristics of air quality are typically mirrored by a variety of elements, including temperature, wind direction, humidity, wind speed, rainfall, snowfall, and so on, which complicates comprehending the shift in air pollutant intensity. In this study, a convolutional neural learning-based Long Short- Term Memory (LSTM) predicting algorithm for PM2.5 (air pollutants having an aerodynamic size less than or equal to $2.5\mu$ m) intensity is proposed. Hourly datasets spanning from 2010 to 2014 are analysed to evaluate the overall efficacy of the suggested LSTM model. This research assesses the LSTM algorithm's practical value for a pollutants prediction system for health mitigating risk through performance standards and comprehensive defect detection.

**Published in:** 2022 4th International Conference on Inventive Research in Computing Applications (ICIRCA)

**Date of Conference:** 21-23 September 2022

**Date Added to IEEE** *Xplore*: 29 December 2022

▶ **ISBN Information:**

**INSPEC Accession Number:** 22473638

**DOI:** 10.1109/ICIRCA54612.2022.9985722

**Publisher:** IEEE

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# Syzygium Cumini leaf extract exploited in the green synthesis of zinc oxide nanoparticles for dye degradation and antimicrobial studies

R. Padmavathi [a], R. Raja [b], C. Kalaivanan [c], S. Kalaiselvan [a]

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## Abstract

Zinc oxide was prepared via green synthesis method. ZnO had high excitation energy (60 meV), ample energy band gap (3.37 eV), high thermal stability and mechanical stability. These properties made ZnO smart and it will be utilized in various fields like electronics, optoelectronics and laser technology, light emitting diodes (LEDs), photo detectors, solar cells, gas sensors, film transistors and biological applications. The structural and surface morphology were investigated using XRD, SEM, EDAX and UV–visible techniques. The antibacterial activity of ZnO had been evaluated. The results indicated that the sample was giving more effective for *Klebsiella* when compare with other bacterial organisms such as *Pseudomonas, Enterococcus, Escherichia coli.* The ZnO nanoparticles were synthesized via green method and analysed, and the enhancement of their catalytic properties against congo red dye under diverse experimental conditions. The maximum decolourisation for Congo red was found to be 90%. ZnO had numerous applications in which some of applications were used in biomedical field like drug delivery, cancer therapy, anti-diabetic agent, anti bacterial, dye degradation.

## Introduction

Nanotechnology had the potential to create a multitude of new materials and gadgets with a diverse range of relevance such as medicine, electronics, generation of energy, toxicity and environmental effect of nanomaterials etc. Nanomaterials contain a larger fraction of atoms on their surface; they have a higher surface reactivity. As a result, nanomaterials have a substantial impact in bionanotechnology, fundamental and applied sciences. [1].

Zinc oxide (ZnO) was an inorganic compound that was widely utilized in daily life. ZnO exhibited a substantial excitation-binding energy (60 meV) [2] broad gap (3.37 eV) [3], durability, greater selectivity, good thermal and mechanical stability. Interestingly, various investigations have exposed that ZnO nanoparticles are non-toxic to human

# Antioxidant and antimicrobial studies of silver nanoparticles synthesized via chemical reduction technique

R. Padmavathi [a], C. Kalaivanan [b], R. Raja [c], S. Kalaiselvan [a]

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## Abstract

Chemical synthesis is used to create silver nanoparticles (Ag-NPs). Silver nanoparticles were made via reducing silver salt with sodium borohydride in a chemical reaction ($NaBH_4$). XRD, SEM, UV–Visible spectra, and FT-IR are exploited in the investigation of the structural and surface morphology of silver nanoparticles. Silver nanoparticles have been tested for their antibacterial properties. The findings demonstrate that silver nanoparticles as manufactured have greater antibacterial action against E.Coli and staphylococcus aureus germs. Silver nanoparticles have enhanced antioxidant activity as evidenced by DPPH assay results.

## Introduction

Nanoscience and nanotechnology have emanated as two of the paramount fields of research worldwide in the recent decade. Nanoscience is the study of events that occur in materials with diameters between 1 and 100nm. Nanotechnology has surpassed nanoscience in terms of popularity, which is concerned with the design, production, characterisation, and applications of materials in the nanometer range[1]. Nanoscience and nanotechnology, in other terms, are fields of science that focus on the microscopic world.

(i) Development of synthetic methodologies and analytical tools for creating nanoscale structures and materials.

(ii) Miniaturization-induced changes in chemical and physical characteristics, and.

(iii) Application of such qualities in the development of innovative and functional materials and devices.

It is widely assumed that the lecture by Richard Feynman stated, "There is plenty of room at the bottom," in 1959 at the American Physical Society convention, set the framework for the current nano era. The scientific world has paid close

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# Multi Source based Battery Charging and Cutoff System

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Sophia Jasmine G ;  Magdalin Mary D ;  Kumar C ;  Lohith Raj S ;  Nafica Parveen M ;  Neshan T ;  Karthikeyan K      **All Authors** •••

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**Abstract:**
The merits of utilizing Lithium-Ion battery makes a perfect choice for many applications such as Cameras, Laptops, Electric Vehicles, etc. Meanwhile, charging and using these batteries requires considerable attention, which can lead to damage. This is especially important when multi-cell batteries are involved. For this project after re viewing cell charging methods, a used battery charger was introduced, which can charge cellular batteries. The Battery is charged using solar and also supply mains which has a protection circuit along with a cutoff module. The Controller is used to control the process of automatic charging and cutoff based on the feedback provided by the battery which involves Arduino in this project.TP 4056 module is used as battery management system to maintain constant current and voltage.

**Published in:** 2022 International Conference on Inventive Computation Technologies (ICICT)

**Date of Conference:** 20-22 July 2022

**Date Added to IEEE *Xplore*:** 16 August 2022

▸ **ISBN Information:**

**INSPEC Accession Number:** 21971907

**DOI:** 10.1109/ICICT54344.2022.9850446

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# A High Efficiency MPPT Based PV System Using DC-DC Converter

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**Abstract:**
This system is linked to a grid-connected single-phase solar PV module. To monitor the strength of the global maximum peak point, MPPT is used. An energy management system's grid is connected to a bidirectional converter. These suggested systems deliver nonlinear power quality output. The harmony search is an upgraded form of the fuzzy logic with machine learning method, It is inspired by the process of making music, and applying the normal probability distribution component enhances its searching performance. A constructed prototype is used to test the control strategies NHS-based MPPT and PNKLMS-based with a reduced sensor approach were considered. NHS is therefore suitable for hardware-based internet searches since it quickly approaches the global maximum power point (GMPP). The NHS algorithm's strong steady-state and dynamic performances are shown in various irradiance, temperature, and partial shade conditions. Situations including overvoltage, undervoltage, harmonic distortion, and load nonlinearity, the power normalized kernel least mean square algorithm's capabilities are also proved without the need of a DC link voltage and voltage sensor. The recommended system's objectivity has been confirmed by these outcomes.

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# Highly Enhanced Safety & Security System in Helmet & Bike using Various Sensors with GSM Modules

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A. Subramaniya Siva ;  P. Vishal ;  A.T. Sankara Subramanian ;  M. Ramesh ;  S. Sathishkumar ;  N. Vinothini    **All Authors** •••

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**Abstract:**
This paper focuses on the eradication of road accidents by bikes and scooters & also enhances the safety & security of the bikes. A proficient method is proposed to decrease road accidents & enhance the security of the bikes by the usage of Alcohol Detection Sensor (MQ3) sensor & Fingerprint sensor. Mostly road accidents are due to the intake of alcohol by the drivers. To avoid this, MQ3 sensor is placed on the helmet to sense the alcohol content of the drivers. The MQ3 sensor monitors the blood alcohol content of the driver. The sensor continuously monitors the driver's breath, and if alcohol is detected by the sensor, the driver can't switch on the engine. Nowadays most of the bikes are hijacked while parked on the roadside. To mitigate this, a fingerprint sensor is placed on the bike, so that only the authorized person can switch on the bike. Therefore, it enhances the security of the bike. The MQ3 sensor & Fingerprint sensor are interfaced to engines using an Arduino Nano microcontroller along with a DC motor.

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# Performance analysis of PD Controller tuning in Frequency domain for Dual-Motor Ball & Beam System (DMBB)

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M Lakshmanan ;   K Chitra ;   M. Premkumar ;   C Kumar ;   K Viji ;   S Jaisiva     **All Authors** •••

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**Abstract:**
The proposed Dual Motor Ball & Beam (DMBB) is the best example of a non-linear system. The Dual Motor Ball and Beam
(DMBB) is quite complex to regulate the ball position because the output of the ball position increases without limit when
the beam angle is fixed as an input. Hence, a suitable controller is needed to control the ball position on the beam by
varying the angle of the beam. In this proposed work, required two PD controllers one for to control the Dual motors and
another to regulate the ball's position on beam. In this research work, DMBB system has implemented in a linear model,
each motor's models also represented in linear/transfer function model. The motor angular position and the position of the
ball are controlled by Proportional Derivative controllers. The PD controller parameters such as proportional gain $K_p$ &
derivative gain $K_d$ are tuned by using proposed frequency domain/response method. The performance of PD controller
tuned by frequency response method is compared with conventional Ziegler's Nichols Tuning (Z-NT).

**Published in:** 2022 3rd International Conference on Communication, Computing and Industry 4.0 (C2I4)

**Date of Conference:** 15-16 December 2022          **INSPEC Accession Number:** 22776051

**Date Added to IEEE *Xplore*:** 14 March 2023        **DOI:** 10.1109/C2I456876.2022.10051246

▶ **ISBN Information:**                                **Publisher:** IEEE

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# Enhancement of Voltage Conversion Ratio using DC-DC Boost Converter with Coat Circuit

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S. Jaisiva ;   C. Kumar ;   K. Viji ;   M. Premkumar ;   M. Lakshmanan ;   V. Jayakumar        **All Authors** •••

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**Abstract:**
This article aims to develop a solar powered efficient DC-DC converter to charge electric vehicle. While implementing the DC sources for boost converter with coat circuit charger it becomes continuous power supply. In the boost converter with coat circuit, which raise the input voltage 3 time higher from the voltage of battery or PV cell. According to this method of boost, the voltage is boosted to three times higher than normal voltage rate which is stored in the battery for steady supply of voltage. The solar based dc-dc boost converter charger is effective for converting the low-level voltage to high-level voltage of a converter. Over voltage and current can be controlled and limited by coat circuit to be an efficient PV charger. The battery is connected between PV and converter to store energy from sunlight. By this of boost converter, the losses which occur is reduced and produce improved voltage conversion ratio. Improvising voltage conversion ratio using boost converter with coat circuit is premeditated using MATLAB and the simulation outputs have been verified with a model.

# Pathway Guided Deep Neural Network towards Interpretable and Predictive Modeling and Drug Preparation

Authors:

Nandhini K M

Kumar C

Shineka Varshini A P

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# Novel Multilevel Inverter using Switched Capacitor unit with Voltage Boosting feature for EV Applications

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**Abstract:**
A novel hybrid switching capacitor (SC) based multilayer inverter (MLI) is available for electric vehicle (EV) applications. The suggested unit (SCMLI) uses a series and parallel conversion strategy to enable self-balancing of the capacitor voltage as well as higher voltage with any number of SC cells. The switched converter that is bidirectional can be used with DC source to provide intermediate voltage levels, improving the output power quality. For a considerable phase mismatch between the output current and voltage, many active switches will be replaced by diodes. The proposed SCMLI is better for EV applications since the voltage level of ripple in SC units will be inversely related to the output in fundamental frequency. This article covers the working model of the recommended inverter employing staircase modulation with circuit and corresponding switching state descriptions. Additional mathematical computations are available for ripples in capacitor voltage, size, and power loss. Two units of SC units are linked with a string of voltage source and 3 symmetric dc sources to form a seven-level MLI with a voltage gain of three. The suggested inverter's functionality and performance were validated by simulation on the inverter. When the 7-level staircase output was modulated at the fundamental frequency, the inverter worked properly and the power quality was satisfactory.

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# Particle Swarm Optimizer with Time-Varying Acceleration Coefficients: Application to Maximum Power Point Tracking for Photovoltaic Systems

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M. Premkumar ;  R. Satheesh Kumar ;  M. Lakshmanan ;  S. Jaisiva ;  T. Alex Stanley Raja ;  C. Kumar          **All Authors** •••

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**Abstract:**
Since the performance of the Photo-Voltaic (PV) arrays is dependent on irradiation and temperature, the PV output power fluctuates with the ambient temperature and the solar irradiance. The achievement of the Maximum Power Point (MPP) under various shading patterns is, as a result, an important aspect in the enhancement of PV systems' overall performance. Because existing methodologies, such as perturb & observe, incremental conductance, etc., are likely to fail, it is necessary to develop an improved Maximum Power Point Tracking (MPPT) method to distinguish between the Global MPP (GMPP) and the Local MPP (LMPP). The characteristics of a PV array under shading conditions include several LMPPs and a single GMPP. To improve the MPPT method of shaded photovoltaic systems, this paper introduces an improved Particle Swarm Optimization (PSO) algorithm with Time-Varying Acceleration Coefficients (PSO-TVAC) that is fast and more efficient than the PSO. Firstly, the PSO-TVAC algorithm is mathematically modeled and applied to the MPPT application for solar PV systems. The primary objective of this paper is to analyze the performance of the PSO-TVAC for the MPPT application. Three shading patterns are considered to study the effectiveness of the PSO-TVAC in handling the MPPT application. The results and discussions prove that PSO-TV AC can be an alternative tool for MPPT application for PV systems.

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**Abstract:**
Industries require early diagnosis of induction motor faults to avoid complete failure. The use of machine learning and condition monitoring to detect faults has huge promise. Machine learning can be used to detect motor faults. To avoid losses, induction motor faults must be rectified promptly. Fault detection using machine learning algorithms is an excellent method for preventive maintenance. If any fault arises, the motor may continue to process and produce failure in windings core etc. Hence, the faults can be prevented by the monitoring the motor output values and cutoff the power before the motor gets damaged. This research develops a machine learning strategy based on algorithms in order to learn the characteristics from vibration signal's frequency distribution. This is mainly to characterize the operational status of induction motors. The operational status includes the parameters such as temperature, voltage and current. It automates and intelligently diagnoses faults by combining feature extraction and categorization.

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# IoT based Smart Communication System for Accident Prevention

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N. Selvam ;  M. Sampath ;  J. Sethu Madhavan ;  T. Sharmitha ;  D. Sri Mugesh     **All Authors** •••

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**Abstract:**
In the era of the Internet of Things (IoT), smart communication systems (SCS) are becoming increasingly important for accident prevention. It is well known that accidents are one of the major causes of death and injury in the world. The SCS can be used to detect and alert the authorities and people involved in accidents in real-time. This paper presents a novel IoT-based SCS for accident prevention. The proposed system is designed to detect and alert the authorities and people involved in accidents in realtime. By using the latest technologies such as sensors, artificial intelligence, and big data, the system will be able to detect and alert the authorities and people involved in accidents in real-time. Furthermore, the system will use data analytics to provide predictive analytics and improve the accuracy of the system. The challenges faced in this system are mainly related to sensing, communication, and data analysis.

**Published in:** 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT)

**Date of Conference:** 23-25 January 2023

**Date Added to IEEE *Xplore*:** 14 March 2023

▸ **ISBN Information:**

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**INSPEC Accession Number:** 22776914

**DOI:** 10.1109/ICSSIT55814.2023.10060924

**Publisher:** IEEE

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**Abstract:**
In contemporary year, multimedia data is transmitted and accessed through Internet. Despite of its advantages, unauthorized copying, distribution and hacking of data has created security issues. So secure transmission and access of the biometric data has to be suggested. A single biometric identification is not preferable in most highly secured areas due to their parody attacks and ageing. These limitations can be overcome by deploying this system that incorporate information from multiple sources for personnel identification. In this project multiple sources are incorporated using Digital watermarking algorithm comprising both the spatial and frequency domain approach. Even though the digital watermarking scheme is highly secured, network hackers may easily trap the image and it's key. So to increase the security, encryption and decryption of watermarked image using RSA algorithm is employed at the transmission and the reception side respectively. So the cipher text image is alone transmitted in the network increasing the security of the multimodal data. The Stillness of this proposed scheme is measured by Quality Index (QI), Similarity of the original and the recovered images for various attacks and Peak Signal to Noise Ratio (PSNR).

**Published in:** 2023 2nd International Conference on Computational Systems and Communication (ICCSC)

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# Implementation of PV Integrated Power Quality Enhancement and Performance Analysis of Battery Operated Electric Vehicle using Boost Converter

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IV.  Existing Block Diagram

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This paper presents an innovative concept of photovoltaic system which includes the voltage quality issue that is rectified by active power filter. This method is useful for electric vehicle charging by using boost converter. The concepts like performance analysis of battery, increasing the efficiency of a non-linear loads and improving the power quality by using the boost converter algorithm is proposed. A Constant charging is required for EV charging which is achieved by the combination of solar PV array, Lithium Ferro Phosphate battery as battery energy storage (BES) and boost converter. By using Maximum Power Point Tracking (MPPT), the effective battery charging is executed. The threephase pulse width modulation inverter helps in maintaining the power quality enhancement and also used to charge the electric vehicle in AC supply. This work is carried out by the matlab Simulink. And also, with the execution of THD analysis, the harmonic distortion is reduced.

**Published in:** 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT)

**Date of Conference:** 23-25 January 2023        **INSPEC Accession Number:** 22777081

**Date Added to IEEE** *Xplore*: 14 March 2023        **DOI:** 10.1109/ICSSIT55814.2023.10060994

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# An Intelligent Hybrid Fuzzy PI controller for Performance Analysis of Permanent Magnet Synchronous Motor

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N Lakshmipriya ;  S Ayyappan ;  R Prabu ;  M Hariprabhu    **All Authors** •••

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     PMSM

III. Proposed New Hybrid
     Sms-Bpsnn-Fuzzy Pi Soft
     Computing Controller
     Model

IV.  Results and Discussions

IV.  Conclusion

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**Abstract:**The Conventional AC drives are replaced by the Permanent Magnet motor drives in various applications due to its brushless, efficiency and minimal weight. In industiial ap... **View more**

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**Abstract:**
The Conventional AC drives are replaced by the Permanent Magnet motor drives in various applications due to its brushless, efficiency and minimal weight. In industiial applications, Proportional-Integral (P1) controllers are largely employed in PMSM drives and it's a very simple controller that results in adequate performance. appropriate controller modelling is required for the PMS M for regulating the speed so that it becomes more suitable for numerous industrial applications where high precision and high performance is required. This paper orooooses a novel control method to improve the performance of the Permanent Magnet Synchronous Motor (PMS M) system. A simulation of the entire system is built in MATLAB to control the speed of the machines. The hybrid soft computing controllers are orooosed by using stochastic slime mould algorithm (S MA). back prooagated soiking neural network (BPSNN) and fuzzy inference svstem based Proportional – Integral (PD controller and it improves the speed performance of PMSM drives.

**Published in:** 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT)

**Date of Conference:** 23-25 January 2023                    **INSPEC Accession Number:** 22777120

**Date Added to IEEE** *Xplore***:** 14 March 2023               **DOI:** 10.1109/ICSSIT55814.2023.10061103

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# Review Of Hybrid Microgrid Power Management Using Renewable Energy Sources

**Publisher: IEEE**     [ Cite This ]          📄 **PDF**

Kalaivani C ;  Subramanyam M V ;  Gopinath Singaram ;  Udhaya Kumar A ;  Mohanraj K ;  Saravanakumar R     **All Authors** •••

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II.  Distributed Generation

III. Hybrid Microgrid
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     Advancements

IV.  Hybrid Dc-Ac Inverter
     Microgrid Technology

V.   Conclusion

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**Abstract:** Distributed generation is a promising alternative to renewable energy-based electricity generation, which is currently in use. Microgrids are small energy networks that c... **View more**

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**Abstract:**

Distributed generation is a promising alternative to renewable energy-based electricity generation, which is currently in use. Microgrids are small energy networks that connect distributed generation (DG) to loads in the local area. The emergence of hybrid microgrids was aided by traditional direct current (DC) and alternating current (AC) distribution systems. In a hybrid microgrid, parallel connection of sources complicates voltage regulation and load distribution. As a result, power management between parallel-connected sources and loads is required. The islanding system's MPPT algorithm is built into the PIC microcontroller to monitor the multiple modes of power management between photovoltaics (PV), batteries, and AC-DC loads. Active and reactive power management is also covered in an inverter-controlled, grid-connected photovoltaic energy system. This research will investigate the control of power management for hybrid microgrids in both islanding and grid connected modes.

**Published in:** 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS)

**Date of Conference:** 17-18 March 2023

**Date Added to IEEE** *Xplore*: 05 May 2023

▶ **ISBN Information:**

▶ **ISSN Information:**

**INSPEC Accession Number:** 23115688

**DOI:** 10.1109/ICACCS57279.2023.10112787

**Publisher:** IEEE

**Conference Location:** Coimbatore, India

# Design, synthesis and computational evaluation of a novel intermediate salt of *N*-cyclohexyl-*N*-(cyclohexylcarbamoyl)-4-(trifluoromethyl) benzamide as potential potassium channel blocker in epileptic paroxysmal seizures

V. Natchimuthu [a], Srinivas Bandaru [b], Anuraj Nayarisseri [b], S. Ravi [a]

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## Abstract

The narrow therapeutic range and limited pharmacokinetics of available Antiepileptic drugs (AEDs) have raised serious concerns in the proper management of epilepsy. To overcome this, the present study attempts to identify a candidate molecule targeting voltage gated potassium channels anticipated to have superior pharmacological than existing potassium channel blockers. The compound was synthesized by reacting (S)-(+)-2,3-dihydro-1H-pyrrolo[2,1-c][1,4] benzodiazepine5,11(10H,11aH)–dione with 4-(Trifluoromethyl) benzoic acid ($C_8H_5F_3O_2$) in DMF and *N,N'*-dicyclohexylcarbodiimide (DCC) which lead to the formation of an intermediate salt of *N*-cyclohexyl-*N*-(cyclohexylcarbamoyl)-4-(trifluoromethyl)benzamide with a perfect crystalline structure. The structure of the compound was characterized by FTIR, $^1$H NMR and $^{13}$C NMR analysis. The crystal structure is confirmed by single crystal X-ray diffraction analysis. The Structure-Activity Relationship (SAR) studies revealed that substituent of fluoro or trifluoromethyl moiety into the compound had a great effect on the biological activity in comparison to clinically used drugs. Employing computational approaches the compound was further tested for its affinity against potassium protein structure by molecular docking in addition, bioactivity and ADMET properties were predicted through computer aided programs.

## Graphical abstract

# Bi-Directional DC-DC Flyback Converter using Zero Voltage Switching for Hybrid Electric Vehicle Application

S. G, C. Kumar • Published in 9th International Conference… 17 March 2023 • Engineering •
2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS)

For dual-power applications, such as charging the battery and discharging electric vehicles, the DC-DC bidirectional Flyback converter is used. On the other side of the circuit, added an additional inductor and capacitor to power the Flyback network to operate in both forward and reverse directions. The switches in the inverting stage have zero voltage switching (ZVS). ZVS reduces losses and allows for higher frequency performance, resulting in smaller magnetic filters, reducing size, weight… Expand

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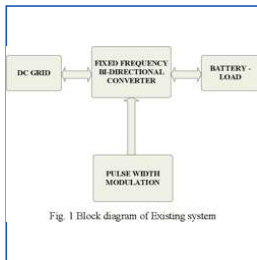

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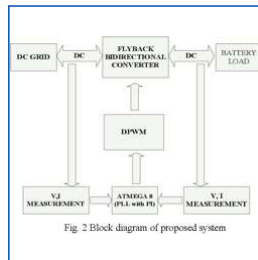

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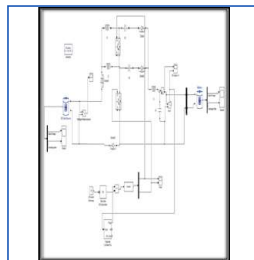

Figure 3
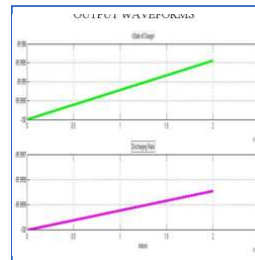

Figure 4
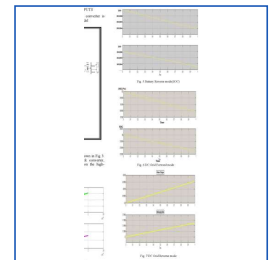

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### Control of a high-voltage bidirectional dc–dc flyback converter for driving DEAs

A. Shagerdmootaab    S. Pourazadi    M. Moallem    C. Menon    Engineering • IET Power Electronics • 2018

TLDR Modelling and control of a high-voltage ratio flyback converter for driving capacitive loads including smart material dielectric elastomer actuators (DEAs) and experimental results are presented which validate the performance of the proposed converter and its control strategy. Expand

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### Over 300kHz GaN device based resonant bidirectional DCDC converter with integrated magnetics

Gang Liu    Dan Li    Y. Jang    Jianqiu Zhang    Engineering • Applied Power Electronics Conference • 2016

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# MPPT-Based Charge Controller for Battery Fast Charging

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M. Deepika ; P. Karthikeyan ; A.V. Keerthana ; M. Lakshmanan ; P. Gowtham ; C. Kumar ; S. Jaisiva		**All Authors** •••

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**Abstract:**In solar PV system, there is no overcharging prevention when the batteries are linked to the PV modules without any intermediate circuits. To overcome this problem, charg... **View more**

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**Abstract:**

In solar PV system, there is no overcharging prevention when the batteries are linked to the PV modules without any intermediate circuits. To overcome this problem, charge controllers are used. The charge controller's primary function is to regulate the solar panel's output and also protects against overcharging and over discharging of the battery. The Pulse Width Modulation (PWM) and the Maximum Power Point Tracker (MPPT) charge controllers are the two main types of charge controllers. Between the solar panel and the battery, the PWM charge controller functions as a switch. In this type of controller, the current drawn from the panel is just above the voltage of the battery. The efficiency of the PWM controller is about 75 to 80%. To improve the charging efficiency, the MPPT charge controller is used instead of PWM charge controller. The MPPT charge controller draws current from the panel at its maximum power voltage, which is typically higher than the battery voltage. By converting all excess voltage to current, it is capable of extracting more electricity from the solar panel. As a result, the MPPT charge controller, which has an efficiency range of 94-99%, determines the maximum voltage and current of the solar panel at any given circumstance. For the design and implementation of the proposed method, the Perturb & Observe (P&O) MPPT algorithm was employed.

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# Design and Implementation of Solar based Maximum Power Point Tracking using Machine Learning

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B.Rajesh Kumar ;  S. Srikanth ;  P. Sujeet ;  T. Swetha ;  P. Tanya    All Authors •••

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IV.  Software Description

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**Abstract:**The photovoltaic-based applications are discussed in this study. For a photovoltaic (PV) system to produce the most power, an automated MPPT algorithm calibration and eff... **View more**

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**Abstract:**
The photovoltaic-based applications are discussed in this study. For a photovoltaic (PV) system to produce the most power, an automated MPPT algorithm calibration and effective MPPT implementation are essential. In our proposed maximum power point tracker method system PV array's global maximum power point is automatically determined using an Artificial Neural Network (ANN)-based strategy. A solar tracking system with batteries is subjected to this technique. Photovoltaic systems are appropriate for AI-based MPPT approaches. The function approximation of the MPPT problem in PV, the best approach and network architecture should be chosen for the performance of several training algorithms and network architectures is taken into consideration. Due to the nonlinear, dynamic nature of PV panels, soft computing technologies based on artificial neural networks (ANN) will be used for function approximation. PV panel modelling and a MATLAB- simulated ANN-based MPPT technique created the data set needed to train neural networks.

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# A Battery Monitoring System based on IoT for Electric Vehicles

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**Abstract:**Electric vehicles (EVs), which are considered as dynamic electrical energy storage units, are widely used because of their outstanding electrical characteristics and vers... **View more**

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**Abstract:**
Electric vehicles (EVs), which are considered as dynamic electrical energy storage units, are widely used because of their outstanding electrical characteristics and versatility. However, their widespread adoption has a significant adverse effect on the grid and carries the risk of harming their batteries when they become profoundly discharged. EV batteries require a precise state of charge estimation to minimize the lisk of damage, prolong their lifespan, and in order to safeguard the equipment power. Based on simplicity of implementation and reduced overall complexity, this study suggests a real-time Battery Monitoring System (BMS) employing the coulomb method of counting for SOC estimation and MQTT which is messaging-based as an internal communication protocol. Utilizing an ade quate central CPU, interfacing devices, and sensor technology, the proposed BMS is implemented. In order to monitor and regulate the discharging and charging of rechargeable battery packs, which increases the operational efficiency, battery management systems are important in electric vehide technology. Monitoring involves keeping a close eye on the important operating factors including voltage, current, fire, and temperature while charging and draining a battery. This is a hardware-timed sensor system that tracks various variables, like temperature, voltage, and fire and reports them on IOT so you can see exactly when everything has reached the right value.

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# Novel Single Switch DC to DC Converter for PV Applications

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**Abstract:**
In general, the increasing cost in fossil fuel and CO2 emissions has led to the interest in renewable energy resources. Natural resources produce renewable energy which can be replaced or regenerated fast than we use. The benefits of renewable sources are, it reduces some kinds of air pollution and increases the energy supply diversity and decreasing the dependence on imported fuels. Photovoltaic (PV), which is considered as one of the renewable energy resources, using PV materials and equipment solar energy is converted into electrical energy and a cell is a single photovoltaic device. Now a days, photovoltaic technology is becoming more popular as a leading source of renewable energy in various nations, including the United Arab Emirates, India, Sweden, and Germany. The output voltage of PV is the function of irradiance and temperature, operating point and it also causes to vary.

**Published in:** 2023 9th International Conference on Electrical Energy Systems (ICEES)

**Date of Conference:** 23-25 March 2023

**Date Added to IEEE *Xplore*:** 01 May 2023

▸ **ISBN Information:**

▸ ISSN Information:

**INSPEC Accession Number:** 23039578

**DOI:** 10.1109/ICEES57979.2023.10110207

**Publisher:** IEEE

**Conference Location:** Chennai, India

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It has been published in the proceedings of the International Conferenc

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# OPENCV BASED PLANT DISEASE DETECTION AND FERTILIZER SPRAYER

**[1]S. Banumathi, [2]R. Kamalesh, [3]P. Dhamotharan and [4]N. Mohanlal**

[1]*Professor, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

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[4]*UG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

## ABSTRACT:

The population of India is highly increasing day by day. But due to lack of manpower and knowledge in the agriculture field the yield and profit are less. Implementation of Robotics and Artificial Intelligence in agriculture will increases the yield and profit for the farmers. As a part of idea Machine Learning is implemented using YOLOv5s trained model and OpenCV to detect the diseases by image processing. From plant image of leaf is captured by camera and process in system using OpenCV that detect the plant whether the plant is healthy or affected by disease and it take decision according to program and past data. If it is affected by disease, then the fertilizer will be sprayed automatically. It is user (farmer) friendly, and less manpower required.

*Keywords :* Machine Learning (ML), OpenCV, Embedded System.

# IMPLEMENTATION OF WIRELESS CHARGING SYSTEM FOR ELECTRIC VEHICLE

**[1]S. SathishKumar, [2]S. Abirami, [3]P. Monika and[4]M. NandhaKumar**

[1]*Professor, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

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## ABSTRACT:

In reaction to the depletion of resources, electric cars are considered as an alternate choice. Wireless power transfer (WPT) is seen as a solution to charge batteries since practical and dependable ways to charge EV batteries are crucial for increasing the usage of EVs in daily life. This project involves designing and implementing a wireless charging prototype system with a 60 kHz operating frequency. The drawbacks of plug-in electric vehicles (PEVs) include the necessity for large energy storage systems (ESS) packs, galvanic separation of the on-board electronics, the size and price of the required chargers, and the requirement for cable and plug chargers. Yet, by utilising the wireless charging capability of the equipment. It offers ease to the user, built-in electrical isolation, grid-side control, and on-board ESS size reduction through dynamic on-road charging. Our project's primary goal is to design and construct an antenna system that can be used for vehicles to charge electric vehicles wirelessly utilising resonant magnetic coupling technology. WPT use in EVs offers a clean, practical, and secure functioning. The primary and secondary coils are the heart of the WPT systems. The coupling coefficient of the system created by these coils ranges from 0. 1 to 0. 5. Resonant capacitors are required on both sides to tune them in order to transfer the rated power. The operating frequency is a vital selection factor for all applications, and it has a significant impact on the power electronic circuit's component choices and coil size. A wireless resonant transfer mechanism for automobile charging is created.

*Keywords :* Wireless Power Transfer (WPT), Resonant magnetic Coupling, Plug-in Elctric vehicle (PEV), Antenna.

*Organized By Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Thalavapalayam, Karur, Tamilnadu, India*

ISBN : 978-81-19147-73-1                24

# PORTABLE SEISMOMETER BASED ON IOT USING ARDUINO

[1]G. Bharani, [2]P. Sakthivel, [3]R. Sudahar, [4]T. Sudharsan and [5]S. Yogeshwaran

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[5]UG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.

## ABSTRACT:

Conventionally, an earthquake's moment magnitude or the related but largely obsolete Richter magnitude is recorded, with earthquakes of magnitude 3 or lower being almost unnoticed and those of magnitude 7 causing catastrophic damage across wide areas. To meet precaution and ensure mobility in diverse immobile devices. ADLX 335 sensor is used to detect high sensitive disturbance of any vibration and shake at a wide range. To immediately inform the public by using a buzzer and an IoT transmitter. There are several technology available now that can be used to detect minor tremors and knocks so that we can take action at the significant earth vibrations occur. In this study, an accelerometer is used to find vibrations prior to an earthquake. The three axes, as well as shakes and vibrations, are extremely sensitive to the accelerometer. Reduced destructive losses are a benefit of utilizing an accelerometer to develop an earthquake detector based on an Arduino.

*Keywords :* IOT, Mobility, Earthquake Detector, Arduino.

*Organized By Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Thalavapalayam, Karur, Tamilnadu, India*

ISBN : 978-81-19147-73-1

32

# SOLAR POWER INVERTER

[1]G. Bharani, [2]C. Gokulapriya, [3]S. Jayasri and [4]A. Dhanush

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## ABSTRACT:

A solar inverter, also known as a photovoltaic inverter, is a type of power inverter that transforms a photovoltaic solar panel's variable direct current (DC) output into utility-frequency alternating current (AC), which can then be used by a local, off-grid electrical network or fed into a commercial electrical grid. Due to its lower overall harmonic distortion, multilevel inverters are growing in popularity in solar applications. Provide low distortion waveforms with lower harmonic amplitude by synthesizing the ac output voltage from various amounts of voltage. On the other side, multilevel inverters have also been in competition with high frequency pulse width modulation inverters for low power systems in situations where great efficiency is crucial. It to reduce leakage current, a single phase, five-level transformer-free PV inverter is suggested. A five-level inverter that injects genuine photovoltaic power into the grid in order to lessen switching power loss and harmonic distortion brought on by power electronic device switching.

*Keywords :* Solar energy, Pulse width Modulation, Multi-level Inverter

# OBJECT DETECTION FOR VIDEO SURVEILLANCE

**[1]G. Bharani, [2]N. Kiruthika and[3]A. Mysticah**

*[1]Assistant Professor, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

*[2]UG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

*[3]UG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

## ABSTRACT:

The main goal of object detection is to extract one or more useful targets from still images or video data. Pattern recognition, artificial intelligence, machine learning, and image processing are just a few of the crucial methods that are successfully incorporated. Object detection algorithms typically leverage machine learning or deep learning to produce meaningful results. When humans look at images or video, we can recognize and locate objects of interest within a matter of moments. Object detection is useful for applications such as video surveillance and picture retrieval systems. The goal of object detection techniques is to identify the different kinds of objects present in an image as well as their positions and levels of visibility. The main tactic employed to overcome this issue has been the employment of computer vision and deep learning techniques. Existing methods, however, have never been able to find small, dense objects or objects with random geometric modifications. In this project, the object in the picture is located using Python.

*Keywords :* Object detection, Image Identification, Python

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ISBN : 978-81-19147-73-1

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# FUZZY LOGIC CONTROLLED CASCADED H-BRIDGE MULTILEVEL INVERTER

**[1]V. Jayakumar and [2]K. Santhosh Kumar**

[1]*Assistant Professor, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

[2]*PG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.*

## ABSTRACT:

This paper represents the layout primarily based totally completely Fuzzy Logic Controller (FLC) for multilevel inverter. A multilevel inverter is managed with the useful resource of numerous the modulation index of the inverter thru keeping the DC link voltage consistent. A multilevel inverter is controlled by varying the modulation index of the inverter by keeping the DC link voltage constant. The proposed fuzzy logic controller shows improved functionalities in the simulative experimental studies. The Fuzzy Associative Memory (FAM) table is derived after a thorough research of the characteristics and compared with the conventional controller for harmonic disturbance, voltage profile. The traditional manipulate strategies are especially limited to the direct and oblique manipulate of the inverter. The proposed fuzzy not unusual place experience controller suggests progressed functionalities in the simulative experimental Studies.

*Keywords:* Fuzzy Logic Controller (FLC), Fuzzy Associative Memory (FAM), Multilevel Inverter.

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**Abstract:**
Despite its importance. more than 800 million people still lack access to electricity. Individuals in many rural areas lack access to a consistent supply of energy due to the high cost of grid extension. Off-grid solar systems enable rural residents to connect to the energy 2rid and power their homes' lights. appliances. and other electronic equipment. This document provides a brief overview of a solar power system that can be used to Dower remote homes. Solar panels. a charge controller. batteries. and an inverter make up the system. Sunlight is converted into direct current by solar panels. which is then stored in batteries. The charge controller regulates the charging and discharging cycles of the battery pack in order to keep the cells healthy and long-lasting. The inverter converts the stored DC electricity into the alternating current (AC) power that appliances and other AC loads require. The proposed method is intended to be simple and low-cost. making it an appropriate option for regions with limited resources and low growth. The system can be customized to meet the exact energy needs of the house by adding additional solar panels or batteries. Furthermore. the structure is made up of discrete components. making it easier to assemble and maintain. Off-grid solar power systems are a cost-effective and efficient wav of bringing electricity to areas that are not connected to the power grid. The proposed system describes the design and installation of a solar-powered. direct current (DC) power source for isolated dwellings. The strategy promotes long-term economic growth and raises the living standards of rural families.

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**Abstract:**
The present work describes the modelling, simulation and configuration of Luo converter for renewable application. Solar energy has become one of the most favourable energy due to its availability and sustainability but the conversion system which act as a barrier for its performance in energy conversion efficiency. In this paper, the solar energy is boost up using a luo converter. It makes sense that boost converters are frequently employed to increase their dc output voltage. The luo converter, with its extremely high voltage transfer gain, greatly reduces the downside of the boost converter, which has ripple presence in the output voltage. Luo converter are evolved as a series of boost converters with greater efficiency, more power density and gives large output with insignificant ripples. Comparing to conventional converter, the luo converter boosts upto 3times of the input voltage. MATLAB/SIMULINK software is used to simulate the defined luo converter and produce data like the ripple content and dc output voltage.

**Published in:** 2023 9th International Conference on Electrical Energy Systems (ICEES)

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The output waveform grows into a staircase wave form that reaches the required wave form as the level count increases and contains more steps. The usage of integrated gate driver circuits, voltage standing on switches, cascaded multilayer inverters, and few switches is advised. Here, a cascaded H bridge with a topology based on reduced switching count is proposed. The switching count was lowered by the suggested topology. The output waveform grows into a staircase wave form that reaches the required wave form as the level count increases and contains more steps. It is recommended to use fewer switches, a cascaded multilevel inverter design, circuits for integrated gate drivers and switches with voltage standing. Here, a cascaded H bridge architecture with less switching is recommended. The suggested topology decreased the switching count.

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**Abstract:**

For the detection and prognosis of heart disease, Internet of Medical Things (IoMT) technology has recently been implemented in healthcare systems. The intended study's main objective is to foresee heart illness using medical data and imaging to classify data. Preprocessing is done on the input dataset to deal with missing values and incorrect data. IoT devices analyse the data they receive from patients, physicians, or nurses using the Modified Imperialist Competitive Algorithm (MICA). The IoT device's analysis of the data allows for effective and informed judgements to be made by humans, robots, and even other IoT devices. A modified imperialist competitive algorithm is suggested in this research in order to pinpoint the essential characteristics of heart disease. The Modified Imperialist Competitive Algorithm is used to select features for the diagnosis of heart disease (MICA). The improved self-adaptive Bayesian algorithm (ISABA) technique is then used to classify the chosen features into normal and abnormal states. For detecting normal sensor data and abnormal sensor data, respectively, the ISABA approach achieved accuracy of 96.85% and 98.31%. With a 96.32% specificity and a 99.15% maximum accuracy in categorizing images, the proposed model outperformed the competition

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# AUTOMATIC ARDUINO POWERED PET FEEDER

[1]P. Sasirekha, [2]R. Indhumathi, [3]M. Kaviyalakshmi and[4]D. Hemapriya

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[4]UG Scholar, Department of Electrical and Electronics Engineering, M. Kumarasamy College of Engineering, Karur, Tamilnadu, India.

**ABSTRACT:**

The work involves a pet feeding equipment that runs automatically for a minimum of eight hours each day, even when everyone in the nuclear family is working to survive in metropolises and other cities. IOT sensor refers to the whole network of technologically interconnected gadgets. An ultrasonic sensor has been applied to this pet feeding module. This sensor is used to track movement. The pet feeder is made to make it simpler to feed small animals, such dogs and cats, dry food. Up to a certain quantity will be automatically provided to the animal only when it approaches the food container in need. Due to the introduction of such a machine on the market, the cost of pet care has decreased. It involves connecting physical items with electronics built into its architecture in order to communicate and detect interactions with one another or with the surrounding environment. IoT-based technology will provide higher levels of services in the future years, effectively altering how individuals go about their daily lives.

**Keywords :** Arduino UNO, Servo Motor, Ultrasonic Sensor, Internet Of Things(IOT), Bipolar Junction Transistor (BJT).
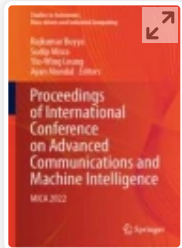
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# MF-Based Load Sharing System for Paper Rolling Mill Using Variable Frequency Drive

G. Bharani, S. Dineshkumar, M. Elango, U. Harshavarshini ✉
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Controlling the several drives coupled with the same machinery is the primary feature of the master follower. This would be accomplished with the use of a variable frequency drive considering that no other soft starter can replace it because it can control the

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This study presents a non-invasive technique for detecting localized heating and quantifying the area of hotspots, which are a potential cause of degradation in photovoltaic system. Solar system is affected by dust and that reduces energy and power, so that we used monitoring to make sure that the system is working efficiently. In order to safeguard the other components from any possible harm, the suggested system will also be able to isolate the hot regions from the rest of the system. This is accomplished by the use of a Temperature Sensor, a well-known non-destructive evaluation approach that enables contactless, real-time examination. The PIC Microcontroller, which controls the temperature of the Solar Pane... input signal from the microcor... the user through the applicatio... in locating hotspots within a s...

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# SURVEY ON CONVERGENCE OF ARTIFICIAL INTELLIGENCE AND HUMAN INTELLIGENCE USING DIFFERENT MACHINE LEARNING ALGORITHMS FOR REAL WORLD APPLICATIONS

**A. Syed Musthafa[1], C.Nallusamy[2]**

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[2]Department of Information Technology, K.S.Rangasamy College of Technology, Tiruchengode – 637215, nallu80@gmail.com

**ABSTRACT**

Artificial Intelligence (AI) is a term that not only a technical innovation, also it makes a relation among the physical and the digital worlds, that is entirely used in transforming the way in which the humans beings interact with the machines. In the modern revolution of the Fifth Industrial Turning (Industry 5.0), the digitalized world has a abundance of data, like cyber security based data, Internet of Things (IoT) data, business data, enterprise data, Medical data, mobile data, social media data, health application data, etc. The Psychological features of intelligence already had a major role in different countries like Europe's digital emerging to handle the data. To intelligently examine those data and to design a comparable machine-controlled and the smart applications, the cognition of Artificial Intelligence (AI), especially, the Machine Learning (ML) is the significant. The Machine Learning (ML) furnishes the knowledge of the sense modality on automatic realizing the patterns and to determine the prognostication models for both the unstructured and structured data in the lack of definitive programming instructions. Different variety of ML algorithms like supervised, semi-supervised, unsupervised, and the reinforcement based learning are there in this method. Likewise, the deep learning, a subset of ML model, is used to analyze the data in intelligent manner on a bigger scale. This article, develops a extensive view on different ML algorithms which might be used to deepen the susceptibility and the intelligence of an modern application. The objective is to represent and diagnose the different ML algorithms and models with its pertain in the several real-world application domains, like smart cities, cyber security based systems, healthcare application, e-commerce, agriculture field, and lot more. Also it highlights the difficulties and research challenges towards the current scenario. This work gives a idea about the different ML algorithms with its functionalities for various real world application for both the industry and academia professionals to choose right decision based on their applications.

**Keywords** Machine learning, Supervised learning, Unsupervised learning, Semi-supervised learning, Reinforcement learning, Deep learning, Artificial intelligence,

## 1. INTRODUCTION

We live in the age of data, where everything around us is connected to a data source, and everything in our lives is digitally recorded. For instance, the current digital world has a wealth of various kinds of data, such as the data of Internet of Things (IoT), data of smart city, cyber security data, business data, smart phone data, social media data, health data, data about COVID-19 patient and many more. The data may be of many types such as structured, semi-structured, or unstructured, which is used in many ways.. "Different types of Real-World Data along with the Machine Learning Techniques", which is being increasing day-after-day. Extracting impending from those data could be used in building various intelligent based applications in the pertinent domains. For example, for building a data-driven mechanism and the intelligent based cyber security approach, the appropriate cyber security data might be used to construct adapted context-aware elegant mobile based applications, the related mobile oriented data might be used and so on. This kind of data managing tools and methods have the ability of take out insights or helpful knowledge as of the data in a appropriate and smart way is immediately needed based on the current need of real-world applications.

AN Artificial intelligence (AI), predominantly, machine learning (ML) comprise the grown speedily in the recent years in situation of data examination and evaluating that normally permits the applications to purpose in smart intelligent way. ML typically provides scheme with the capability to study and enhance since experience routinely without being purposely programmed plus it is normally referred in the direction of most admired latest technologies within the latest industrial revolution. "Industry 5.0"is naturally the enduring automation of predictable developed and industrial practices, as well as the investigative data processing, by novel smart technologies like machine learning based automation. Thus, to cleverly analyze those data and also to extend the equivalent real-world based applications, the machine learning algorithms are used frequently. The learning algorithms can be classified into four chief types, such as unsupervised, supervised, semi-supervised, and the reinforcement learning in the area, "

### 1.1. TYPES OF REAL WORLD DATA AND MACHINE LEARNING TECHNIQUES

Machine learning (ML) algorithms naturally devour and process the data to learn the connected patterns concerning individuals, the business processes, the transactions, events, and so on. Different types of Real-World data typically and its accessibility of the data is measured as the solution to build a machine learning based model or data-driven based real world systems. Besides, the "metadata" be another kind that typically symbolizes data concerning the data. The structures data are well-defined one which is traditional to a data method following a normal order, that is highly controlled and effortlessly accessed, and worn by a person or a computer based program. In well-

defined schemes, such as a relational databases, the structured data are naturally stored, i.e., in a tabular arrangement. Unstructured: On the other hand, presents a format or organization for unstructured based data, making it much more difficult to process, capture, and analyze, mostly hold text and the multimedia material. For example, is the sensor data, blog entries, emails, wikis and word processing documents, PDF files, audio files, videos, images, presentations, web pages, and many other types of business documents can be considered as unstructured data. – Semi-structured: Semi-structured data are not stored in a relational database like the structured data mentioned above, but it does have convinced organizational properties that make it easier to analyze. HTML, XML, JSON documents, NoSQL databases, etc., is some examples of semi-structured data. – Metadata: It is not the usual form of data, but "data about data".

## 2  TYPES OF MACHINE LEARNING TECHNIQUES

Machine Learning algorithms are mainly divided into four categories: Supervised learning, unsupervised learning, Semi-supervised learning, and Reinforcement learning. Supervised: Supervised learning is typically the task of machine learning to learn a function that maps an input to an output based on sample input-output pairs. It uses labeled training data and a collection of training examples to infer a function. Supervised learning is carried out when certain goals are identified to be accomplished from a certain set of inputs, i.e., a task driven approach. The most common supervised tasks are "classification" that separates the data, and "regression" that fits the data. For instance, predicting the class label or sentiment of a piece of text, like a tweet or a product review, i.e., text classification is an example of supervised learning. – Unsupervised: Unsupervised learning analyzes unlabeled datasets without the need for human interference, i.e., a data-driven process. The most common unsupervised learning tasks are clustering, density estimation, feature learning, dimensionality reduction, finding association rules, anomaly detection, etc.

Semi-supervised: Semi-supervised learning can be defined as a hybridization of the above-mentioned supervised and unsupervised methods, as it operates on both labeled and unlabeled data. Thus, it falls between learning "without supervision" and learning "with supervision". In the real world, labeled data could be rare in several contexts, and unlabeled data are numerous, where semi-supervised learning is useful. The ultimate goal of a semi-supervised learning model is to provide a better outcome for prediction than. Some application areas where semi-supervised learning is used include machine translation, fraud detection, labeling data and text classification. The below figure shows the different types of ML algorithms.
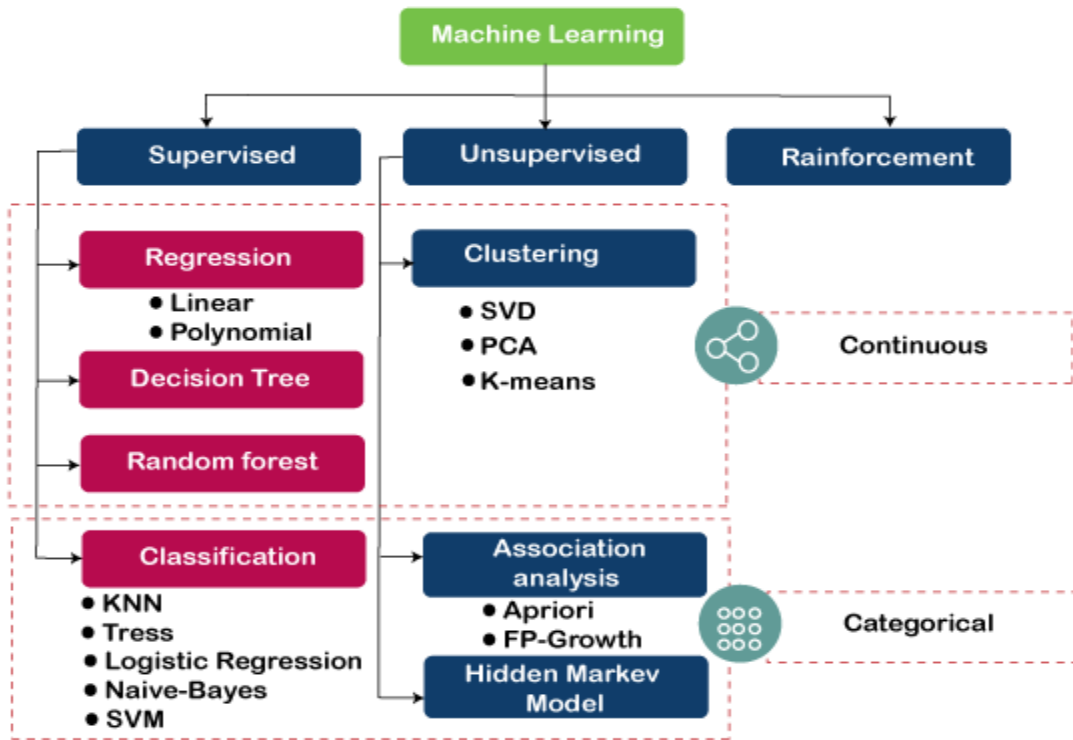
**Figure 1: Types of Machine Learning Techniques**

Reinforcement: Reinforcement learning is a type of machine learning algorithm that enables software agents and machines to automatically evaluate the optimal behavior in a particular context or environment to improve its efficiency, i.e., an environment-driven approach. This type of learning is based on reward or penalty, and its ultimate goal is to use insights obtained from environmental activists to take action to increase the reward or minimize the risk. It is a powerful tool for training AI models that can help increase automation or optimize the operational efficiency of sophisticated systems such as robotics, autonomous driving tasks, manufacturing and supply chain logistics, however, not preferable to use it for solving the basic or straightforward problems. Thus, to build effective models in various application areas different types of machine learning techniques can play a significant role according to their learning capabilities, depending on the nature of the data discussed earlier, and the target outcome. In Table 1, we summarize various types of machine learning techniques with examples. In the following, we provide a comprehensive view of machine learning algorithms that can be applied to enhance the intelligence and capabilities of a data-driven application. The below table describes the each and every category of ML methods along with its application model and real world example.

**Table 1: Different Classifications of ML Algorithms**

| Category | Application and model used | Examples |
|---|---|---|
| Supervised | Algorithms or models learn from labeled data (task-driven approach) | Classification, regression |

| Unsupervised | Algorithms or models learn from unlabeled data (Data-Driven Approach) | Clustering, associations, dimensionality reduction |
|---|---|---|
| Semi-supervised | Models are built using combined data (labeled + unlabeled) | Classification, clustering |
| Reinforcement | Models are based on reward or penalty (environment-driven approach) | Classification, control |

## 2.1 MACHINE LEARNING TASKS AND ALGORITHMS

In this section, we discuss various machine learning algorithms that include classification analysis, regression analysis, data clustering, association rule learning, and feature engineering for dimensionality reduction, as well as deep learning methods. A general structure of a machine learning based predictive model is trained from historical data in phase 1 and the outcome is generated in phase 2 for the new test data.

### 2.2 Classification Analysis

Classification is regarded as a supervised learning method in machine learning, referring to a problem of predictive modeling as well, where a class label is predicted for a given example. Mathematically, it maps a function (f) from input variables (X) to output variables (Y) as target, label or categories. To predict the class of given data points, it can be carried out on structured or unstructured data. For example, spam detection such as "spam" and "not spam" in email service providers can be a classification problem. In the following, we summarize the common classification problems.

### 2.2.1 Binary classification

It refers to the classification tasks having two class labels such as "true and false" or "yes and no". In such binary classification tasks, one class could be the normal state, while the abnormal state could be another class. For instance, "cancer not detected" is the normal state of a task that involves a medical test, and "cancer detected" could be considered as the abnormal state. Similarly, "spam" and "not spam" in the above example of email service providers are considered as binary classification.

**2.2.2 Naive Bayes (NB):** The naive Bayes algorithm is based on the Bayes' theorem with the assumption of independence between each pair of features. It works well and can be used for both binary and multi-class categories in many real-world situations, such as document or text classification, spam filtering, etc. To effectively classify the noisy instances in the data and to construct a robust prediction model, the NB classifier can be used. The key benefit is that, compared to more sophisticated approaches, it needs a small amount of training data to estimate the necessary

parameters and quickly. However, its performance may affect due to its strong assumptions on features independence. Gaussian, Multinomial, Complement, Bernoulli, and Categorical are the common variants of NB classifier.

### 2.2.3 Logistic regression (LR)

Another common probabilistic based statistical model used to solve classification issues in machine learning is Logistic Regression (LR). Logistic regression typically uses a logistic function to estimate the probabilities, which are also referred to as the mathematically defined sigmoid function in Eq. 1. It can over fit high-dimensional datasets and works well when the dataset can be separated linearly. The regularization (L1 and L2) techniques can be used to avoid over-fitting in such scenarios. The assumption of linearity between the dependent and independent variables is considered as a major drawback of Logistic Regression. It can be used for both classification and regression problems, but it is more commonly used for classification.

### 2.2.4 K-nearest neighbors (KNN)

K-Nearest Neighbors (KNN) is an "instance-based learning" or non-generalizing learning, also known as a "lazy learning" algorithm. It does not focus on constructing a general internal model; instead, it stores all instances corresponding to training data in n-dimensional space. KNN uses data and classifies new data points based on similarity measures (e.g., Euclidean distance function). Classification is computed from a simple majority vote of the k nearest neighbors of each point. It is quite robust to noisy training data, and accuracy depends on the data quality. The biggest issue with KNN is to choose the optimal number of neighbors to be considered. KNN can be used both for classification as well as regression

### 2.2.5 Support vector machine (SVM)

In machine learning, another common technique that can be used for classification, regression, or other tasks is a support vector machine (SVM). In high- or infinite-dimensional space, a support vector machine constructs a hyper-plane or set of hyper-planes. Intuitively, the hyper-plane, which has the greatest distance from the nearest training data points in any class, achieves a strong separation since, in general, the greater the margin, the lower the classifier's generalization error. It is effective in high-dimensional spaces and can behave differently based on different mathematical functions known as the kernel. Linear, polynomial, radial basis function (RBF), sigmoid, etc., is the popular kernel functions used in SVM classifier. However, when the data set contains more noise, such as overlapping target classes, SVM does not perform well.

### 2.2.6 Decision tree (DT)

Decision tree (DT) is a well known non-parametric supervised learning method. DT learning methods are used for both the classification and regression tasks. ID3, C4.5, and CART are well known for DT algorithms. Moreover, recently proposed BehavDT, and IntrudTree by Sarker et al. are

effective in the relevant application domains, such as user behavior analytics and cyber security analytics, respectively. By sorting down the tree from the root to some leaf nodes, DT classifies the instances. Instances are classified by checking the attribute defined by that node, starting at the root node of the tree, and then moving down the tree branch corresponding to the attribute value. For splitting, the most popular criteria are "gini" for the Gini impurity and "entropy" for the information gain that can be expressed mathematically.

**2.2.7 Random forest (RF)**

A random forest classifier is well known as an ensemble classification technique that is used in the fled of machine learning and data science in various application areas. This method uses "parallel assembling" which fits several decision tree classifiers in parallel on different data set sub-samples and uses majority voting or averages for the outcome or final result. It thus minimizes the over-fitting problem and increases the prediction accuracy and control. Therefore, the RF learning model with multiple decision trees is typically more accurate than a single decision tree based model. To build a series of decision trees with controlled variation, it combines bootstrap aggregation (bagging) and random feature selection. It is adaptable to both classification and regression problems and fts well for both categorical and continuous values.

**3. REGRESSION ANALYSIS**

Regression analysis includes several methods of machine learning that allow predicting a continuous (y) result variable based on the value of one or more (x) predictor variables. The most significant distinction between classification and regression is that classification predicts distinct class labels, while regression facilitates the prediction of a continuous quantity. Regression models are now widely used in a variety of fields, including financial forecasting or prediction, cost estimation, trend analysis, marketing, time series estimation, drug response modeling, and many more. Some of the familiar types of regression algorithms are linear, polynomial, lasso and ridge regression, etc., which are explained briefly in the following.

**3.1 Simple and multiple linear regressions**

This is one of the most popular ML modeling techniques as well as a well-known regression technique. In this technique, the dependent variable is continuous, the independent variable(s) can be continuous or discrete, and the form of the regression line is linear. Linear regression creates a relationship between the dependent variable (Y) and one or more independent variables (X) (also known as regression line) using the best ft straight line.

**3.2 Polynomial regression**

Polynomial regression is a form of regression analysis in which the relationship between the independent variable x and the dependent variable y is not linear, but is the polynomial degree of nth in x. The equation for polynomial regression is also derived from linear regression.

### 3.3 Cluster Analysis

Cluster analysis, also known as clustering, is an unsupervised machine learning technique for Identifying and grouping related data points in large datasets without concern for the specific outcome. It does grouping a collection of objects in such a way that objects in the same category, called a cluster, are in some sense more similar to each other than objects in other groups. It is often used as a data analysis technique to discover interesting trends or patterns in data, e.g., groups of consumers based on their behavior. In a broad range of application areas, such as cyber security, e-commerce, mobile data processing, health analytics, user modeling and behavioral analytics, clustering can be used. In the following, we briefly discuss and summarize various types of clustering methods

### 3.4 Partitioning methods:

Based on the features and similarities in the data, this clustering approach categorizes the data into multiple groups or clusters. The data scientists or analysts typically determine the number of clusters either dynamically or statically depending on the nature of the target applications, to produce for the methods of clustering. The most common clustering algorithms based on partitioning methods are K-means, K-Mediods, CLARA etc.

### 3.5 Hierarchical-based methods

Hierarchical clustering typically seeks to construct a hierarchy of clusters, i.e., the tree structure. Strategies for hierarchical clustering generally fall into two types: (i) Agglomerative—a "bottom-up" approach in which each observation begins in its cluster and pairs of clusters are combined as one, moves up the hierarchy, and (ii) Divisive—a "top-down" approach in which all observations begin in one cluster and splits are performed recursively, moves down the hierarchy, Our earlier proposed BOTS technique, Sarker et al. is an example of a hierarchical, particularly, bottom-up clustering algorithm.

### 3.6 K-means clustering

K-means clustering is a fast, robust, and simple algorithm that provides reliable results when data sets are well-separated from each other. The data points are allocated to a cluster in this algorithm in such a way that the amount of the squared distance between the data points and the centroid is as small as possible. In other words, the K-means algorithm identifies the k number of centroids and then assigns each data point to the nearest cluster while keeping the centroids as small as possible. Since it begins with a random selection of cluster centers, the results can be inconsistent. Since extreme values can easily afect a mean, the K-means clustering algorithm is sensitive to outliers. K-medoids clustering is a variant of K-means that is more robust to noises and outliers.

## 3.7 Reinforcement Learning

Reinforcement learning (RL) is a machine learning technique that allows an agent to learn by trial and error in an interactive environment using input from its actions and experiences. Unlike supervised learning, which is based on given sample data or examples, the RL method is based on interacting with the environment. The problem to be solved in reinforcement learning (RL) is defined as a Markov Decision Process (MDP), i.e., all about sequentially making decisions. An RL problem typically includes four elements such as Agent, Environment, Rewards, and Policy.

## 4.  ARTIFCIAL NEURAL NETWORK AND DEEP LEARNING

Deep learning is part of a wider family of artifcial neural networks (ANN)-based machine learning approaches with representation learning. Deep learning provides a computational architecture by combining several processing layers, such as input, hidden, and output layers, to learn from data. The main advantage of deep learning over traditional machine learning methods is its better performance in several cases, particularly learning from large datasets. The most common deep learning algorithms are: Multilayer Perceptron (MLP), Convolutional Neural Network (CNN, or ConvNet), Long Short-Term Memory Recurrent Neural Network (LSTM-RNN). In the following, we discuss various types of deep learning methods that can be used to build effective data-driven models for various purposes.

## 4.1 Applications of Machine Learning

In the current age of the Fourth and fifth Industrial Revolution, machine learning becomes popular in various application areas, because of its learning capabilities from the past and making intelligent decisions. In the following, we summarize and discuss ten popular application areas of machine learning technology.

**4.2 Predictive analytics and intelligent decision-making:** A major application field of machine learning is intelligent decision-making by data-driven predictive analytics. The basis of predictive analytics is capturing and exploiting relationships between explanatory variables and predicted variables from previous events to predict the unknown outcome. For instance, identifying suspects or criminals after a crime has been committed, or detecting credit card fraud as it happens. Cyber security is one of the most essential areas of Industry 5.0, which is typically the practice of protecting networks, systems, hardware, and data from digital attacks.

## 4.3 Traffic prediction and transportation

Transportation systems have become a crucial component of every country's economic development. Nonetheless, several cities around the world are experiencing an excessive rise in traffic volume, resulting in serious issues such as delays, traffic congestion, higher fuel prices, increased CO2 pollution, accidents, emergencies, and a decline in modern society's quality of life. Thus, an intelligent transportation system through predicting future traffic is important, which is an

indispensable part of a smart city. Accurate traffic prediction based on machine and deep learning modeling can help to minimize the issues. For example, based on the travel history and trend of traveling through various routes, machine learning can assist transportation companies in predicting possible issues that may occur on specific routes and recommending their customers to take a different path.

**4.4 Healthcare and COVID-19 pandemic:** Machine learning can help to solve diagnostic and prognostic problems in a variety of medical domains, such as disease prediction, medical knowledge extraction, detecting regularities in data, patient management, etc.. Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus, according to the World Health Organization (WHO). Recently, the learning techniques have become popular in the battle against COVID-19. For the COVID-19 pandemic, the learning techniques are used to classify patients at high risk, their mortality rate, and other anomalies. Deep learning also provides exciting solutions to the problems of medical image processing and is seen as a crucial technique for potential applications, particularly for COVID19 pandemic. Overall, machine and deep learning techniques can help to fight the COVID-19 virus and the pandemic as well as intelligent clinical decisions making in the domain of healthcare.

**4.5 Ecommerce and product recommendations**

Product recommendation is one of the most well known and widely used applications of machine learning, and it is one of the most prominent features of almost any e-commerce website today. Machine learning technology can assist businesses in analyzing their consumers' purchasing histories and making customized product suggestions for their next purchase based on their behavior and preferences. E-commerce companies, for example, can easily position product suggestions and offers by analyzing browsing trends and click-through rates of specific items. Using predictive modeling based on machine learning techniques, many online retailers, such as Amazon, can better manage inventory, prevent out-of-stock situations, and optimize logistics and warehousing. The future of sales and marketing is the ability to capture, evaluate, and use consumer data to provide a customized shopping experience.

## 5. CONCLUSION

In this paper, we have conducted a comprehensive overview of machine learning algorithms for intelligent data analysis and applications. According to our goal, we have briefy discussed how various types of machine learning methods can 160 Page 18 of 21 SN Computer Science (2021) 2:160 SN Computer Science be used for making solutions to various real-world issues. A successful machine learning model depends on both the data and the performance of the learning algorithms. The sophisticated learning algorithms then need to be trained through the collected real-world data and knowledge related to the target application before the system can assist with intelligent decision-

making. We also discussed several popular application areas based on machine learning techniques to highlight their applicability in various real-world issues. Finally, we have summarized and discussed the challenges faced and the potential research opportunities and future directions in the area. Therefore, the challenges that are identifed create promising research opportunities in the feld which must be addressed with efective solutions in various application areas. Overall, we believe that our study on machine learning-based solutions opens up a promising direction and can be used as a reference guide for potential research and applications for both academia and industry professionals as well as for decision-makers, from a technical point of view.

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# ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING BASED APPROACH ON FOOD RECOGNITION AND NUTRIENTS SCIENCE RESEARCH FOR HEALTH CARE

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## ABSTRACT

Artificial intelligence (AI) as a division of computer technology, the intention is to replicate the thought processes, knowledge based management and the learning abilities, finds enormous applications in investigational and clinical and health care system. In recent decades, there has been an extension of AI based applications along with Machine Learning (ML) in the field of biomedical, health and food sciences. The potential of artificial intelligence and ML in the field of medical diagnostics, risk calculation, food safety, health care and support of therapeutic methods are increasing rapidly. The objective of the paper is to examine the current use of AI application in nutrients science research and health care system. It represents how the computer-based decision procedures, under the broad umbrella of artificial intelligence (AI) and ML, which can assists in improving health and health care. a novel system based on machine learning that automatically performs accurate classification of food images and estimates food attributes. Although advanced statistics and machine learning provide the foundation for AI, there are currently revolutionary advances underway in the sub-field of neural networks. This has created tremendous excitement in many fields of science, including in medicine and public health.  Deep learning (DL) algorithms prevailed in a group of research works on clinical nutrients intake. The development of dietary systems using AI technology may lead to the creation of a global network that will be able to both actively support and monitor the personalized supply of nutrients. The paper designs a prototype system based on the client server model. We experimented with a variety of food categories, each containing thousands of images, and through machine learning training to achieve higher classification accuracy.

## 1. INTRODUCTION

Recent days, all peoples are extremely keen on calculating the weight, diet for health, and keeping away from the obesity, mounting demand for the food calorie dimension. Increase in adult fatness is at frightening rate. One of the reasons for the obesity is the dissimilarity between intake of dietary and people's energy that have been got from the diet. High-calorie intake may be injurious and lead to various diseases. Prostate, the breast, cancers and colon are basis of intake high calorie foods. This problem is the second important source of affecting cancer. Dietitians have gritty that the typical intake of a quantity of calories is necessary to maintain the correct balance of the calories in the

human being. As per information by the WHO, more than 1150th of the grown population in the globe is overweighed. Fatness is a health condition in which surplus body fat has mount up to the point that it might have a harmful effect on the health.

Fatness and being plump are interrelated to many chronic and hazardous diseases. In 2017, the American Medical Association formally stated that the obesity as the syndrome that has severe consequences on the patients healthiness and so it needs the medical treatment. So, every day intake capacity is very important for trailing weight and so that maintaining a healthy weight and diet for the normal people. This can be achieved by timely amount of daily food utilization which can makes fat people to lose weight in a better way, and be able to make healthy people better healthy.

The literature analysis was done by the PubMed. A total of 435 records published between 1992 and 2020 were acquired, after examine the contents, 275 were rejected. In the next level, the remaining proceedings were analyzed and, from which 62 papers were selected. These articles were separated into three research areas: AI in biomedical nutrients and research (22 studies), AI in clinical based nutrients research (28 studies) and AI in nutritional epidemiology (12 studies). It was initiate that the artificial neural network (ANN) based methodology was very dominant in the group of investigation on food composition reading and nutrients production. But, machine learning (ML) algorithms are extensively used in majority of the influence in nutrients and functioning of the human body in identifying diseases and health monitoring.

In recent years, a escalating interest in and apprehension over the use of artificial intelligence (AI) in medical and healthcare has stood at the centre of interdisciplinary political debate, scientific research, and the social activism. The objective of this paper is to elucidate the various areas in which AI can contribute towards medical and healthcare field, identify the most important risks connecting to its application in this high-stakes and quickly-changing field, and current policy decisions to counteract these risks, in order to optimize the use of biomedical based AI. Not only will this ensure the safety and respectful treatment of patients receiving AI-mediated healthcare, it should also aid the clinicians and developers involved in implementing it.

## 2. SYSTEM DESIGN AND IMPLEMENTATION

The system design, system flow and implementation along with its results and evaluation are shown in this chapter. The aim of this demonstration is to throw light on the components, flows, and tools that we have used while implementing our system and their collaborative working to get the desired results and functionalities. Methodology This study employs an interdisciplinary methodology based on a comprehensive (but nonsystematic) literature review and analysis of existing scientific articles, white papers, recent guidelines and regulations, governance proposals, AI studies, and online publications. The multidisciplinary resources examined for this report include works from the fields of computer science, biomedical research, the social sciences, biomedical ethics, law, industry, and government reporting. This report explores a wide range of technical obstacles and solutions, clinical studies and results, as well as government proposals and consensus guidelines. Specific applications of AI in medicine and healthcare This study first outlines the potential for AI in medicine to

address pressing issues, in particular the ageing population and the rise of chronic diseases, a lack of health personnel, inefficiency of health systems, lack of sustainability, and health inequities. The report also details the different fields in which biomedical AI could make the most significant contributions: 1) clinical practice, 2) biomedical research, 3) public health, and 4) health administration.

In the realm of clinical practice, the report goes into further detail concerning specific contributions – both realised and potential – to particular medical areas such as radiology, cardiology, digital pathology, emergency medicine, surgery, medical risk and disease prediction, adaptive interventions home care, and mental health. In biomedical research, the report details the potential contributions of AI to clinical research, drug discovery, clinical trials, and personalised medicine. Lastly, the report presents potential contributions of AI at the public health level as well as to global health. Risks of AI in healthcare. The below diagram demonstrates the role of AI in health care.
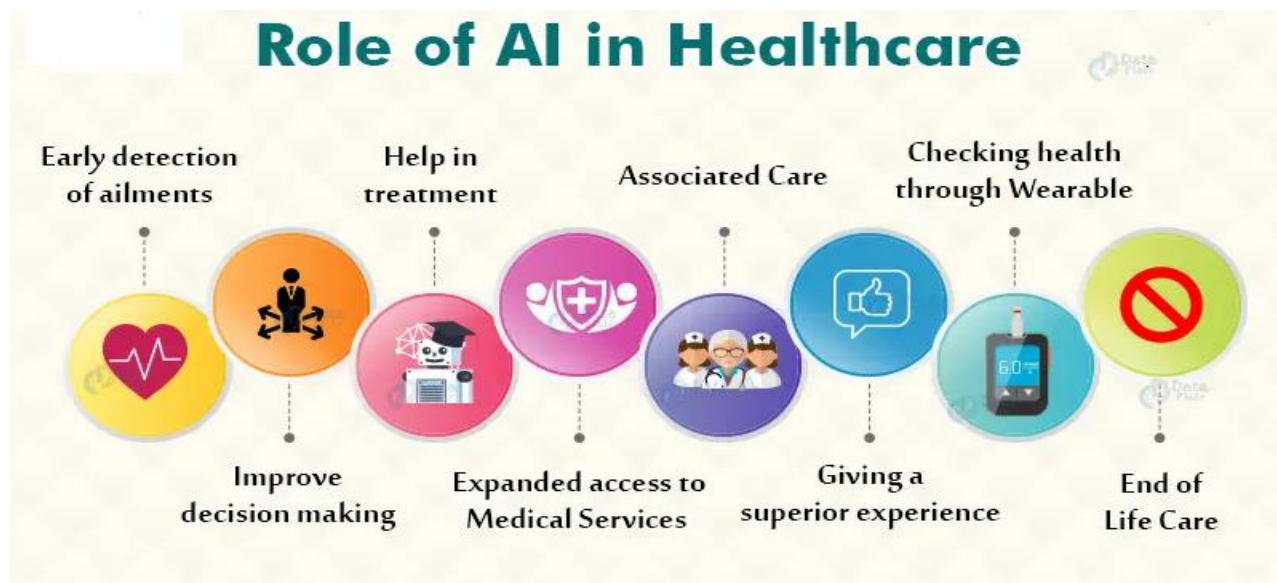


**Figure 1: Role of AI in Healthcare**

This study identified and clarifies seven main risks of AI in medicine and healthcare: 1) patient harm due to AI errors, 2) the misuse of medical AI tools, 3) bias in AI and the perpetuation of existing inequities, 4) lack of transparency, 5) privacy and security issues, 6) gaps in accountability, and 7) obstacles in implementation. Each section, as summarized below, not only describes the risk at hand, but also proposes potential mitigation measures. Patient harm due to AI errors The study explains the main causes of AI errors: noise in AI clinical inputs and measurements, data shift between AI training data and real-world data, and unexpected variations in clinical contexts and environments. The medical consequences of such errors may include missed STOA | Panel for the Future of Science and Technology II diagnosis of life-threatening conditions as well as false diagnosis, leading to inadequate treatment and incorrect scheduling or prioritization of intervention.

Misuse of biomedical AI tools AI tools, even when accurate and robust, are dependent on how human beings use them in practice and how the results they produce are used; in the

healthcare context, these human factors include clinicians, healthcare professionals and patients. Incorrect usage of AI tools can result in incorrect medical assessment and decision making, and subsequently in potential harm for the patient. Potential causes of AI misuse include limited involvement of clinicians and citizens in AI development, a lack of AI training in medical AI among healthcare professionals, lack of awareness and literacy among patients and the general public, and the proliferation of easily accessible online and mobile AI solutions without sufficient explanation and information. Risk of bias in medical AI and perpetuation of inequities systemic human biases often make their way into AI models, including widespread and rooted bias based on sex and gender, race and ethnicity, age, socioeconomic status, geographic location, and urban or rural contexts. The most common causes of AI biases in the healthcare sphere are due to biased and imbalanced datasets which may be based on structural bias and discrimination (systemic discrimination that is imbedded in the ways that data is collected or the ways in which doctors treat their patients) and disparities in access to quality equipment and digital technologies, as well as lack of diversity and interdisciplinary in technological, scientific, clinical, and policymaking teams. Impact of different factors on risk is highlighted below.
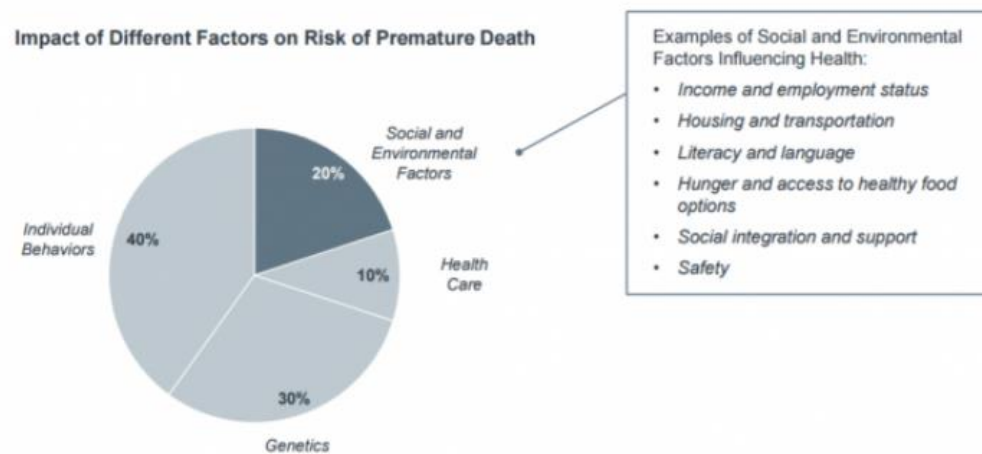


**Figure 2: Impact of different factors on risk of Premature Death**

The increasingly widespread development of AI solutions and technology in healthcare, recently underscored by a reliance on big data during the Covid-19 pandemic, has highlighted the potential risks of a lack of data privacy, confidentiality and protection for patients and citizens. The main risks for data privacy and security in AI for healthcare, including personal data sharing without fully informed consent, data repurposing without the patient's knowledge, data breaches that could expose sensitive or personal information, and the risk of harmful – or even potentially fatal – cyber attacks on AI solutions, at both individual and hospital or health-system level. Gaps in accountability 'Algorithmic accountability' are a crucial aspect of trustworthy and applicable AI in the field of healthcare. However, legal lacunae continue to exist in current national and international regulations concerning who should be held accountable or liable for errors or failures of AI systems, especially in medical AI. Different

algorithms and approaches to AI in health and health care system is shown below.
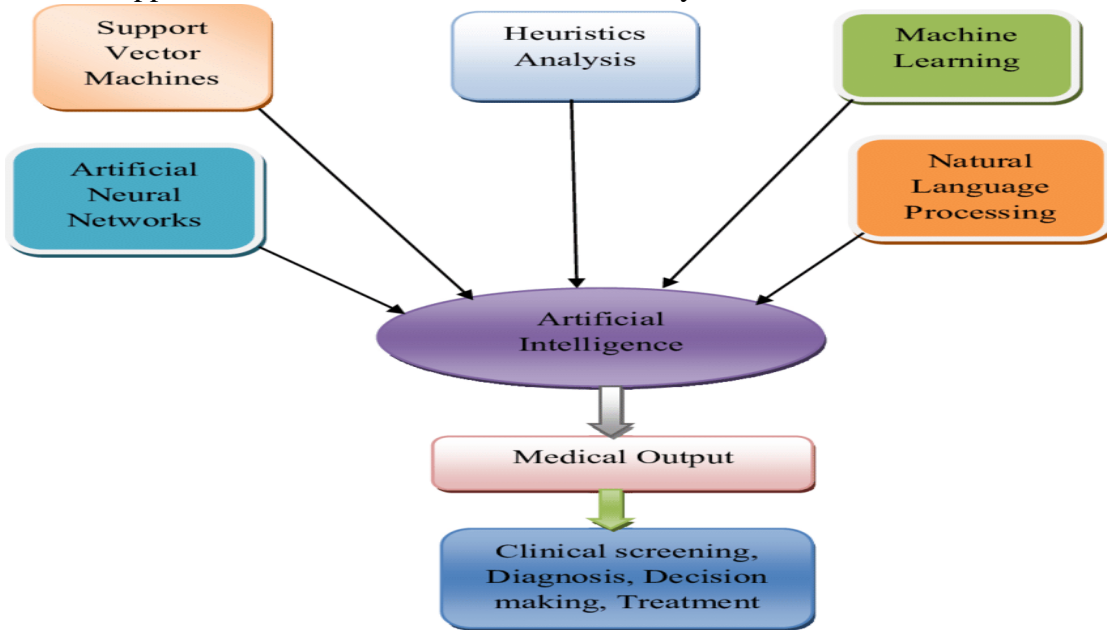


**Figure 3: Different algorithms of AI**

The European Commission proposal for AI regulation is general for all domains of society and does not take into accounts the specificities and risks of AI in the healthcare domain, contrary to the MDR and IVDR regulations. Furthermore, the European Commission proposal retains of some of the limitations of the MDR and IVDR, such as the lack of mechanisms to address the dynamic nature and continuous learning of medical AI technologies. Risk minimization through risk self-assessment For risk identification in AI, several stakeholders have suggested a self-assessment, structured approach composed of specified checklists and questions. For example, the independent HighLevel Expert Group on Artificial Intelligence (AI HLEG), established by the European Commission, published an assessment checklist for trustworthy AI called ALTAI. The checklist is structured around seven categories: (1) human agency and oversight; (2) technical robustness and safety; (3) privacy and data governance; (4) transparency; (5) diversity, non-discrimination and fairness; (6) environmental and societal well-being; and (7) accountability.    n the future regulatory framework, the validation of medical AI technologies should be harmonized and strengthened to assess and identify multi-faceted risks and limitations by evaluating not only model accuracy and robustness but also algorithmic fairness, clinical safety, clinical acceptance, transparency and traceability. 2. Promote multi-stakeholder engagement and co-creation throughout the whole lifecycle of medical AI algorithms For the future acceptability and implementation of medical AI tools in the real world, many stakeholders beyond AI developers – such as clinicians, patients, social scientists, healthcare managers and AI regulators – will play an integral role. Hence, new approaches are needed to promote inclusive, multi-stakeholder engagement in medical AI and ensure the AI tools are designed, validated and implemented in full alignment with the diversity of real-world needs and contexts.

AI-based systems or autonomous systems are extensively applied in approximately every portion of the technology. It enables the world to efficiently optimize the problems, computerize the food industry, and transfigure food industries products [3]. By using a computerized system, the industry can examine and make sure the most favourable circumstances such as seed selection, crop monitoring, watering, and temperature monitoring can be improved, which will provide excellence of the food industry products [4, 5]. The use of AI is not limited to these things only. It can also be helpful in food processing, storage, and delivery of food items. Intelligent gadgets such as robotics and intelligent drones can also play a very crucial and significant role in minimizing the packaging cost. It will also help in delivering the food products, completing the task in perilous surroundings, and also providing very-good-quality products [6–8]. The important roles of AI in food industries can be broadly classified into two classes: one is food security management, and another one is food quality management. The area under each class is given in Figure 1. By keeping every aspect of AI in the food industry, this study provides a literature study of machine learning and AI in the food industry.
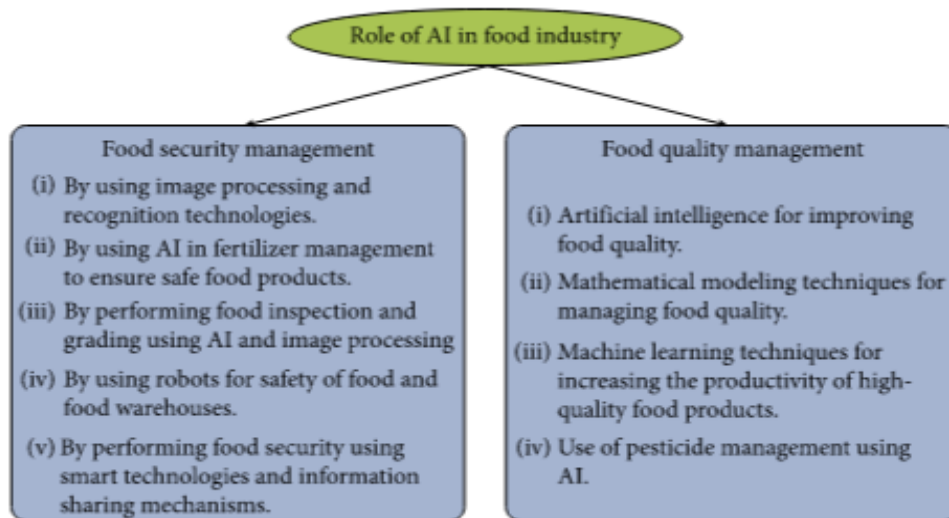


**Figure 4: Role of AI in food industry**

Another way to bolster accountability is through periodic audits and risk assessments, which can be used to evaluate how much regulatory oversight a certain AI tool might need. To this end, the assessments must be conducted through the whole AI pipeline, from data collection, to development, to pre-clinical stages, to deployment, but also when the tools are in use. 5. Introduce education programs and campaigns to enhance the skills of healthcare professionals and the literacy of the general public in medical AI To increase adoption and minimise error, future medical professionals should be adequately trained in medical AI, including its advantages in terms of improving care quality and access to healthcare, and its limitations and risks. It is therefore time to update educational programs in medicine and increase their interdisciplinary. AI in food processing s shown below.
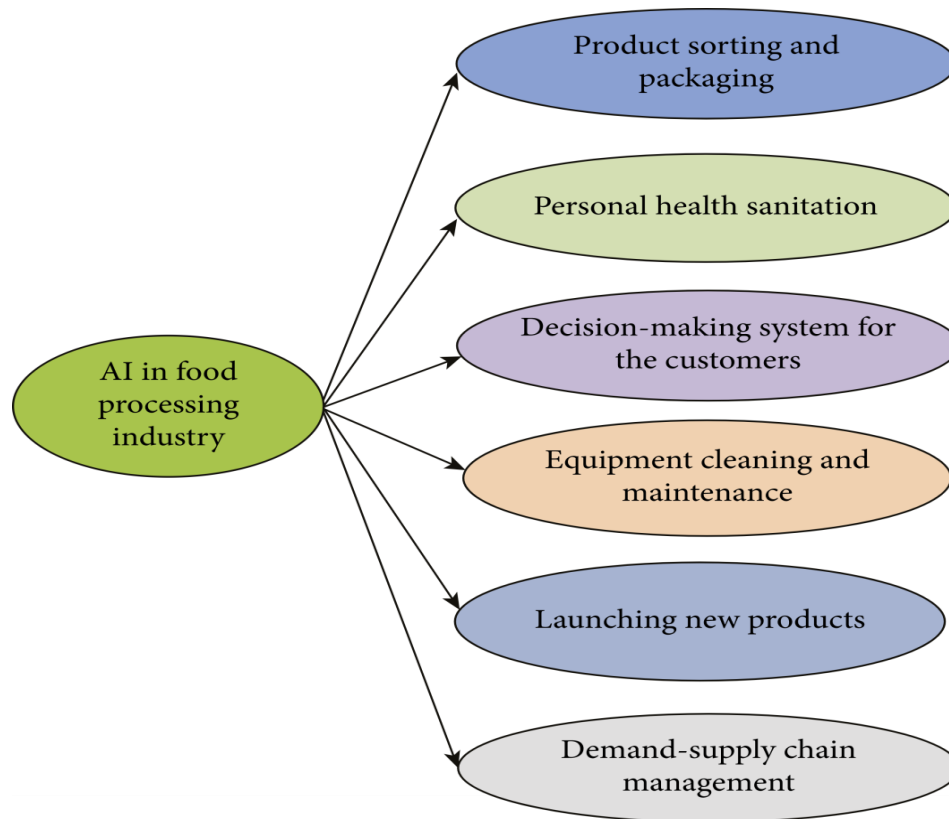
**Figure 5: AI in food processing industry**

Furthermore, there is an urgent need to increase the AI literacy of the public so that citizens and patients can empower themselves and thus better take advantage of the benefits of emerging medical AI tools; increased AI literacy will also help minimize the potential risk of misuse of the AI tools, especially during remote monitoring and care management. 6. Promote further research on clinical, ethical and technical robustness in medical AI There is a need for further research on the interrelated areas of medical AI to address the current clinical, socio-ethical and technical limitations. Examples of areas for future research include explain ability and interpretability, bias estimation and mitigation, and secure and privacy preserving AI. More research is also needed to develop adaptation methods that can ensure a high level of generalisability of future AI tools across population groups, clinical centers and geographical locations. Future AI solutions for healthcare should be implemented by integrating uncertainty estimation, a relatively new field of research that aims to provide clinicians with clinically useful indications on the degree of confidence in AI predictions.

## 3. PRE-TRAINED MODEL SELECTION

Here we divide our proposed methodology intro three separate parts. The first part has to deal with the transfer learning-based CNN models, the second part has to do with the text recovery from different sources while the third part has to deal with the text data training.

### 3.1 PRE-TRAINED CONVOLUTIONAL NEURAL NETWORK MODEL

A pre-trained network model is used in machine learning to overcome the problem that the system gets stuck in local solution while in its training age. These models can carry out machine training to respond immediately to different data. A CNN model that we used in our suggested process of transferring learning -based food recognition and extraction attributes uses a variety of food items from our prepared dataset to get different characteristics from an object [5].

### 3.2 DATASET PREPARING AND PER-PROCESSING PHASE

To obtain the needed characteristics from the images of various foods we assign for our research, we categorize each image into its corresponding class. To this end, with the help of different attributes, we distinguish each and every class. For our study, the size of the text data we receive from the internet is nearly 1.8 GB. We used two completely different frameworks to gather data. Common Crawl [6] is the first and Scrapy [7] is the second. We collected about 100 MB of data using Scrapy while using Common Crawl we collected 1.7 GB of data.

The dataset we created includes hundreds and thousands of pictures of various foods. For our research study, some images are relevant and some are not. Filtering the data set is remarkable in the preparation of a model. We use the Data Augmentation concept to improve the efficiency of training data. We perform image transformation in data augmentation [8]. To train transformation parameters, we implement Spatial Transform Network [9]. Once the training is complete, these parameters are applied to the image of the food and the image is transformed.

### 3.3 TEXTUAL DATA MODEL TRAINING

Word2Vec is a machine learning tool that helps us for the computation of vector representation of different words. Word2Vec is a two-layer neural network which is used as the substitution of the clustering algorithm because World2Vec is much powerful algorithm than the clustering algorithm [10]. During this study, we used word2vec, continuous Bag of words and skip Gram for the training of text data. For the extraction of attributes and ingredients, first, we classify and divide the attributes according to our requirements. This classification and division are helpful when we find the distance of attributes and ingredients with respect to their corresponding classes. In order to find the distance of attributes and ingredients, the procedure that we follow is the fixation of food class and then iterate all attributes and ingredients against it.

### 4. RESULTS AND EVALUATION

As we know explained above that before the classification of pictures that our dataset has, we need to train our system. For creating the environment, we are using the Linux based operating system. Before creating the Anaconda environment, we need to install the Anaconda python distribution, python 2.7 and python 3.6 version. For installing Anaconda, we follow some commands [11]. Once the Anaconda is installed, we will create two environments with python 2.7 and python 3.6 using commands. After the environment is created we will activate the environment using the command. After the environment is

activated then we will install the necessary packages of Theano, Pygpu, and Keras inside the environment files [12].

**Table 1. Comparison of models in terms of Single and Multiple Crops**

| Model | | Top-1 | Top-2 | Top-3 | Top-5 |
|---|---|---|---|---|---|
| Inception V3 | Single corpus | 79.8% | 87.9% | 91.6% | 95% |
| | Multiple corpus | 89.12% | - | - | 98.31% |
| Inception V4 | single corpus | 83.8% | 89.8% | 92.4% | 94.7% |
| | multiple corpus | 91.73% | - | - | 98.56% |
| V4-101 | single corpus | 78.3% | 85.4% | 88.2% | 91.2% |
| | multiple corpus | - | - | - | - |

We selected the CNN model based on Inception-v3 and Inception-v4 as they perform better than other models on our proposed problem domain. These models are fine-tuned on our own created datasets as well as Food-101 datasets in order to perform a comparison.
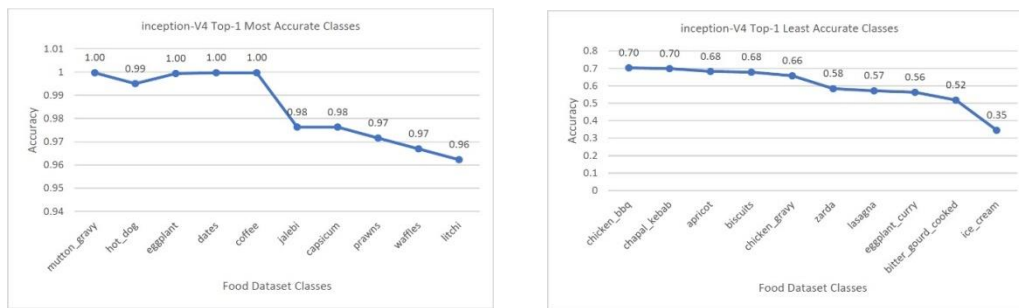


**Figure 3. (a) Top-1 most accurate of inception-v4 model (b) Top-1 least accurate class**
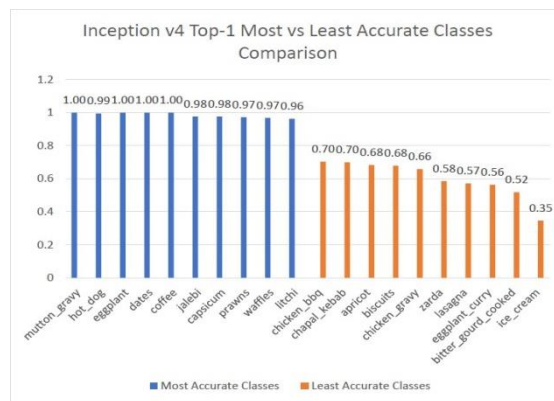


**Figure 4. Comparison of top-1 most vs least accurate classes**
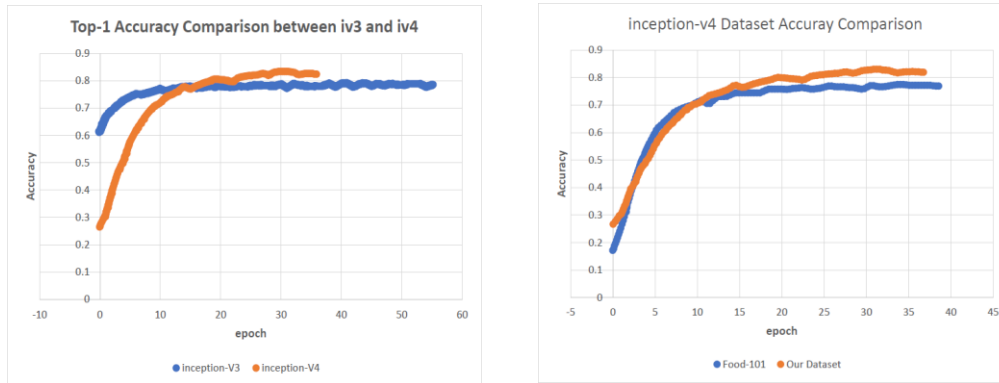
**Figure 5. (a) Top-1 accuracy comparison; (b) Inception-v4 model based performance**

## 4.1 DRAWBACKS AND IMPROVEMENTS

In this section, we will explain the drawbacks current and improvements as future work.

### 4.1.1 Recognition and Detection of various food

Current systems do not adequately identify and process mixed physical images. They do not involve cooking foods, liquid foods, and composite foods such as salads and sandwiches. In future research, a mixed food image and a cooking-like physical image are processed by combining image segmentation techniques to solve the phenomenon that the image has oblique edges or each other causes the recognition detection to fail.

### 4.1.2 Enhancement of Systems and Datasets

Data sets and features have a great impact on the detection results. Existing data sets are not sufficient and contain limited parameters such as different lighting conditions, camera angles, different backgrounds, etc. In future research, better review techniques [13] should be used to review various types of data sets. In addition, the system and application are optimized architecturally, and a database for storing calculated values, food labels, and other parameters is combined with a faster lookup technique to process the image.

### 4.1.3 Calories Awareness and Nutrition aware

It is important to understand calorie calculations and their importance. Literature [13] describes the problems in the field based on the small fast food questionnaire, and the literature uses game methods to obtain more informational foods and calorie values. In order to better nurture the basic awareness of calorie calculations between users, it can be extended by introducing new calories to measure nutritional characteristics and combing with deep learning techniques.

## 5 CONCLUSION

Currently, fatness is a major issue in human life. Curiosity is found among people to measure their heaviness and healthy eating in order to avoid overweightness. So, this paper

presents a novel system that tells us the information about the type of food we eat and its attributes. Using various AI and ML technique food analyzing, awareness, risk, health and safety based aspects are analyzed. This system takes the image of the food from the user and after correct classification, the system will tell us about the attributes of the food. A dataset that consists of a common meal of Food-101 and our subcontinental food has been used in our system. We have fine tune the Inception V-3 and V-4 model to recognize the food items and also proposed a method to measure the attributes of the food using the attribute estimation model. The results are enhanced via data augmentation, multi-crop, and similar techniques. Our proposed method for classification as well as for the extraction of attributes achieves a considerably high accuracy of 85 %. We have also described the possible improvements and the future work to enhance the usability and accuracy of the system.

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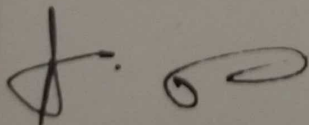
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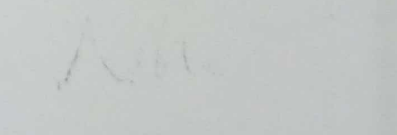SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
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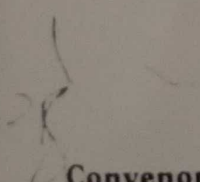Data Science and Business Systems

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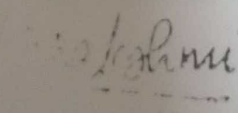
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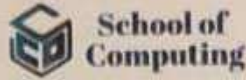KATTANKULATHUR - 603 203

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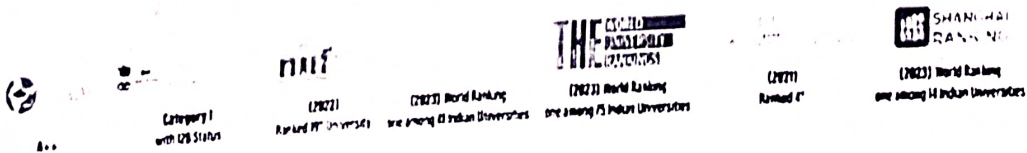
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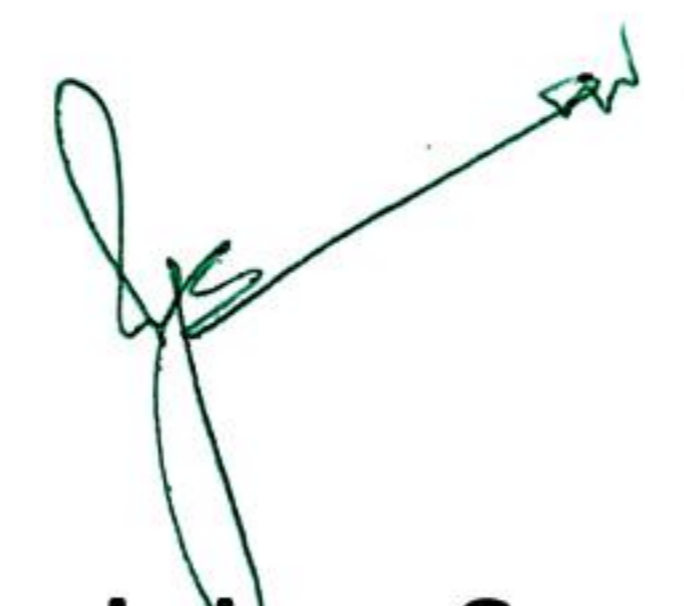
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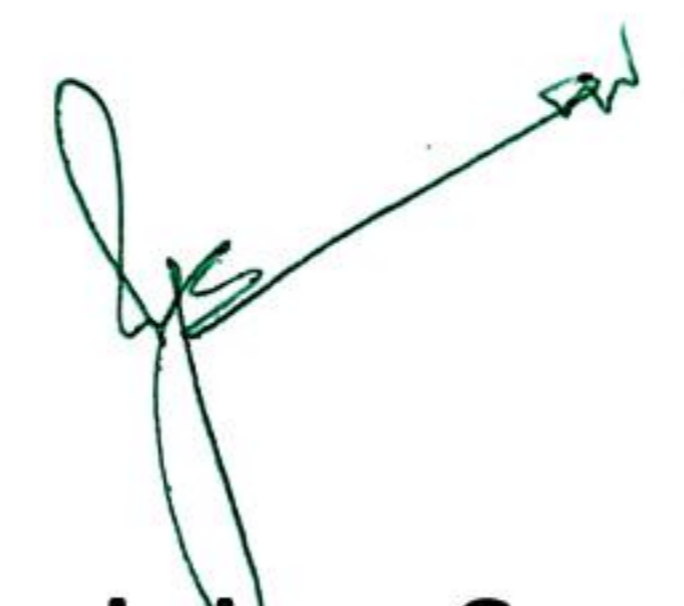
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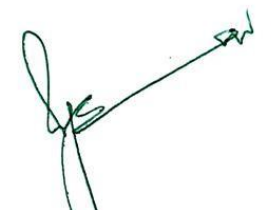
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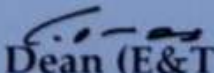
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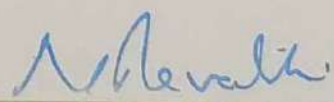
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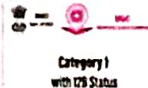
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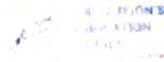
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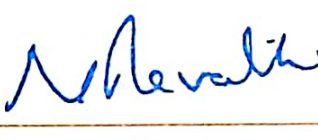KATTANKULATHUR - 603 203

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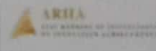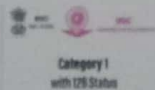
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## Materials Today: Proceedings

# Study on Al 2024, Sic and lithium metal matrix composites in heat treatment process

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## Abstract

The present research work is to identify the properties of Al2024 composite reinforced with lithium and silicon nitride to make it applicable for automobiles and aerospace applications. An effort was made to minimize the density and increased in hardness and other mechanical properties of Al2024 material with entity of and various reinforcement used multi casting techniques in non-reactive environmental stage. The morphological image is mentioned in thickness of materials, hardness strength, and impact strength also various mechanical properties matrix materials were analysed. The microstructure study reveals the uniform dispersion of reinforcements in the matrix alloy. The result shows that increasing mechanical properties which is added the silicon powder particles. Also the density is abridged because of added the lithium powder particles. The metal matrix composite makes it suitable for light weight and high strength applications.

## Introduction

In composite material the data expected to decipher the outcomes gotten will be momentarily introduced. These are: the overall attributes of aluminum combinations what's more, those of type 2024 compounds, the technique and working strategy utilized, the outcomes got and their certified investigation [1], [2], [3] In this effort, we concentrated on the changes including intelligent ($\theta''/S''$), semi coherent ($\theta'/S'$), and disjointed ($\theta/S$) hastens framed through heat treatment of the tempered nano powder particles of Al 2024

delivered by cryogenic processing. The encourages structure done the widespread temperature range was (250–450°C) contingent upon synthetic synthesis. The Heat treatment handled powder was done with the three special temperatures (250, 350 & 450°C) X-beam diffraction investigation at the heat treated and processed powders. [4]. In most aluminum–silicon-based kick the bucket projecting composites, iron is thought about perhaps the most hurtful component. Lessening the development of the b-AlFeSi stage has the capability of altogether working on the pliability of pass on projecting combinations. Trial results demonstrate that assuming heat treatment temperature drives till450°C, the highest temperature lessen arrangement [5]. The drive for ceaselessly working on the exhibition and expanding the competences of the marine transportation has brought about the advancement of another combination, alloy A362. The new model gear case stayed exposed to Mercury Marine's normal help positions which brought about the untimely disappointment of the model. Luckily, T5 heat treatment test has decreased the extent to the stress beside roughly half. This examination article portrays the impacts for the T5 heat treatment test has been in size division along with microscopic of intermetallic, by means offline the ductile presentation in the composite. It's observed T5 heat treatment prompted just slight expansions of capacity part of the bearings intermetallic, prompting comparable ductile properties to do together and T5 state. Outcomes propose that T5 heat treatment can be lighten remaining pressure lacking fundamentally adjusting the mechanical properties of amalgam [6]. The impact on T6 heat treatment in microstructure and hardness in optional semi strong AlSi9Cu3(Fe) amalgam consume stayed explored via utilizing visual, checking. The semi-strong compound was created utilizing the twirled enthalpy equilibration gadget (SEED) [7]. Furthermore, in the transmission electron for microscopic and the hardness testing explored. An outcomes presented in expansion brought about huge refinements by arbitrary direction. Contrasted and Al 2024, a ton amount organization alike stages remained produced that the as-kept TiB2/Al 2024 composite, prompting low pliancy. During the maturing system, Cu component was encouraged and semi-reasonable q' stage was created, working on the impact of reinforcing [8]. To work on the less minimization &restricted amount of powder metallurgy aluminum amalgam materials, cool moving disfigurement on aluminum composite is done. An better mechanical properties essentially came about because of the consolidated impacts of the expanded micro structural smallness and mis shapening reinforcing [9]. In impact of the heat treatment happening the development of oligocyclic weariness lifetime on two sorts of aluminum compounds was considered. The two compounds (2024 and 2024 plated by 1050) are to a great extent utilized in the airplane business due to their benefit mechanical attributes and their softness. The principle element of hotness treatment affecting exhaustion conductors of the composites is the precipitation of Al2Cu the 2024 amalgam dispersion of copper from the center of surface in the 2024 plated metal. Micro structural examinations, like checking electron microscopy and miniature hardness, were completed to notice the micro structural advancement because of hotness treatment [10]. They impact grain development while sintering and may be the work with an development of completely material. The Mechanical processing DSC investigation demonstrated Aggregation of distortion energy through processing proposed prompt an initial change S and Q progressively better dust [11]. The musts of taking solid and light material for some, development is expanding. Aluminum is one of the accouterments that satisfy this prerequisite with different benefits, for illustration, consumption safe and easily framed. By and large, the hardness of aluminum and its mixes is lower than ferrous essences like iron and sword. Aluminum hardness enhancement can be led by heat treatment specifically fake growing in aluminum compound kind 2024 T3 in this study was directed in 2 precipitously eases that's arrangement treatment in 500°C for 1h and go on with the growing process in 180°C by holding time 2, 4 and 6h. From the led exploration, it was observed that there was hardness improvement for aluminum type 2024 T3 in agreement with the expansion of growing time. The acquired microstructure was getting smooth and that implies the rush solidifying process was getting stupendous [12]. Many Al combinations are solidified by the rush of rational, semi-coherent, and ungraspable encourages, which are shaped during heat treatment. In view of the emulsion association of the emulsion, this encourages can shape amongst 100 & 500C and forestall scrap development in

sintering procedure [13]. The examination of the outcomes will be done as far as the nature of the test, and less as far as fulfilling the utilization necessities, in light of the fact that the choice to utilize the compound has a place with the designers and material science trained professionals. In modern applications, aluminum isn't utilized in unadulterated state since it has deficient mechanical and physic chemical properties, however as composites, on the grounds that by alloying it works on its properties. Subsequently, to increment the breaking strength, as far as possible and the hardness, aluminum is alloyed with various components (Cu, Si, Mg and seldom Mn, Ni, Fe, Cr, Zn). Adjusting consistently prompts a lessening in the electrical conductivity of the amalgam comparative with unadulterated aluminum and pliability. Practically speaking, considering the point sought after, a trade off is permitted between the barred properties and the property of most interest [14], [15], [16], [17] multiple strategies command existed created in an field the concentrate metallurgy aimed at creating materials. For a circumstance, it's doable deliver a nano structured Al blend by processing (ball or cryomilling) a pre alloyed precipitate. Further, hot of isocratic squeezing, dynamic combination, hot expatriation, flash tube sintering (SPS) are procedures that be the employed at last get a completely thick material with the minimum grain development.[18], [19], [20], [21], [22] The highest-strengthen heat treated Al composite, Al 2024 offerings great execution, which will be upgraded by precipitated fortifying heat treatment. Hence, Al 2024 has the more extensive improvement intergalactic [23], etc. additional Zr elements for the Al 2024 residue for the Al compound fortifying. It was the observed that holes, breaks remained controlled in the rigidity were extraordinarily moved along. As a changer, TiB2 will in the utilized nucleating specialist to improve grains. Wang et al. [24] utilized TIB2 to upgrade Al 2024, that handled the composite nano powder by DED. Subsequent to the addition of TiB2 nano particles materials, the exhibition fundamentally gotten to the next level. Heat treatment is a significant technique for working on the exhibition of hotness treatable Al compounds. Knowles [25]. In this paper we first done the heat treatment with materials of aluminum mixed with silicon and lithium with the temperature of 250°C, 350°C and 450°C with mechanical properties. and we have done the scanning electron microscopy test.

## Section snippets

## Experimental procedure

The Al-2024SiC and lithium carbide metal matrix composite composites were be created by a pressure less dissolve penetration of a 2024-aluminum alloy Sic and lithium carbide performs. The normal molecule size of the building up sic and $li_2C_2$ powder was viewed as 1.12 mm as assessed by an outward separator.The beginning powder was uniaxially squeezed into bars 1×1 cm in the size, at that point, the green bar were into the some extent sintered below ionize 250°C to 450°C intended for 90 min (…

## Mechanical properties

The effect of the heat treatment mechanical properties for composites remained contemplated. To choose in the time arrangement treatment, the 52% Sic & Lic content composites were solution zed at 450°C at various time stretches, trailed normal maturing for 96h. displays in connection among in the hardness examples too arrangement time, when an examples remained normally matured. Obviously composite. The hardness builds quickly to arrive at the pinnacle solution zing time at140 min. Later this …

## Result and discussion

Accounted for Gupta et al. [10], the credited an expansion for maturing of 2024 composite has improved heterogeneous nucleation reinforcing stages an isolation of Cu from the inter face district. Outcomes

displayed in Table 2.1 uncovered specially an examples don't show a huge contrast in hardness when exposed to normal or counterfeit maturing. Estimated elastic properties for the various circumstances are summed up in Table 4.1. Obviously the arrangement and maturing heat medicines reinforces…

## Conclusion

The cross breed aluminum (Al2024) combination composite was effectively manufactured by consolidating silicon nitride and lithium particulate by base poured mix projecting. At last, the impact of support on mechanical, micro structural, and consumption qualities fined. The mechanical and sem qualities of aluminum (Al2024) amalgam cross breed composite was expanded because of the presence of hard silicon nitride and lithium particles because of appropriate mechanical mixing activity and uniform…

## CRediT authorship contribution statement

**N. Parthipan:** Funding acquisition, Supervision, Writing – review & editing, Writing – original draft, Investigation, Validation, Conceptualization. **G. Navaneethakrishnan:** Methodology. **K. Chellamuthu:** Resources. **A. Thirukumaran:** Data curation. **L. Vigneshwaran:** Formal analysis. **K.R. Arvindha karthik:** Software.…

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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# Study of mechanical behaviour on jute fiber and rice straw reinforced hybrid silica filled composite material

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## Abstract

World is focusing on alternate material resource that are environment friendly and recyclable in nature. Now-a-days, renewable natural fibers provide an alternative polymer composite material instead of synthetic fibers. With several natural fibers such as wheat grass, rice straw fiber, timber powder, jute, hemp is widely used natural fiber for its advantage of ease of availability, low density fiber, low production costs, material properties and the equipment. This study introduces the effect of synthetic filler on silica with natural fiber such as jute fiber and natural fiber as Rice straw Hybrid composites have better properties than single reinforced fiber which is a composite and applied to the application such as Home appliances like(Door), Bed Headboard, Mattress, Panel board for interior walls, Reusable shopping bags. Though the hybrid composite have better strength when compared to single fiber composites. By combining Natural Fiber with synthetic filler which strengthened the fiber matrix interface. The test were taken on sample by means of mechanical test such as Tensile test, Hardness test, morphological study on X ray Diffraction Analysis and Scanning Electron Microscope is done and results were found 90.1Mpa and 78.8Mpa for Tensile and Hardness test by adding 4% of silica.

## Introduction

In modern developing nation, the composite with natural fiber is preferred mostly in academic and industries. This happens because of low cost, low density, light weight, non-toxic, recyclable and eco-

friendly. Rice is the largest cereal crop in which rice straw is the outer covering considered as wastage in agriculture and it can be used as a food for livestock, production of bio-fuel, paper, fertilizer and animal feed. Mostly the wastage are burned and it causes air pollution, to avoid this Rice straw is used commercially. Rice straw technology has been found in recent days in usage material such as shopping bags and cutlery. By carbon footprint of shipping rice straw from North America from Asia somewhat aiming to reduce plastic waste, for that they used rice straw in US for American consumers. The rice straw having high silica content that strengthened the matrix interface [1], [2]. The tensile strength decreases with increase in the filler fraction volume [3], [4], [5]. The treated Rice straw with NaOH solution for 30% volume component with high density [6], [7], [8]. Rice straw at length 12 mm increases the tensile strength of 24.3% [9], [10].

Jute is one of the affordable natural fiber. Jute fiber in composite which increases the tensile strength and having low extensibility [11]. It is also called as bast fiber which jute obtained from the skin of the plant [12]. The hardness of the jute fiber is achieved by treatment by NaOH and H2O2 which removes lignin and impurities makes the matrix and fiber interface strong. After treatment of jute it becomes brown to silvery white due to de-lignifications. Jute fiber length from 10 to 15 mm increases the tensile strength, >15 mm resulting reduction in tensile strength [13], [14].

This is embedded between the resin and the filler. Epoxy Resin which having superior mechanical properties, electrical properties, resistance to corrosive liquid, good adhesion property and good performance at elevated temperature [15], [37]. Silica di oxide used in composite as filler resulting low elongation and high tensile strength [16], [17], [18], [19], [35].

Advantages of Jute fiber having properties of good insulating, low thermal conductivity and moderate moisture absorption. And whereas alkali treated Rice Straw in composite gives better interfacial bonding.

## Section snippets

### Alkaline treatment

Alkaline treatment increases the strength of the fiber [20], [21], [22]. Jute filaments were exposed to treatment with alkaline arrangement (NaOH) at 0, 2, 4, 6 and 8 h at 30 °C. The improvement of translucent jute strands expanded its modulus by 12%, 68% and 79% after treatment for 4, 6 and 8 h individually. misuse diminished by 23% following 8 h of treatment. Of 35% composites with 4 h compact strands, adaptability improved from 199.1 MPa to 238.9 MPa by 20%, the modulus values from…

### Tensile strength test

By giving uniaxial load during testing for two finishes of the layout. sample size of ASTM standard 170x25x3mm. extreme elasticity (UTS) or high strain; offset yield potential (OYS) addresses a point past only the start of a super durable variable; and a crack (R) or a break point where the layout parts into pieces. Tractable testing was acted as per ASTM D E-08 standard 9 arrangements of examples with the AUTOGRAPH – AGS − 2003 standard testing machine with speed of 5 mm/min.

Then the…

### Conclusion

In this project, jute fiber and rice straw supported cross breed silica filled composite material. With the test boundaries taken according to the structure. The combination of Epoxy, jute fiber, rice straw and silica are

mix together to give the accompanying outcomes is not done before with this combination and composition, this is the Novelty of this research. Expansion of the silica filler with NaOH treated normal fiber in a mix of polymer framework shows the high mechanical properties found …

## CRediT authorship contribution statement

**S. Kirubai:** Conceptualization, Methodology. **S. Padmavathy:** Validation. **N. Ganesh:** Investigation. **K. Rajaguru:** Investigation.…

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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# Dissimilar resistance spot welding process on AISI 304 and AISI 202 by investigation metals

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## Abstract

The point of the exploration review was to examine of divergent obstruction spot welding (RSW) process on austenitic tempered steel (304 grade) and austenitic hardened steel (AISI 202 grade) is concentrated tentatively. According to a process by using 304 stainless steel is smart choice for your cost effective in comparison to other materials, due to its durability, ease of fabrication and cleaning, corrosion resistance to oxidation. The impact of cycle boundaries, for example, welding current, welding time, welding pressure and electrode force on elastic shear strength of obstruction spot welded joints are explored with reaction surface approach (RSM). Taguchi method of design experiments was applied. This research work presents the high strength and high corrosive applicants use 304 instead of 202 are used as applications such as kitchen sinks, railway bogeys, automobile trim, chemical containers. The combination of AISI 304 and AISI 202 joined together to give the accompanying outcomes is not done before with this combination and composition, this is the Novelty of this research To achieve corrosion resistance using low grade carbon steel experimental test where taken for samples such as hardness test, tensile shear strength test and morphological characteristics on scanning electron microscope (SEM) where analysed.

## Introduction

Stainless steel materials are used in an enormous amount in next-generation vehicle body manufacturing [2], Marine construction and also it is perfect for construction purposes which can last a long time without being replaced or breaking.Since it is the prevalent corrosion opposition and energy-assimilation capacity to carbon primary steel [4], [5], [6], [7]. The carbon rate can go from 0.03% to 1.2% and has a high measure of chromium. Stainless steel contains at least 10.5% of chromium which helps in further developing corrosion obstruction and strength. The chromium alloy exposed to air creates a detached layer that acts as a shield against all rustproof. Stainless steel is 100% recyclable and maximum production is from scrap metal that's why it is called an eco-friendly material. In this paper the stainless steel used is Austenitic stainless steel, it is in a solid solution of iron and carbon with an elevated temperature of 723°C [8], [9].

Grade 304 Stainless steel has great forming and welding characteristics with or without filler material and it is deep drawn without intermediate annealing and does not require post- annealing when a thin section is welded. SS304 grade has high toughness, even down to cryogenic temperatureIt has great oxidation opposition in discontinuous support of 870°C and nonstop support of 925°C. It is easy to sanitize so most of this is used in kitchen and food applications.The properties are Better corrosion resistance, High ductility, excellent drawing, forming, and spinning properties.Non-magnetic, becomes slightly magnetic when cold worked. Low carbon content means less carbide precipitation in the heat-affected zone during welding and a lower susceptibility to intergranular corrosion.

Stainless steel grade 202 is a type of cr-Ni-Mn has high corrosion resistance, hardness, and strength. The grade 202 hardened steel delivers long, tacky chips. Machining can likewise be acted in the hardened condition [10], [11], [12], [13]. For heat treatment, the material must be drenched at 1038°C for 30min and cooled underneath 16°C for full martensite change. The material can be welded by typical blend and obstruction strategies. Hence the suitable filler is AWS E/ER630. The material easily becomes dirty that should be cleaned using applying a thin coat of olive oil to the stainless steel in a soft cloth mask scratching water spots and repelling smudges [14], [15], [16], [17]. The properties about 50% higher thermal expansion and lower heat conductivity compared to carbon steels. It shows larger deformation and higher shrinkage stresses may result from welding.

## Section snippets

### Welding preparation

SS 302 and 202 hardened steel plates with the elements of 300×150×4 mm that can be Prepared with the slant levels of 4mm, incline point of 450 and welded with a root hole distance 1mm. The filler material use for the preliminary is copper covered MS material terminals with size of 1.20mm width. A protecting gas combination is chosen for the investigations. It contains 20% $CO_2$ and 80% Argon. After readiness, plates are put on the worktable, distance between the spout and work piece and…

### Tensile test

Maximum tensile strength of 199MPa result of the dissimilar finned joint which is 69.7% of the parent metal of stainless steel. The fine chromium particles distributed in the iron part matrix weld region make the weld region a composite-like system. This chromium reinforcement makes a pinning effect for the dislocation motion during the tensile loading. A flat feature-less fracture surface was observed for the SS304&SS202 joint region. Initially, the fracture started from the tunnel defect and …

### Conclusion

In this chapter the findings of experimental investigation on the resistance spot welding of dissimilar austenitic stainless steel AISI 304/AISI 202 spot welded dissimilar joints are summarized. The scope of research in spot welding of AISI 304 and AISI 202 sheet is also discussed. Elaborate research work was conducted to explore the successful RSW of AISI 304/202 stainless steel sheets. RSW process is a complicated process which involved simultaneous interaction of electrical, thermal and…

## CRediT authorship contribution statement

**S. Midhun:** Conceptualization, Methodology. **C. Ramesh:** Validation. **K. Chellamuthu:** Investigation. **R. Yokeswaran:** Investigation.…

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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## Materials Today: Proceedings

# Mechanical behaviour and microstructure analysis of aluminium 2024 and 5052 using friction stir welding

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## Abstract

Friction Stir Welding (FSW) is a solid-state joining technique. It is employed to avoid the melting of aluminium, which is more efficient. The objective of this work is to study the properties of friction stir welded joints with AA2024 and AA5052. A friction stir tool, an H13 cylindrical profile was used. The stir zone evaluates the hardness, wear, and impact tests that are performed. The welded joint's metallurgical characterization was investigated by Optical Microscope and Scanning Electron Microscope. Mechanical tests are hardness, tensile, wear and impact carried out. The hardness increase and impact energy has increased in the weld zone. The corrosion tests are performed on the chemical properties of the welded joints. The process parameters of tool transverse speed and rotational speed were optimized. The aluminium alloys AA2024 and AA5052 are widely employed in various industrial applications.

## Introduction

The solid-state technique that is used here is Friction Stir Welding [1], [2], [3], [4]. The advantage of the technique consumes low energy, and ecological adaptable. Fusion welding is used to weld aircraft with high strength which is considered to be a difficult task. For the past few years, FSW is widely considered to be effective in the joining of metal processes. Modification in microstructure is done while undergo Friction Stir Welding. There is always a challenge in producing aluminium alloy with high strength, flexibility, and resistance to fracture. The aluminium 2024 and 5052 cannot be welded as easily as it is considered to be non-weldable due to their porous formation while welding and solidifying effect on the microstructure of the alloy [5]. Also, there is a challenge that its mechanical properties would reduce below the level of the parent metal. The advantage of using friction stir welding is it does not pollute the environment, its super strength, and flexibility. When comparing FSW to traditional welding methods FSW is more efficient [7]. It is often pronounced to be ecological because there is no emission of gas. Without the usage of filling material, there will not be a great change in material composition. The tests were conducted to find all the changes that are made in alloys after the process of welding. When parent metal is chosen to have high properties the joints were produced defect-free. It has been demonstrated that FSW on aluminium is becoming a more advanced technology.

## Section snippets

## Methodology

Welding is a material-joining procedure. The work materials are melted together with frictional heat and then allowed to cool, resulting in a blend [13]. Lower-temperature procedures such as brazing and soldering, which do not melt the base metal, are not considered welding. Al 2024 and Al 5052 were the alloys of choice. Aluminum alloy 5052 is stronger and has better physical properties than any other aluminum alloy [23]. The 2024 aluminum is easy to manufacture. FSW is investigated to combine…

## Hardness test

The hardness testing is performed on one of the test samples using a Wilson Wolpert Microhardness tester [11], [21]. The Aluminium alloy 2024 and 5052 the Microhardness value is 69.7 HV measured. Each sample was evaluated at four different locations, with the test specimen being exposed to a 0.5 kg weight for 10-second dwell duration at each location. The Hardness result is shown in Table 2. It clearly explains that there are some changes in Hardness after the welding process. The hardness…

## Conclusion

- Defect-free welds produced by friction stir welds were undergone for various tests.…

- In the Hardness test, the weld has increased the hardness strength of the alloys.…

- In the Tensile test, the weld increases the tensile strength of the alloys.…

- The Impact test shows an increase in the impact energy. This can be used in materials that require additional impact energy.…

- From SEM analysis we came to know that after weld there was a lot of porous, debris, and microcrack.…

- The corrosion test concludes that…

…

## CRediT authorship contribution statement

**S. Saravanakumar:** Conceptualization, Data curation. **K. Kalaiselvan:** Formal analysis, Funding acquisition, Investigation. **K.B. Prakash:** Supervision, Validation, Visualization. **M. Parkunam:** Methodology, Project administration, Resources, Software. **S. Niranjan:** . **N. Dharanish:** . **R. Akash:** ….

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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# Design and comparison of the strength of propeller shaft for truck made of AA2024, AA7068, and Ti-6Al-4V using ANSYS

S. Saravanakumar [a], K. Kalaiselvan [b], M. Ramesh [c], K.B. Prakash [d], A. Sundar Rajan [a], T. Subash Chandru [a], M.S. Aravinth [a]

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## Abstract

Now a day in the automobile field, immense interest in the weight-free material, for instance, fabric material developed combination of different macromolecules, is by all accounts a promising answer for this emerging interest. These materials stand out because of the need in the area of vehicles, aircraft, etc. The general goal of this work is to break down an alternate material propeller shaft to increase torque transmission. Subbing alloy material constructions to ordinary designs have numerous benefits on account of higher explicit hardness and strength of composite materials. This work manages the substitution of ordinary steel propeller shafts with an Aluminum alloy (2024 and 7068), Titanium alloy (Ti-6Al-4V) composite propeller shaft for automotive applications. Normally we use SM45C steel for propeller shafts. The intention is that decrease the weight of the propeller shaft. In this research, we estimate the deflection, tension, and other tests taken with weight by utilizing Finite element analysis (ANSYS). The design is done with CATIA V5. Moreover, an examination was done for the load utilizing Finite Element Analysis (FEA) Further comparing both steel and composite propeller shafts.

## Introduction

A propeller shaft is a rod-like structure that provides a rotational movement to the differential unit. The propeller shaft should work by continually differing points between the transmission and hub. It ought to transfer torque from the transmission to the differential box. The propeller shaft ought to, moreover, be

good for rotating at the fast speed expected by the vehicle. The propeller shaft ought to, moreover, manage rapidly differs the focus among the transmission, the differential, and the axels. A common material for development is excellent steel. Because the bowing regular recurrence of a shaft is proportional to the square of bar length and proportional to the square base of the explicit modulus, steel driveshafts are often constructed in two portions to augment the key bowing regular recurrence. Three all-inclusive joints, a cross-place supporting bearing, and a section make up the two-piece steel propeller shaft, which increases the vehicle's total weight. By reducing inertial mass and lightening Hook's weight, power transmission may be improved. The weight reduction of the drive shaft can contribute to the vehicle's total weight reduction and is a very beneficial goal if it can be achieved without increasing costs or sacrificing quality or dependability [1]. Subbing composite structures for customary metallic designs has many benefits due to higher explicit solidness, also, higher explicit strength of composite materials [2], [9], [10], [15]. The substitution of composite material can bring about impressive measures of weight decrease when contrasted with steel shaft [3], [4]. Composite materials may be custom-fitted to satisfy the plan's requirements for solidity and stiffness, and composite drive shafts weigh less than steel or aluminum driveshafts of comparable strength [5], [6], [7], [8]. Utilization of composites in essential primary regions of the vehicle, for example, body structures, has been very restricted to date. Such applications offer an enormous chance for future extension of composites in the automobile industry [11], [13]. One composite component can be made. Two-piece steel drive shaft to leave without all of the party's accomplices Composite materials, on the other hand, often has a lower adaptability modulus. When power peaks in the driveline occur, the driveshaft can act as a defense, reducing strain on a portion of the drive train and so extending its life. Many professionals have studied hybrid drive shafts and ways for combination shafts to reduce the weight of limitless joints. Nonetheless, this project examines the arrangement from numerous perspectives. Driveshaft is used in vehicle, plane, and aeronautics applications. The car industry is taking advantage of composite material innovation for primary parts development to get decrease the load without a decline in vehicle quality and dependability. It is realized that energy preservation is one of the main targets in vehicle plans and a decrease in weight is perhaps the best measure to achieve this outcome. There is right around a direct proportionality between the heaviness of a vehicle and its fuel consumption, especially in city driving. This work manages the examination of customary steel shafts and composite shafts. Results demonstrate how gainful is the substitution of a customary steel drive shaft with Aluminum compound 2024. Aluminum composite 7068, Titanium amalgam TI-6AL-4V, SM45C steel compound propeller shafts for an auto application. To gauge the avoidance, stresses, and normal frequencies under loads utilizing ANSYS. This current work endeavor has been to assess the diversion, stresses, and regular frequencies under oppressed loads utilizing FEA. Further examination was done for both regular and composite shafts. The principal alloying element in the 2024 aluminum alloy is copper. It's employed in applications where a high strength-to-weight ratio and exceptional fatigue resistance are required. The stress corrosion cracking resistance, strength, stiffness, and shearing resistance of 2024 aluminum make it a good choice [17], [18], [19]. This alloy performs well in severe temperatures, whether in the form of a 2024 aluminum plate or 2024 aluminum bars. Although it has a lower resistance to corrosion in the atmosphere when near water, this problem can be overcome by anodizing or other surface treatments [20], [21], [22]. Aluminum 7068 alloy is a wrought aluminum alloy with high thermal conductivity, high fatigue strength, and efficient anodizing response [23], [24], [25] with tensile strength similar to some steels. One of the strongest commercially available aluminum alloys is 7068 aluminum alloy. This material, also known as an aviation alloy, may be heat-treated [26], [27], [28]. SM45C steel bar is a top-notch extinguished and tempered carbon underlying steel that has a place in the low-carbon, low-chromium, low-molybdenum, nickel case-solidifying steel family. The hardness of oil extinguished and tempered steel is 28–34 HRC. The toughness of KS SM45C steel is under 250HB. EN3 Carbon focus is in the medium reach. The SM45C steel bar is an excellent extinguished and tempered carbon underlying steel that has a place in the low-carbon, low-chromium, low-molybdenum, nickel case-solidifying steel family. The hardness of oil extinguished and

tempered steel is 28–34 HRC. The tempering hardness of KS SM45C steel is under 250HB. EN3 Carbon focus is in the medium range [12], [15], [29], [30]. The alpha–beta titanium compound Ti-6Al-4V (UNS assignment R56400), commonly known as TC4, Ti64, or ASTM Grade 5, has high unambiguous strength and superb erosion obstruction. It is one of the most broadly utilized titanium amalgams, and it is used in an assortment of uses that require low thickness and solid erosion obstruction; for example, aviation and biomechanical applications [31], [32]. Ti-6Al-4V consolidates the strength and hardness of steel, what's more, aluminum amalgams, and has a similar solidness as monetarily unadulterated titanium while being a lot more grounded. Diminish the residual tension that was made during the creation cycle (stress relieving) Produce the most ideal blend of malleability machinability and primary and layered solidness (tempering) Strengthen your body (arrangement treating and maturing) Optimize special characteristics counting crack durability, weariness strength, and creep strength at high temperatures [33], [34], [35]. The drawbacks of customary propeller shafts are They have less unambiguous modulus and strength, Expanded weight, Conventional steel propeller shafts are typically made in two parts of increment the fundamental twisting regular recurrence is based on the fact that a shaft's bowing normal recurrence is inversely proportional to the square of bar length and corresponds to the square base of Specific modulus. As a result, the steel propeller shaft is divided into two segments by a support structure, orientation, and U-joints, resulting in a higher overall load of gathering. Its consumption obstruction is less as looked at with composite materials. Steel propeller shafts have less damping limit Many composite materials are involved now daily to overcome this issue, so in this work, we chose to plan and examine the propeller shaft from Aluminum amalgam 7068, Titanium combination, SM45C, Aluminum compound 2024. The alloy propeller shaft's strength and efficiency were calculated using CATIA software for 3D modeling and ANSYS for analysis [14].

## Section snippets

### Design of propeller shaft

See Fig. 1.

The above figure is a propeller shaft that was designed through CATIA software. The version of the software is CATIA V5. The shaft is connected to the transmission and the differential.…

### Boundary condition

See Table 1.

The above table shows the mechanical properties of Aluiminum alloy 2024, Aluminum alloy 7068, Titanium alloy Ti-6Al-4V, Steel alloy SM45C.…

### Input parameters

See Table 2.…

### Static structural analysis of SM45C steel propeller shaft

Fig. 2 shows when the load is applied to the Propeller shaft the deformation takes place at the shaft. The maximum deformation value is 0.0038779 m. The material used for the propeller shaft is SM45C.

Fig. 3 shows when the load is applied to the Propeller shaft the equivalent stress takes place at the shaft. The maximum equivalent stress value is $1.1479 \times 10^9$. The material used for the propeller shaft is SM45C.

Fig. 4 shows when the load is applied to the Propeller shaft the equivalent elastic…

## Tabulation results

See Table 3.…

## Conclusion

Composite materials are used to reduce the weight of conventional materials; its weight saving is in the range of 24–29% when compared to conventional. So we use composite materials for propeller shafts. The primary point of this work is to decrease the fuel utilization of the vehicle or any machines, which utilize drive shafts; for the most part, it is accomplished by utilizing lightweight composite materials. The presented work moreover oversees plan progression i.e. changing north of two…

## CRediT authorship contribution statement

**S. Saravanakumar:** Conceptualization, Data curation. **K. Kalaiselvan:** Conceptualization, Formal analysis, Funding acquisition, Investigation. **M. Ramesh:** Software, Methodology, Project administration, Resources, Software. **K.B. Prakash:** Methodology, Supervision, Validation, Visualization. **A. Sundar Rajan:** Validation, Writing – original draft. **T. Subash Chandru:** Validation. **M.S. Aravinth:** Validation.…

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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# Investigation on mechanical, microstructural and thermal properties of coconut peduncle fibre epoxy resin

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Available online 2 November 2022, Version of Record 16 November 2022.

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## Abstract

Now days the natural composite materials are used in various applications like automobile interior decorations, Air craft applications, Industrial duct production etc… The Coconut peduncle leaf stack fiber (CPLSF) and Multi-Walled Carbon Nano Tubes (MWCNT) are different percentage used such as 0%, 1%, 1.5% and 2% are used to treat the extracted fiber to explore the influence of MWCNT over the properties of fiber. This research work is focused towards determining the static and dynamic mechanical properties and morphological analysis. This coconut peduncle leaf stalk fiber treated with the distilled water and alkaline sodium hydroxide. The length of each specimen's fiber is slized into 3 mm, 7 mm and 10 mm. The flexural, impact and tensile test are conducted to reveal the mechanical properties of the component. Then the further investigation on thermogravimetric analysis (TGA) to confirm the thermal stable to confirm and finalize the presence of impurities over the surface of raw fiber.

## Introduction

Composite substances have played a vital feature in the course of human records, from housing early civilizations to allowing future upgrades. Composites provide many blessings; the key among them are corrosion resistance, layout flexibility, durability, light weight, and power. Composites have permeated our regular lives together with products which are used in buildings, clinical packages, oil and gasoline, transportation, sports activities, aerospace, and lots of greater. Some packages, collectively with rocket ships, likely could not get off the floor without composite substances. This financial disaster addresses the benefits

of fibre composite substances as well as vital effects, product development, and programs of fibre composites, together with material chemistry, designing, production, homes, and utilization of the substances in numerous applications. Devendra et al [1] investigated the mechanical properties of E-glass fibre reinforced epoxy composites filled with various filler materials Sutharsan et al [2] was developed the amount of Al2O3 and MWCNTs in composites increases the composite's hardness. Abhijith et al were completed [3], [4] the composite material was extensively and the result was a highly impressive material with high strength, stiffness, and good energy absorbing properties. Carbon fillers improve tensile, impact, and flexural properties, Jiao-Ping Yang et al [5] was developed the mechanical is the properties important parameters must be improved to meet the high requirements by adding hybrid ceramics. N.Ramesh Babu et al [6], [7] The findings suggest that mechanical, thermal and laminar shear strength properties could be used as an alternative filler to improve resistance. CNTs are now combined with epoxy resins to increase tensile strength and stiffness.This project aims to improve the mechanical and thermal properties of Coconut peduncle leaf stack.

## Section snippets

## Materials and methods

The coconut peduncle leaf stack is removed from the tree as shown in Fig. 1 (a). After that, it's soaked in water for about 24h. The peduncle's outer layers are then removed. The thorns on the sides of the peduncle, as well as the peduncle's skin, were manually removed. After retting the peduncle in water for 20days, the fiber was manually separated from the stalk by gentle hammering. The fiber was then cleaned, washed, and dried to remove any moisture or other impurities that had adhered to…

## Fibre material die preparation

The polymer composite plates are produced using a compression molding method as shown in Fig. 2(a). The polymer composite's weight ratio is computed first. In a beaker, combine the needed amount of resin with the accelerator and mix thoroughly. To produce a mat, the fibre is first taken in the desired quantity, then filled in the die and crushed properly as shown in Fig. 2(b). The Hardener is then blended into the resin mixture before being poured over the mat carefully.…

## Tensile test specimen images

The test specimens were prepared according to ASTM standards. For tensile testing, the ASTM D638 standard is used. The dimensions of prepared test specimens are 165mm×12.7mm×3.2mm as shown in Fig. 3(a,b).…

## Flexural test specimen images

The test specimens were prepared according to ASTM standards. For Flexural testing, the ASTM D790 standard is used. The dimensions of prepared test specimens are 125mm×12.7mm×3.2mm as shown in Fig. 3 (c,d)…

## Impact test specimen

The test specimens were prepared according to ASTM standards. For Impact…

## Result and conclusion

The studies were carried out to learn more about the mechanical properties of nano composites containing MWCNTs. MWCNTs have a higher mechanical property than Coconut Fiber/Epoxy, according to the test results as shown in graphs 2 (a – l).

The tensile test of 1.5 wt% MWCNTs with 7ATCPLSF samples shows that the 7ATCPLSF particles have a higher tensile value than the 3 mm, 7 mm UATCPLSF AND ATCPLSF nano composites. Finally, the tensile value of Nano composites is affected by 7ATCPLSF. The tensile…

## Conclusion

This experiment examined tensile, flexural, and impact properties of Coconut fiber/Epoxy and the mechanical properties of MWCNTs with different glass fibre and was able to draw conclusions based on the outcomes as shown in graphs. 2(a-l). The influence of reinforced Coconut fibre at different mm improves the mechanical behaviour of 1.5 wt% MWCNTs Nanocomposites. Tensile, flexural, and impact properties of UATCPLSF and ATCPLSF reinforced MWCNTs Nanocomposites were significantly altered at 3 mm…

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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# Optimization of process parameters in turning of AISI 1045 steel using GRA ⊘

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# Optimization of Process Parameters in Turning of AISI 1045 Steel using GRA

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**Abstract:** The cutting tool performance was increased by improving their properties of material. This literature review presents the study of HSS, UTC, CTC Uncoated deep cryogenic treated tool and Deep cryogenic treated tool. The minimal work is carried out to analyze the Grey Relational Analysis (GRA) with the AISI 1045 steel in process for turning operation. The results obtain on untreated and deep cryogenic treated tools are compared. The grey relational analysis method is carried with the normalization, grey relational coefficient, deviation sequence, grade. At Final the grade is identified and with Minitab and Design of experiments (DOE) method is analyzed then for which means and signal to noise ratio is identified and rank identified. From the results obtained on the work, it was finalized that the deep cryogenic treated tool was higher up to an untreated tool in all conditions. This tool had a better benefit concerning the lower cutting force, lower cutting temperature, lower flank wear, lower surface roughness and better chip morphology.
**Key words: Stir casting; Heat treatment; Hardness; Grey Relational Analysis.**

## 1. INTRODUCTION

Many years have passed. The development of carbon steel, the first cutting tool material adopted for use in metal cutting process. The next improvement comes along with the cobalt bonded sintered tungsten carbide. The carbides and coated carbide tools cut about three to five times speeder to high speed steels (HSS). The tool materials which are like high-speed steels and carbides prolong to a steady improvement of their properties through changes in their composition by optimizing the processing techniques and the incorporated various latest methods of treatments. It is found that the cutting tool life increased up along with the hardness and toughness by the cryogenic treatment. the engineers looking for to improve the properties of material tools through the reduction in manufacturing cost and high quality of the product at machining. The work aims to conduct the experimental investigation and optimization of the machining parameters for untreated and deep cryogenic treated high-speed steel and tungsten carbide (coated and uncoated) tools on AISI 1045 steel with the turning operation. The analysis of different response such as cutting force, surface roughness flank wear, for improve the quality performance. To optimize parameters on turning using the Taguchi technique through the grey relational analysis approach. The methodology used for the High speed steel tool in the turning of AISI 1045.

## 2. IMPORTANCE OF METAL CUTTING

In machining the most primary and important processes in manufacturing. currently, manufacturing industries that need to meet the requirements of society through a gradual increase in productivity. In Turning process the fundamental machining method for removal of the metal from outer surface of rotating workpiece with help of a cutting tool. cutting tool plays a important role in an any machining process and it is selected by its cost of processing, quality. To improve performance of tool, the properties on material were Improved. In current work the cryogenic treatment used in the tools for extend the tool life.

### 2.1 Objective of work

This work aims to conduct experimental investigation on optimization of machining parameters for the untreated and deep cryogenic treated, high-speed steel and tungsten carbide (coated and not coated) tools on AISI 1045 steel with turning operation.

# 2.2 Optimization using GRA

The Turning experiments are conducted on AISI 1045 with High speed steel and tungsten carbide (coated and uncoated) tools at various cutting speeds, depth of cuts, feed rate with deep cryogenic treated and untreated tools. The experimental design for the orthogonal array L18.The experimental results on machining with the deep cryogenic tools and untreated considering the cutting force, flank wear and surface roughness they have been compared. An optimum levels of process parameters are predict from the Grey relational grade (GRG) which is derived from Grey Relational Analysis (GRA).

### Factors and levels for HSS tool

**TABLE 1.**

| No. | Factors | Unit | Levels | | |
|-----|---------|------|--------|---|---|
| | | | 1 | 2 | 3 |
| A | Tool Types | | UTT | DCTT | |
| B | Cutting speed (v) | rpm | 382 | 414 | 446 |
| C | Feed rate(s) | mm/rev | 0.13 | 0.135 | 0.145 |
| D | Depth of cut | mm | 0.4 | 0.45 | 0.5 |

### Orthogonal array

**TABLE 2.**

| EXP NO | CUT SPEED | FEED | DOC |
|--------|-----------|------|-----|
| 1 | 1 | 1 | 1 |
| 2 | 1 | 2 | 2 |
| 3 | 1 | 3 | 3 |
| 4 | 2 | 1 | 2 |
| 5 | 2 | 2 | 3 |
| 6 | 2 | 3 | 1 |
| 7 | 3 | 1 | 3 |
| 8 | 3 | 2 | 1 |
| 9 | 3 | 3 | 2 |

### Factors & their levels for UTC tool

**TABLE 3.**

| No. | Factors | Unit | Levels | | |
|-----|---------|------|--------|---|---|
| | | | 1 | 2 | 3 |
| A | Tool types | | UTT | DCTT | |
| B | Cutting speed (v) | rpm | 318 | 446 | 764 |
| C | Feed rate | mm/rev | 0.05 | 0.075 | 0.1 |
| D | Depth of cut | mm | 0.1 | 0.75 | 1 |

### Factors and their levels for CTC tool

**TABLE 4.**

| No. | Factors | Unit | Levels | | |
|-----|---------|------|--------|---|---|
| | | | 1 | 2 | 3 |
| A | Types of tool | | UTT | DCTT | |
| B | Cutting speed | rpm | 318 | 446 | 764 |
| C | Feed rate | mm/rev | 0.1 | 0.08 | 0.1 |
| D | Depth of cut | mm | 0.1 | 0.75 | 1 |
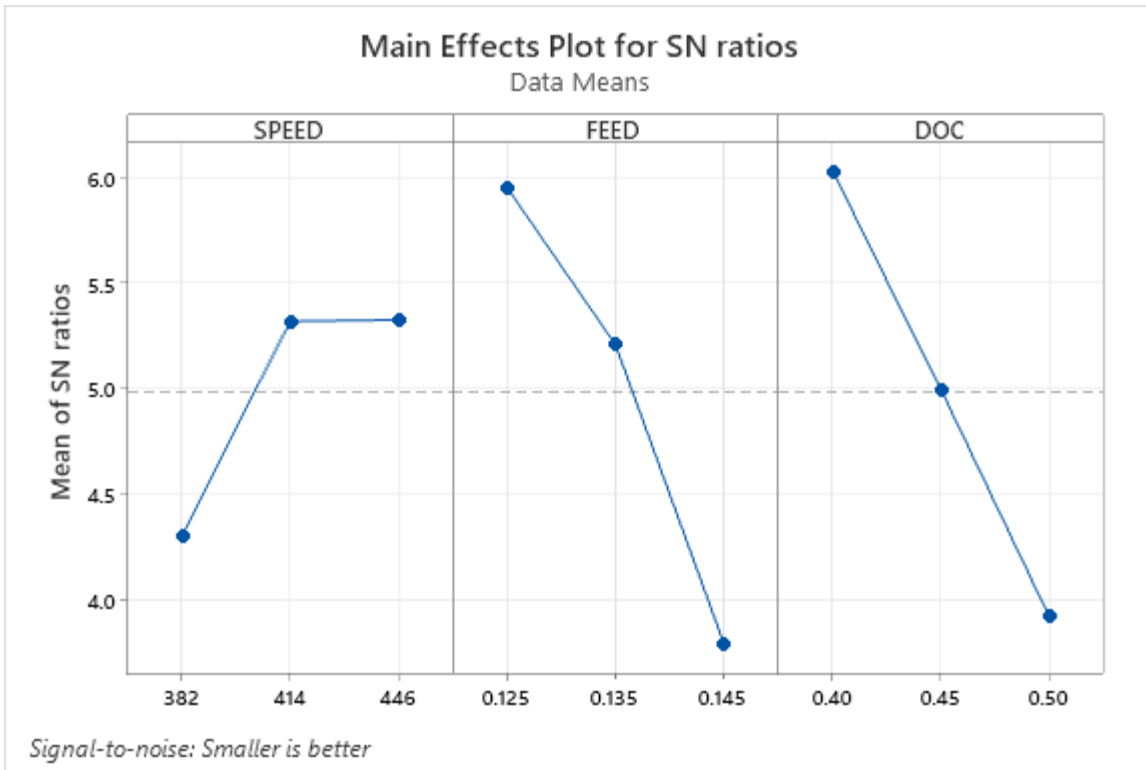
**Fig. 1:** S-N Ratio for HSS Untreated tool

*HSS M2 TOOL*

**TABLE 5.**
**Responses obtained**

| Exp. | Cutting speed (rpm) | Feed rate (s) (mm/rev) | Depth of cut (t) (mm) | CF | | FW | | SR | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | UTT (N) | DCT (N) | UTT (mm) | DCT (mm) | UTT (μm) | DCT (μm) |
| 1 | 382 | 0.125 | 0.4 | 356 | 298 | 0.1 | 0.03 | 3.16 | 2.82 |
| 2 | 382 | 0.135 | 0.45 | 399 | 342 | 0.13 | 0.05 | 3.29 | 2.99 |
| 3 | 382 | 0.145 | 0.5 | 448 | 395 | 0.15 | 0.06 | 3.35 | 3.24 |
| 4 | 414 | 0.125 | 0.45 | 314 | 298 | 0.13 | 0.09 | 2.63 | 2.52 |
| 5 | 414 | 0.135 | 0.5 | 489 | 321 | 0.13 | 0.14 | 2.74 | 2.55 |
| 6 | 414 | 0.145 | 0.4 | 335 | 267 | 0.14 | 0.15 | 2.8 | 2.6 |
| 7 | 446 | 0.125 | 0.5 | 239 | 224 | 0.26 | 0.18 | 2.52 | 2.44 |
| 8 | 446 | 0.135 | 0.4 | 250 | 185 | 0.24 | 0.15 | 2.54 | 2.48 |
| 9 | 446 | 0.145 | 0.45 | 442 | 255 | 0.29 | 0.2 | 2.58 | 2.49 |
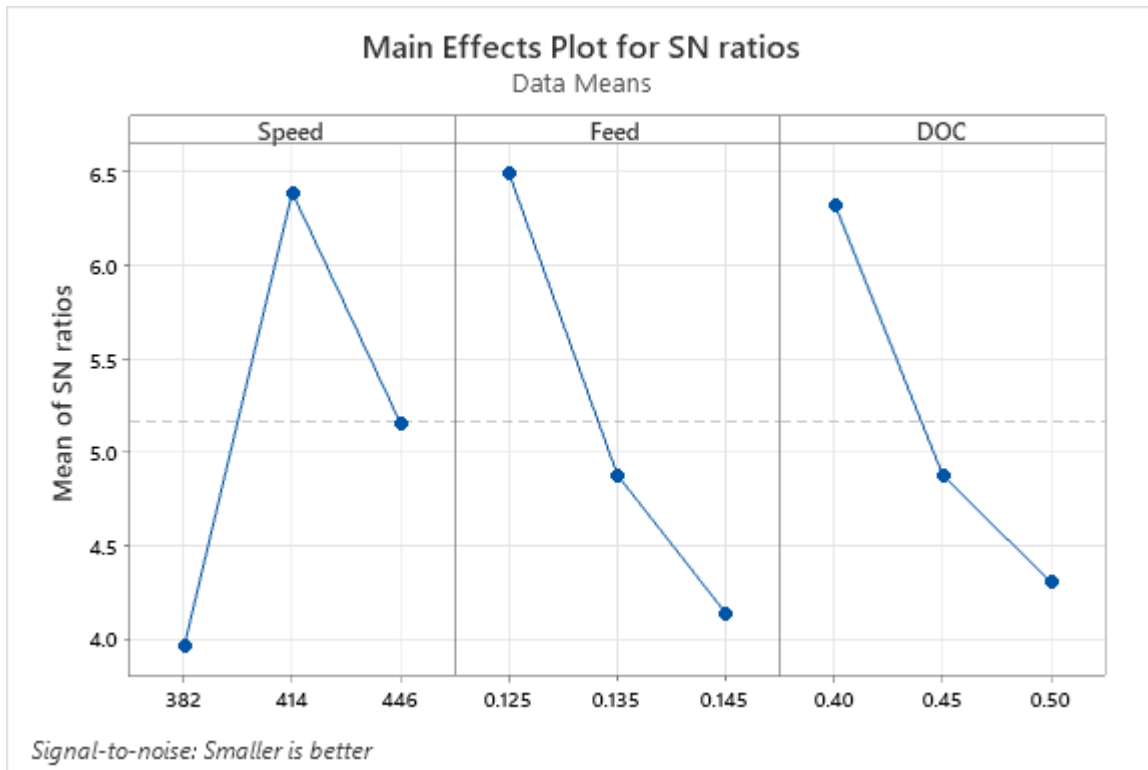
**Fig. 2:** S-N Ratio for HSS Treated Tool

*UNCOATED TUNGSTEN CARBIDE TOOL*

**TABLE 6.**

| | Process parameter | | | Responses obtained | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cutting | Feed | | | | | | | |
| | | | DOC | CF | | FW | | SR | |
| Exp. | speed | rate | | UTT | DCT | UTT | DCT | UTT | DCT |
| | (rpm) | (mm)/rev) | (mm) | (N) | (N) | (mm) | (mm) | (µm) | (µm) |
| 1 | 318 | 0.05 | 0.1 | 204.3 | 186.5 | 0.02 | 0.01 | 4.54 | 4.03 |
| 2 | 318 | 0.08 | 0.75 | 250.6 | 198.5 | 0.03 | 0.03 | 4.67 | 4.63 |
| 3 | 318 | 0.1 | 1 | 259.1 | 287.8 | 0.05 | 0.05 | 4.94 | 4.94 |
| 4 | 446 | 0.05 | 0.75 | 164.8 | 170.1 | 0.04 | 0.02 | 3.29 | 2.83 |
| 5 | 446 | 0.08 | 1 | 189.1 | 197.2 | 0.04 | 0.03 | 3.86 | 3.47 |
| 6 | 446 | 0.1 | 0.1 | 174.1 | 194.2 | 0.06 | 0.03 | 3.87 | 3.75 |
| 7 | 764 | 0.05 | 1 | 69.75 | 57.55 | 0.04 | 0.04 | 2.03 | 1.93 |
| 8 | 764 | 0.08 | 0.1 | 79.79 | 73.2 | 0.06 | 0.05 | 2.34 | 2.24 |
| 9 | 764 | 0.1 | 0.75 | 113.1 | 103.1 | 0.07 | 0.06 | 2.63 | 2.25 |
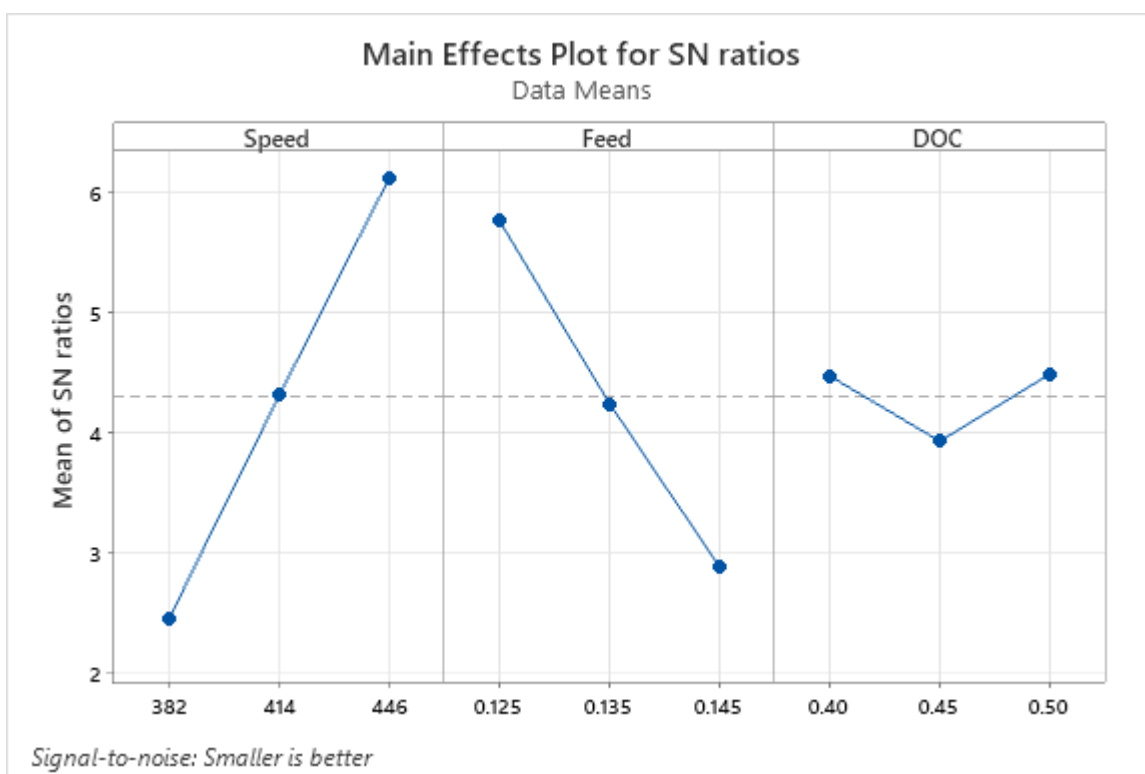
**Fig. 3:** S-N Ratio for UTC Untreated tool

*COATED TUNGSTEN CARBIDE TOOL*

**TABLE 7.**

| | Process parameter | | | Responses obtained | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **CF** | | **FW** | | **SR** | |
| | **Cutting speed** | **Feed rate** | **DOC (t)** | **UTT** | **DCT** | **UTT** | **DCT** | **UTT** | **DCT** |
| **Exp.** | (rpm) | (mm)/rev) | (mm) | (N) | (N) | (mm) | (mm) | (μm) | (μm) |
| 1 | 318 | 0.05 | 0.1 | 206.2 | 186 | 0.02 | 0.01 | 4.27 | 3.63 |
| 2 | 318 | 0.08 | 0.75 | 192.3 | 178 | 0.03 | 0.03 | 4.29 | 3.79 |
| 3 | 318 | 0.1 | 1 | 295.6 | 226 | 0.05 | 0.05 | 4.57 | 3.8 |
| 4 | 446 | 0.05 | 0.75 | 184.7 | 156 | 0.04 | 0.02 | 3.08 | 3.12 |
| 5 | 446 | 0.08 | 1 | 186.3 | 141 | 0.04 | 0.03 | 3.37 | 3.57 |
| 6 | 446 | 0.1 | 0.1 | 138.3 | 125 | 0.06 | 0.03 | 3.61 | 3.57 |
| 7 | 764 | 0.05 | 1 | 104 | 100 | 0.04 | 0.04 | 2.74 | 2.63 |
| 8 | 764 | 0.08 | 0.1 | 109.5 | 109 | 0.06 | 0.05 | 2.99 | 2.72 |
| 9 | 764 | 0.1 | 0.75 | 122.8 | 113 | 0.07 | 0.06 | 2.99 | 2.94 |
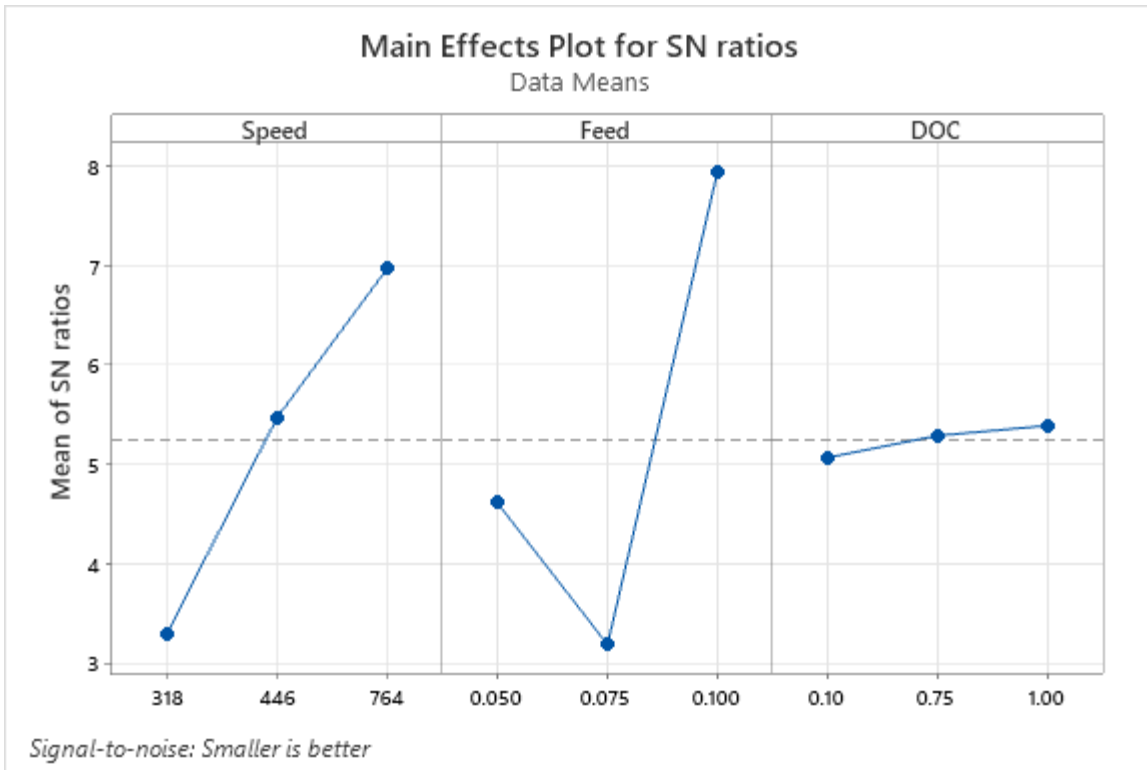
**Fig.4 :** S-N Ratio for UTC Treated tool
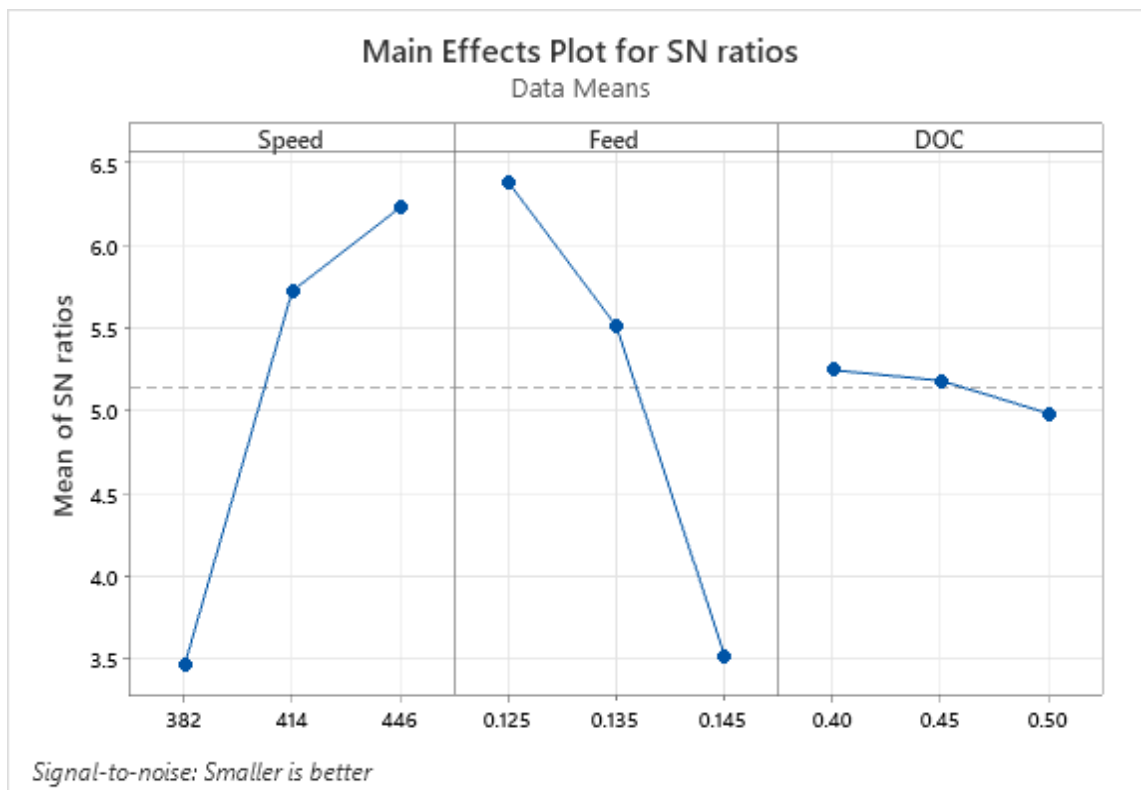


**Fig. 5:** S-N Ratio for CTC Untreated tool
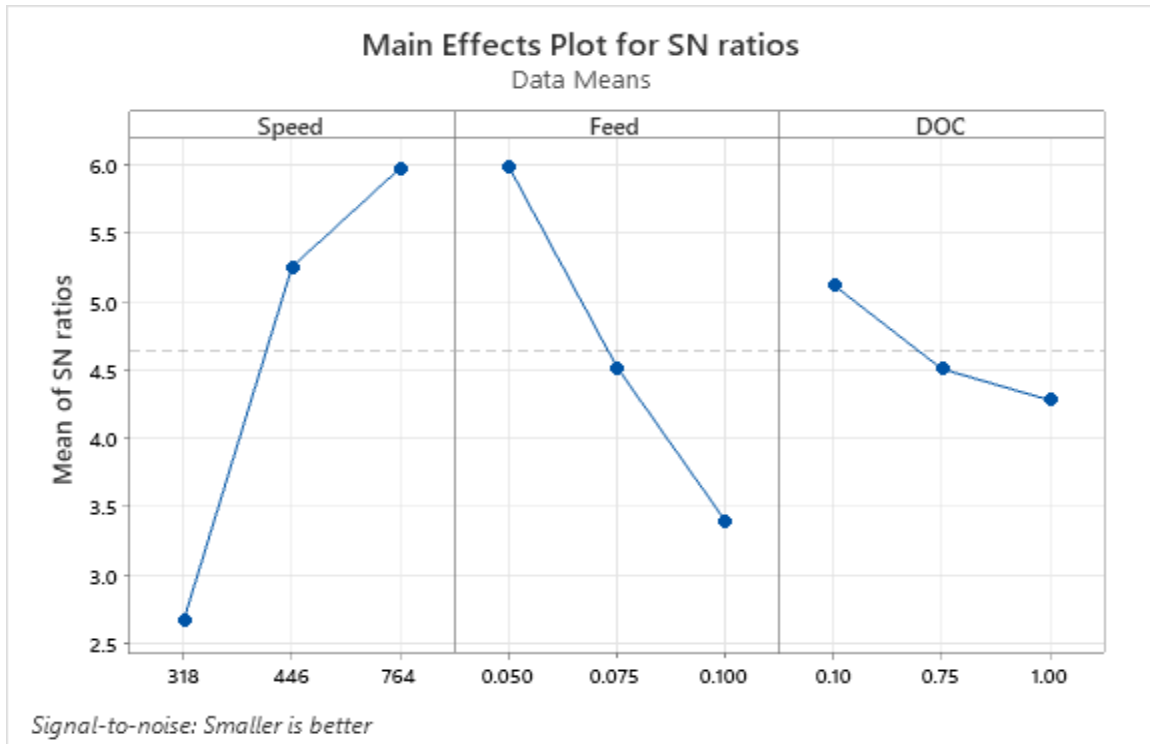
**Figure. 6:** S-N Ratio for CTC Treated tool

## 3. RESULTS

The experiments were conducted on AISI 1045 with High speed steel and tungsten carbide (coated and not coated) tool, at various cutting speeds, depth of cut, feed rate under the deep cryogenic treated, untreated tools. The experimental results for the cutting force surface roughness and flank wear, has been compared with deep cryogenic treated and untreated tool.

## 4. CONCLUSION

The effect on deep cryogenic treated tool was studied and compared with the untreated tool, in parameter of cutting force, surface roughness, flank wear. The cryogenic treated tungsten carbide and high speed tool (coated and not coated) tools have a positive effect of cutting force, flank wear, surface roughness (SR) and chirp morphology. The tool had undergone deep cryogenic treatment (DCT), and operated at the low levels of speed, depth of cut, feed rate were the best combo of the obtained response parameters.

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# IoT based emergency system  FREE

Kamalakannan Ramalingam ✉; Varunprakash; Selvaseeman; Manimaran

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# IoT Based Emergency System

## Kamalakannan Ramalingam[a], Varunprakash, Selvaseeman and Manimaran

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**Abstract.** IoT Based Emergency System which is specially designed for future telecom industries, by 2025 India and many foreign countries like the U.K, U.S expecting 5G network in all locations even from rural to an urban location, in all places telecom towers cannot be monitored physically like a frequent check of base stations like the higher voltage fluctuations, other misc activities around a clock it needed higher monitoring and safety. Implementing security persons for each cellular site is not possible majorly in the rural part. This prototype IOT Based Emergency System can be installed in all types of cellular sites with ease and all devices can be getting connected to a single junction and monitored from a single location. With this prototype, the unfair advantages in this prototype are if the cellular base station gets abnormal than expected this prototype senses and activates the SOS alarm, this method notifies the higher authorities of the cellular network SPOC and also it automatically triggers IVRS robotic calls to nearest patrol, fire station departments. This type of alert system saves a huge source of investment for the company. As this type of prototype connects to the network through 256-bit 3D level encryption this can't be hacked without authorized keys.

*Keywords:* Internet of Things, Cellular Site, Base Station, Telecommunication

## 1. INTRODUCTION

Internet of Things (IoT) is a Boom in the current 21st century, every people using the Internet of Things (IoT) devices either by knowing or unknowing like from television to mobile handsets, smart cities, smart factories all these devices are connected with a source like Radio Frequency (RF) Signals or Electro-Motive Force EMF these are used to communicate all people in the world and these signals are interlinking every people. According to surveys majority of villages got introduced with cellular networks under various government schemes from various governments of the countries. As the technology grows negative part of the specific field also increases like in the telecommunication industry abnormal radio signals, disaster (natural or human errors), etc.,[1] as per research major cellular tower accidents occur in rural (remote) or hill stations either by high voltage, improper maintenance, unexpected radiation- more than government norms flow make huge loss to the area like loss of communication in the area, loss of investment to concern industry, loss to the human sector like abnormal childbirth, nerve weakness due to high radiation, these kinds of disaster occurs either by natural disasters or human errors. All these types of issues can solve by continuous monitoring and auto-sensing [4] of abnormal changes in the base station or telecommunication tower (e.g., Cisco predicts that by 2025, the increase in traffic flowing over the Internet will attain 667 exabytes annually), as social networking sites achieve billion active users and newer bandwidth-hungry applications were also installed on end-user devices (e.g., mobile phones, tablets), allowing users to access Cloud-based content from anywhere at any time.. And many Industries expect more usage of web applications, social media, and communication methods in various modes, either by voice or video [2].

Sometimes all mode of communication gets disconnected and peoples suffer a lot in hill stations during the time of disaster like an earthquake (Fig.1), landslides. During these natural calamities, all Radio Frequency RF and wired communication Code division multiple access CDMA and WDM devices get fails. During this difficult situation, disaster cannot be communicated to the nearest patrol or emergency services stations like ambulance, fire engines.

## 2. PREVIOUS RESEARCH

Many Telecommunication enterprise laboratory's behavior studies are with inside the catastrophe of mobile towers and failure of the bottom station manipulate unit. Most studies are primarily based totally on the suitability of networks and much fewer studies are targeted upon on availability of networks or the capacity of human beings to apply the

**FIGURE 1.** Disaster Events: a) Earth quake in Haiti (October 2010) b) Earth quake in Myanmar

cellular community throughout or immediately in herbal or human blunders primarily based on screw-ups. Most of the troubles had been taking place because of lack of electricity [5], landslides, flooding. The case research for all 3 screw-ups displays bodily destruction of telecommunication gadgets and a sizable lack of business electricity. With hurricanes Katrina and Sandy, the effect on groups became significant. Hurricane Sandy's effect ended with 8.2 million customers losing power, 32% of all mobile websites were out of vector, and Verizon hit six hundred virtual loop vectors (LCS) and many vital workplaces and check-in centres off the carrier. Most of the problems were due to both flooding and lack electricity [5]. For Hurricane Katrina, the effect became very comparable by developing a situation in which 2. Four million humans lost landline carriers, 3,000 mobile websites failed, and seventy-eight of 229 centres E911 lost their skills, 30 vital workplaces were damaged and nine other vital workplaces were destroyed. The best disaster studies applicable to the name or a high number of text messages are laptop computer simulations that have been performed through Sandra National Laboratories and Bell Labs. This version of the cascading influences that occur when a herbal disaster strikes a region.

This device is an unobtrusive second-hand simulator that simulates name activity as well as name blocking, community resource requirements, attempts, and time to complete a name for Wi-Fi and wired talk networks [6]. The device can estimate the effect of conversation interruptions in society. At least 4 types of laptop simulations have been performed with the use of the software. In 2004, a simulation was carried out of the effect of a fire destroying the telecommunications community of a world-class marine port facility [7]. This simulation confirmed that it took 4 weeks to return to each day. In 2005, the review was completed on the interaction of Wi-Fi and wired conversation networks [8]. The simulation confirmed that an outage in one of the networks drove visitors to the opposite community. Depending on the size of the surviving community, this could create an extreme blockade [8]. Immediately after Hurricane Katrina devastated the Gulf Coast region, a second hurricane named Rita approached Galveston, Texas. O'Reilly et al. [9] created a simulation to estimate the possible effect Hurricane Rita could have in the Galveston area, creating a one-of-a-kind scenario. The former has become a vector-free state of affairs due to the basic state of affairs. It predicted the overall non-catastrophic performance of the community.

The 2nd became a simulation of a large-scale blackout that had a cascading effect on the telecommunications community. community. In this last state of affairs, the most extreme state of affairs, the general name tries to raise through 20 instances of daily amounts, the degree of blockage became greater than 95% and lasted for many hours, and for 6 hours, blockage of the device reached nearly 100% [9]. The fourth simulation via Sandia National Laboratories and Bell Labs became a complete blackout of a prime metropolitan area [9].In this simulation, 35% of the population did not call 911, thus increasing the number of simulated deaths from sixteen to twenty people [9].

**TABLE 1.** Profile of disaster impacts on telecommunication networks

| Disaster Type | Physical Destruction | Infra Impact | Warning | Mobility | Impacts of Wireless |
|---|---|---|---|---|---|
| Ice Storm | Widespread | Moderate | Yes | Low | Loss Commercial power, Transport, Physical Damage |
| Flood | Widespread | Severe | Yes | Restricted | Loss Commercial power, water damage to equipment |
| Hurricane | Widespread | Severe | Yes | High During Evacuation | Loss commercial power, transport and physical damage due to storm surge. |
| Winter Storm | Widespread | Moderate | Yes | Low | Loss commercial power and transport |
| Fire | Localized | Low | Yes | Restricted | Physical Damage |
| Thunderstorm | Widespread | Low | Yes | Normal | Electrical damage to equipment |

# 3. METHODOLOGY

This project shows the recovery and auto intimation of telecommunication towers with the specifically authorized persons in the company during natural disasters and human errors, by this project every telecommunication industry can prevent loss of around 15,00,00,000 rupees or 2011762.50 USD per annum, The project IoT based emergency system is based on cloud communication technology which integrates with various technologies like Internet of Things MQTT, MySQL Server (Temporary Resource), Internet of Things IoT devices with advanced IoT devices like raspberry pi, etc.,

- Device connected to base station switch acts as connection mediator between cloud and cellular site.
- Various sensors like Fire, Moisture, seismometers, seismoscope, Generator (Batter Backup) fuel monitor, surveillance cameras, etc., will be connected to the device CPU.
- Based on various abnormal activity or changes in the specific cellular base station and the cellular tower the sensors detect the activity and respond to the cloud through the CPU mediator connected to the base station switch.
- Once the CPU receives the data from the sensors and other components it sends to the cloud through the internet connectivity inside the base station
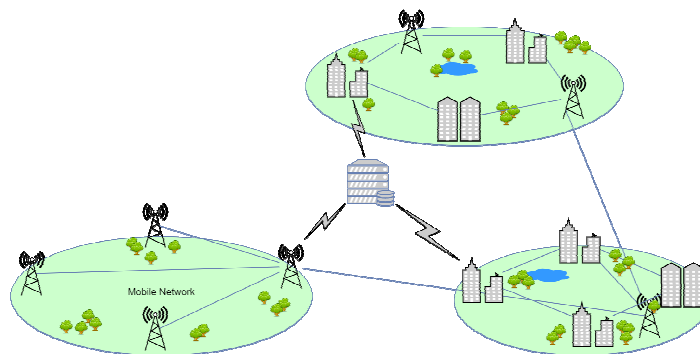


**FIGURE 2.** Diagrammatic Structure of Network Architecture

- The IoT cloud platform like AWS, GCP receives the data from the base station, analysis and send to AI technology were triggers the responses to cellular station what to do next during the disaster time, also it triggers the IVRS robotic calls and SMS (Short Message Service) to the authorized persons of the specific zone and nearest patrol and fire stations.
- The complete actions take place in approximately 1.2 seconds.
- The complete network is encrypted with 256-bit encryption so, there's minimal chance of communication and security failure.

Of this technology many cellular towers located in remote and hill regions get more benefits like by maintaining their stiffness, network level, up time, security, etc., these are some major benefits by implementing this project. Apart from cellular site protection from natural disasters and human errors, it can also be implemented in domestic and commercial public places like schools, colleges, hospitals, social gathering places (Fig:3). Changing sensors based on the location and the type of environment keep the place secure by the same safety measures like by triggering IVRS calls to the nearest patrol and fire stations to rescue immediately.
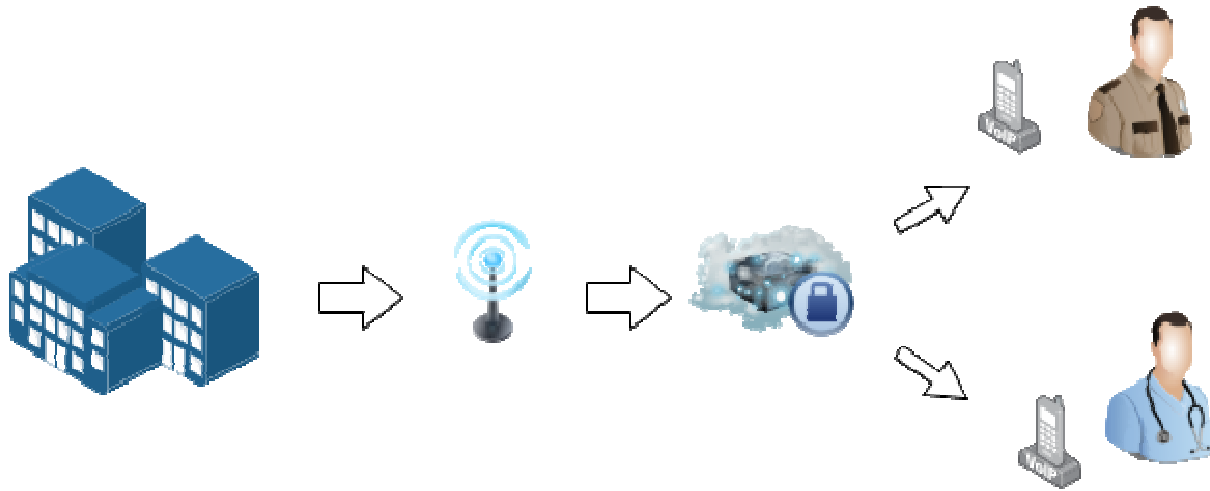


**FIGURE 3.** Domestic Connectivity

# 4. CONCLUSION

Location-based communications services are becoming increasingly important to telecom providers as the Internet of Things (IoT) grows in popularity. We looked into large-scale mobile telecommunication tower failures in this article, as well as the social dynamics that influence user short-term movement. We also present an IoT-based Emergency System prediction method that can forecast user position at the regional level in the next 1 to 6 hours.

In the future, more communications records, such as disasters, will be integrated into the system architecture. Moreover, we want to create a realistic system and mobile applications that will enable a variety of IoT services in the telecommunications sector. However, further research is needed to ensure that the information becomes accessible to everyone. In the scientific process, the replication of studies is an important tool. The knowledge base will grow as more studies are performed. This work offers promising opportunities for further study beyond breeding. Future studies should focus on integrating data from a variety of locations, incorporating multiple factors affecting traffic volume including Internet traffic into the study, and continuing to research various storm patterns. Each type of storm could, and probably should, have its profile ( Table 1). Many telecom companies were facing more than 500 disasters across the country in the base station or transmitters or receivers, in the majority, The disasters happened due to the presence of cell towers in a remote location and they too are located in non-communicable places. In this case, the project's IoT-based emergency system takes control of the complete base station and other major components such as transmitters, receivers, etc. from a cell site and monitors the entire site based on company-specified values such as

weather or other activities such as sensors, once the prototype detects any abnormal value of the base station or any other component of the cell site, it triggers IVRS robotic calls, SMS, e-mails to the officially authorized persons of the specific telecom company and in case of fires due to thunderstorms, power surges, etc. . This prototype activates the IVRS and the next available mode of communication with the nearest patrol and fire station to alert and notify the incident. Many industries such as Reliance JIO, Airtel, Oxygen2, Lyca, Starlink, etc. are planning to introduce a 5G communication system by 2030 to the world as the technology receives updates and also increases the impact like a catastrophe on cell sites. phones, these can be monitored to provide trouble-free service to customers around the world, especially in remote locations.

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# Design and analysis of sharp edged four stroke engine fins compared with rectangular and circular fins  FREE

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# Design and Analysis of Sharp Edged Four Stroke Engine Fins Compared With Rectangular and Circular Fins

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**Abstract:**The chamber of motor is the core of the vehicle parts, which is exposed to high warm pressure and temperature variety.For cooling the chamber, balances are provided on the outer to reduce the hotness. By executing the warm investigation of the motor blades, it is necessary knowing the hotness dispersal value and heat circulation in the interior chamber. The principle point of the current task is to dissect the warm properties like directional Hotness transition, All out hotness motion and temperature dissemination of an altered plan alongside the current model by utilizing Aluminum amalgam. The plan for the blades model will be ready in CATIA V5R20 and analyzed with ANSYS WORKBENCH.

## INTRODUCTION

We understand that assuming there ought to crop an event of gas powered machines, launch of air and energy occurs inside the machine chambers and hot feasts are to be created. The temperatures of the feasts will be around 2300 to 2500°C. It is the incredibly high temperatures and it may affect into consuming of canvas film between to the moving corridor and it may achieve seizing or the welding of the same that's chances of chamber seizure, chances of chamber ring, pressure ring, canvas ring, etc can be affected. Over abundance temperature can like wise harm the chamber material.So the temperature need to be dwindled to round 150 to 200°C at which the motor will paintings maximum productively. A lot cooling is moreover now no longer appealing because it decreases the nice and cozy productivity. Thus, the item of the cooling framework is to preserve the motor walking at its best running temperature. It is to be observed that the motor could be very wasteful whilst it's far bloodless and in the end the cooling framework is deliberate in order that it forestalls cooling whilst the motor is heating up and paintings it achieves best efficient running temperature, then, at that point, it starts off evolved cooling. To abstained from the overheating, and the following unwell impacts, the hotness moved to a motor part (after a particular level) need to be taken out as speedy as can be anticipated and be exceeded directly to the environment. It could be suitable to mention the cooling framework as a temperature tenet framework. It have to be recalled that mirrored image of hotness from the functioning medium thru cooling the engine additives is an instantaneous thermodynamic loss. The tempo of hotness circulate is predicated at the breeze speed, math of motor floor, outside floor area and the surrounding temperature. In this work investigation is done on motor square balances considering temperature inside through conduction and convection, air speed isn't consider in this work. Motorbikes motors are typically intended for working at a specific environment temperature, but cooling past ideal cutoff is additionally not considered on the grounds that it can lessen by and large effectiveness. In this way it very well might be seen that main adequate cooling is desirable. Air-cooled motors by and large utilize individual cases for the chambers to work with cooling. Inline bike motors are a special case, having two,three,four,six chamber air-cooled units in a typical square. Water-cooled motors with a couple of chambers may likewise utilize individual chamber cases, however this makes the cooling framework more mind boggling. The Ducati cruiser organization,which for year sussed air Cooled engines with individual chamber cases, held the fundamental plan of their V-twin motor while adjusting it to water-cooling.

## PURPOSE OF ENGINE FINS

The hotness move processes in a gas powered motor can be demonstrated with an assortment of techniques.These strategies range from straight forward warm organizations to multi-layered differential condition demonstrating. Balances are put on the outer layer of the chamber to improve how much hotness move by convection. For warm examination of the motor chamber balances, it is more gainful to know the hotness scattering the chamber.

# DESIGN OF ENGINE FINS

## DESIGN OF NORMAL ENGINE FIN
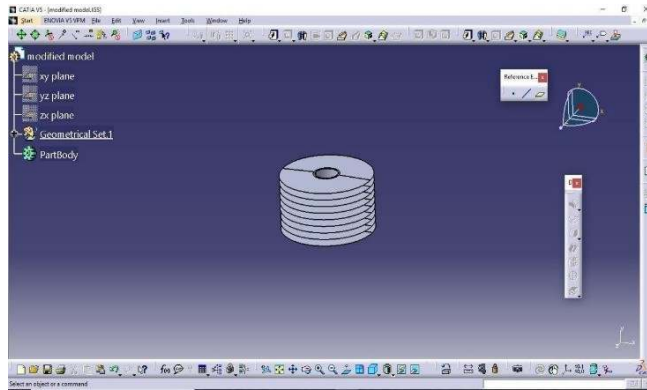


**FIGURE 1.** Design of Normal Circular Engine Fin
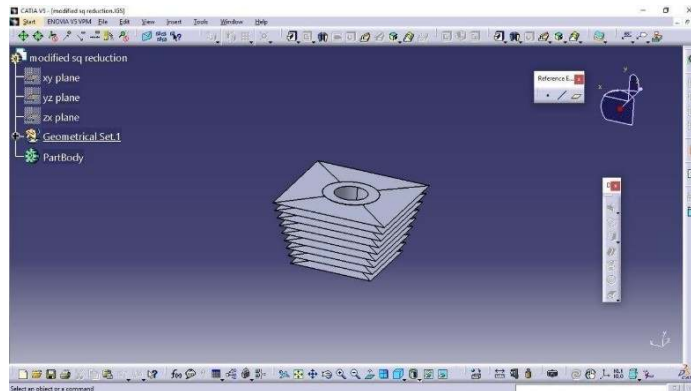


**FIGURE 2:**Design of Normal Sharp Edged Engine Fin
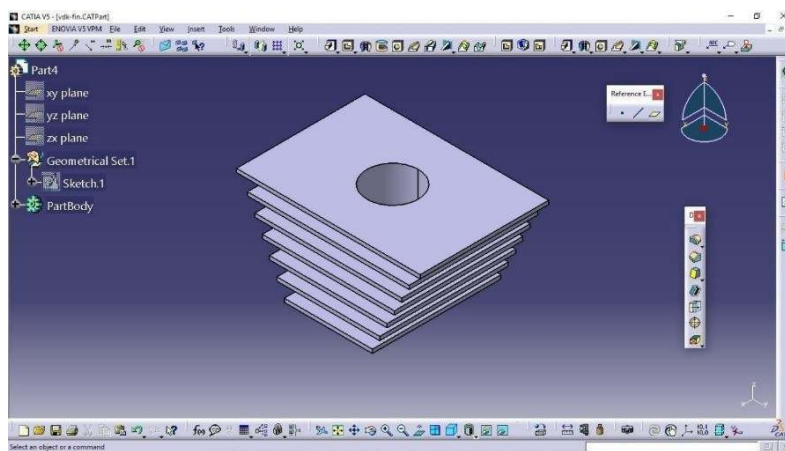


**FIGURE 3.** Design of Normal Rectangular Shape Edged Engine Fin

# DESIGN OF MODIFIED ENGINE FIN
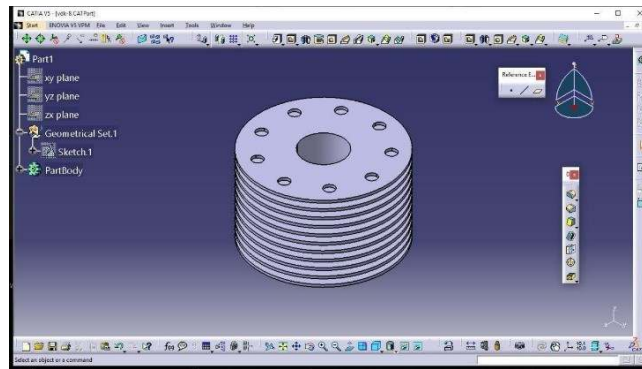
**FIGURE 4.**Design of Modified Circular Engine Fin
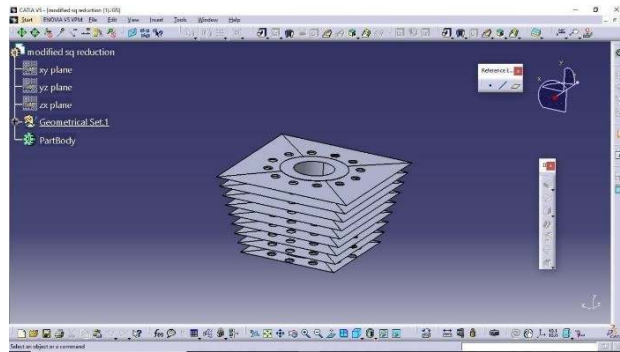


**FIGURE 5:**Design of Modified Sharp Edged Engine Fin
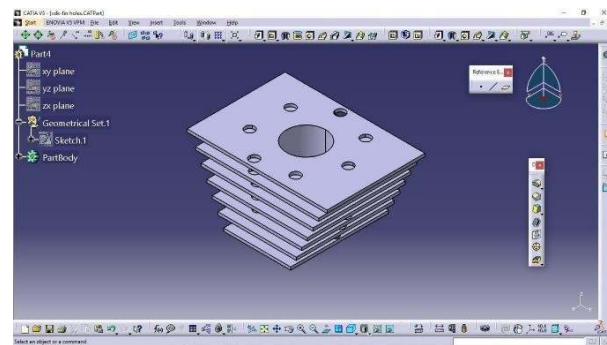


**FIGURE 6.** Design of Modified Rectangular Shape Edged Engine Fin

# RESULTS OF NORMAL ENGINE FINS

## CIRCULAR SHAPE ENGINE FIN USING ALUMINIUM
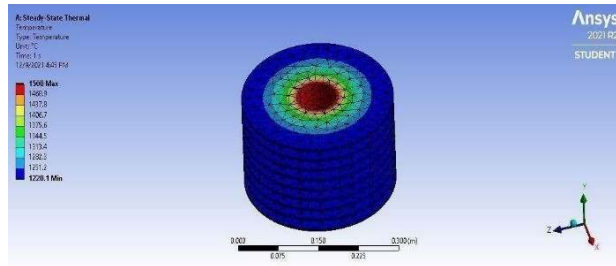


**FIGURE 7.** Temperature distribution of normal circular shape aluminium engine fin
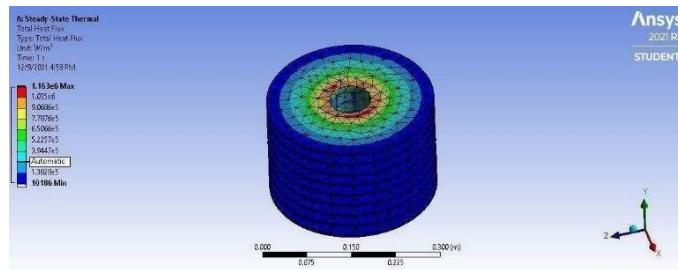


**FIGURE 8.** Total heat flux of normal circular shape aluminium engine fin
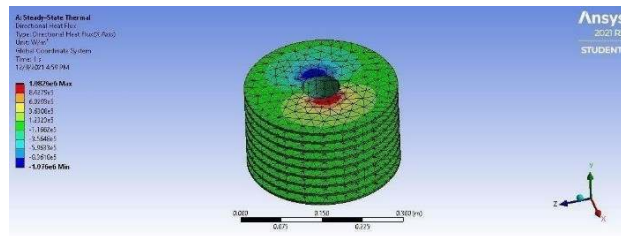


**FIGURE 9.** Directional heat flux of normal circular shape aluminium engine fin

**SHARP EDGED ENGINE FIN USING ALUMINIUM**
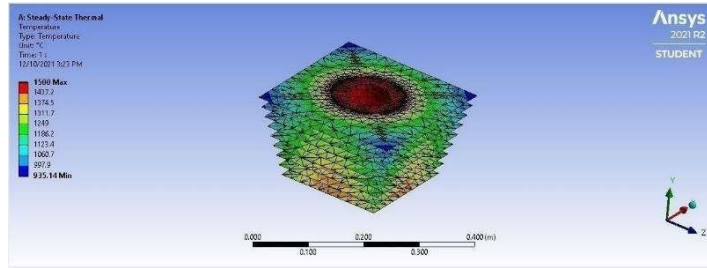


**FIGURE 10.** Temperature distribution of normal sharp edged aluminium engine fin
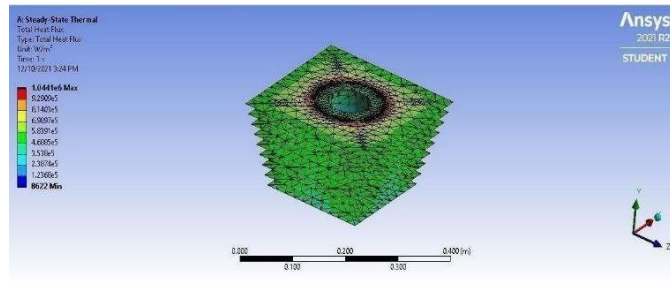


**FIGURE 11:**Total heat flux of normal sharp edged aluminium engine fin
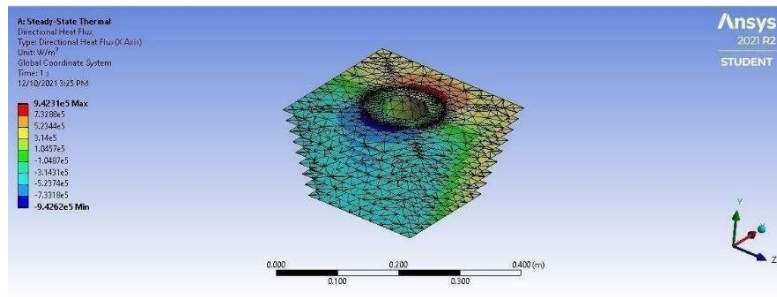


**FIGURE 12.** Directional heat flux of normal sharp edged aluminium engine fin

**RECTANGULAR SHAPE EDGED ENGINE FIN USING ALUMINIUM**
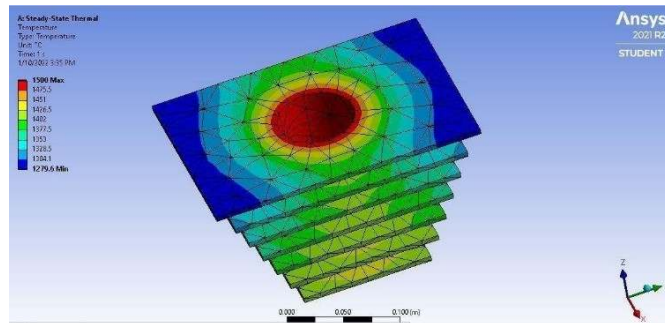


**FIGURE 13.** Temperature distribution of normal rectangular shape edged aluminium engine fin
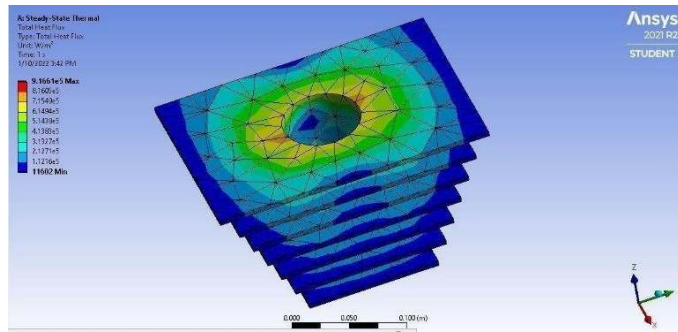
**FIGURE 14:** Total heat flux of normal rectangular shape edged aluminium engine fin
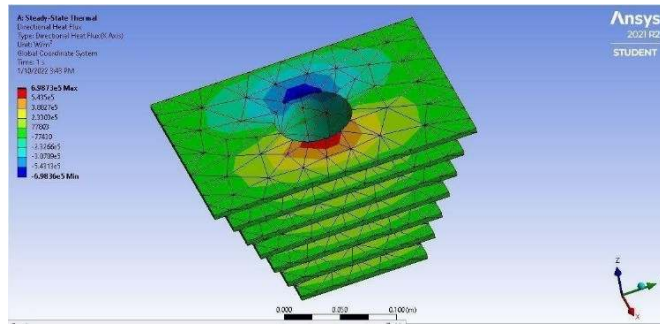


**FIGURE 15.** Directional heat flux of normal rectangular shape edged aluminium engine fin

## RESULTS OF MODIFIED ENGINE FINS

## CIRCULAR SHAPE ENGINE FIN USING ALUMINIUM
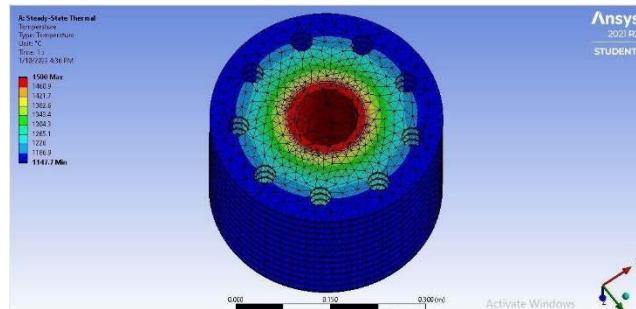


**FIGURE 16.**Temperature distribution of modified circular shape aluminium engine fin
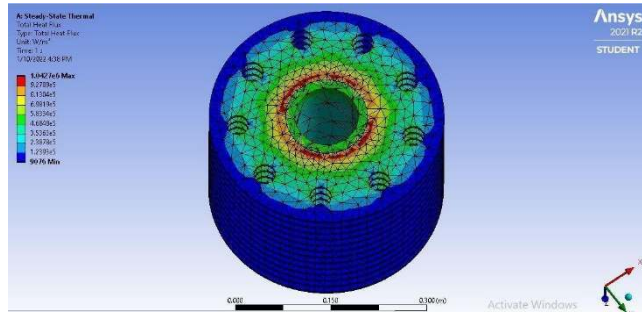
**FIGURE 17:** Total heat flux of modified circular shape aluminium engine fin
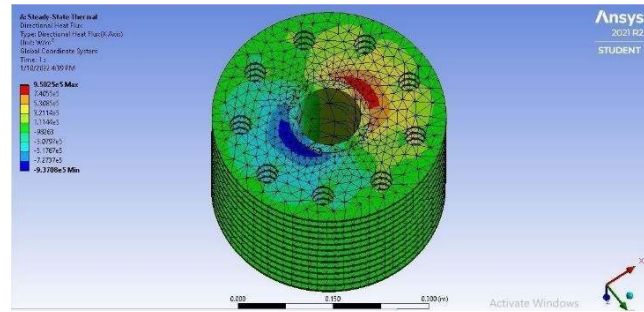


**FIGURE 18.** Directional heat flux of modified circular shape aluminium engine fin

**SHARP EDGED ENGINE FIN USING ALUMINIUM**
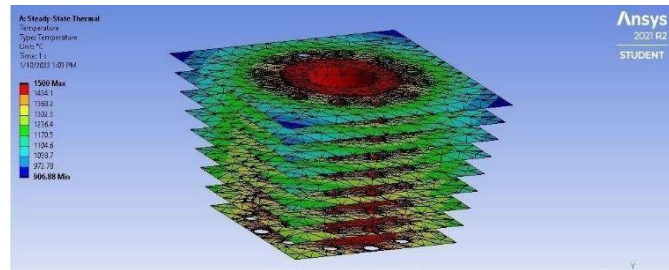


**FIGURE 19.** Temperature distribution of modified sharp edged aluminium engine fin
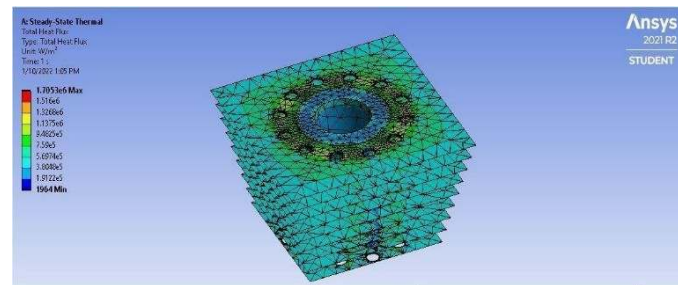


**FIGURE 20:** Total heat flux of modified sharp edged aluminium engine fin
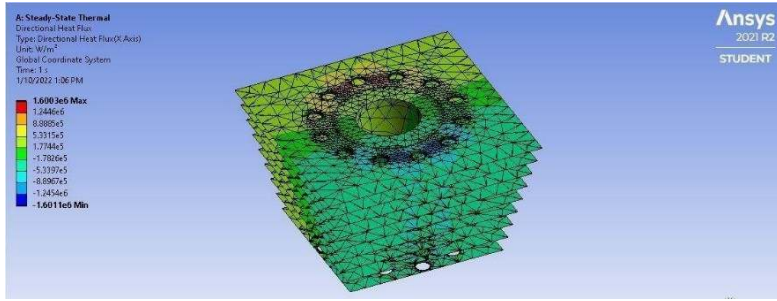
**FIGURE 21.** Directional heat flux of modified sharp edged aluminium engine fin

## RECTANGULAR SHAPE EDGED ENGINE FIN USING ALUMINIUM
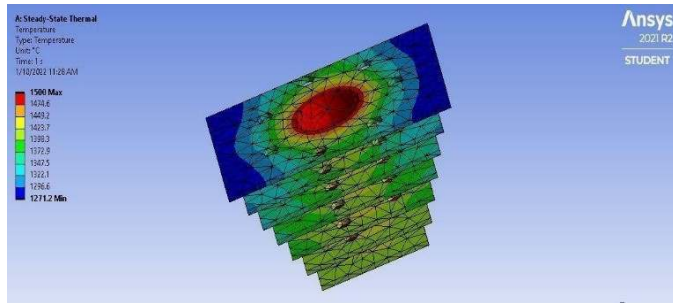


**FIGURE 22.**Temperature distribution of modified rectangular shape edged aluminium engine fin
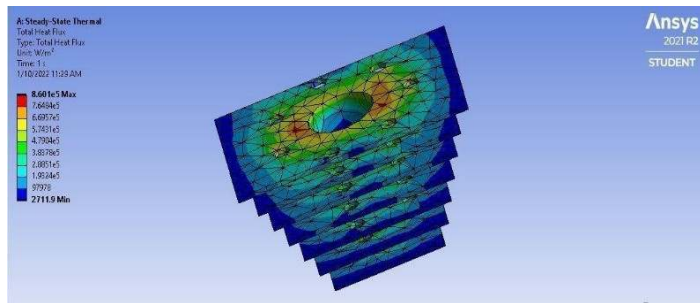


**FIGURE 23:**Total heat flux of modified rectangular shape edged aluminium engine fin
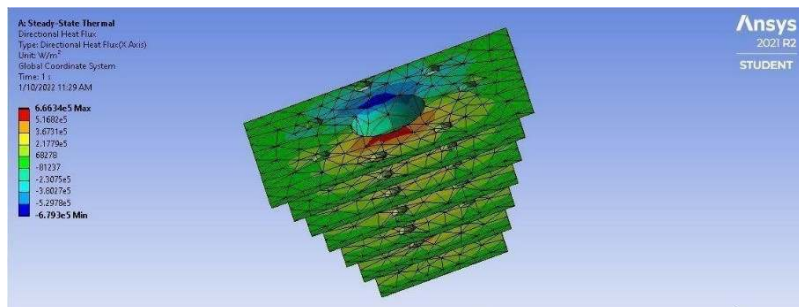


**FIGURE 24**. Directional heat flux of modified rectangular shape edged aluminium engine fin

**TABLE 1.COMPARISION RESULTS OF NORMAL ENGINE FINS**

| S.No | Content | | Circular Shape | Sharp Edged Shape | Rectangular Shape |
|---|---|---|---|---|---|
| 1 | Temperature | Max | 1500 | 1500 | 1500 |
| | | Min | 1220.1 | 935.14 | 1279.6 |
| 2 | Total heat flux | Max | $1.163 \times 10^6$ | $1.0441 \times 10^6$ | $9.1661 \times 10^5$ |
| | | Min | 10186 | 8622 | 11602 |
| 3 | Directional heat flux | Max | $1.0826 \times 10^6$ | $9.4231 \times 10^5$ | $6.9873 \times 10^5$ |
| | | Min | $-1.076 \times 10^6$ | $-9.4262 \times 10^5$ | $-6.9836 \times 10^5$ |

**TABLE 2.COMPARISION RESULTS OF MODIFIED ENGINE FINS**

| S.No | Content | | Circular Shape | Sharp Edged Shape | Rectangular Shape |
|---|---|---|---|---|---|
| 1 | Temperature | Max | 1500 | 1500 | 1500 |
| | | Min | 1147.7 | 906.88 | 1271.2 |
| 2 | Total heat flux | Max | $1.0427 \times 10^6$ | $1.7053 \times 10^6$ | $8.601 \times 10^5$ |
| | | Min | 9076 | 1964 | 2711.9 |
| 3 | Directional heat flux | Max | $9.5025 \times 10^5$ | $1.6003 \times 10^6$ | $6.6634 \times 10^5$ |
| | | Min | $-9.3708 \times 10^5$ | $-1.6011 \times 10^6$ | $-6.793 \times 10^5$ |

**CONCLUSION**

We have carried out that the base temperature of the motor lessens on by changing the plan of the balances which is finished by decreasing the surface region of the fin surface. We likewise executed the decrease in least temperature of the engine by carrying out the openings in the blades which is showing preferred and more efficient results over roundabout and rectangular formed balances . It has been seen that the implementation brings about expanded temperature dissemination, Total hotness motion and Directional heat transition of the motor up to 20%. It is obvious from warm investigation that,to accomplish better cooling results sharp edged balances are better choice.

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# A study on mechanical properties of two dissimilar aluminium alloys (Al 2014 &Al7075) through friction stir welding ⊘

S. Vijay; S. V. Arun; S. D. Gowtham ✉; R. S. Sarandeepak

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# A Study on Mechanical Properties of Two Dissimilar Aluminium Alloys (Al 2014 &Al7075) Through Friction Stir Welding

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**Abstract:** The main purpose of our project is to analyse the mechanical properties of friction stir welded dissimilar aluminium alloys which is Aluminium-2014 and Aluminium-7075.Welding and rotational speed are decided using trial and error method in order to get non defective welds and without any damage like crack and entirely broken. Materials which are difficult to weld by normal welding process can be welded using friction stir welding process. Material Al-2014 and Al-7075 alloy were selected for welding . These welded aluminium compounds are of a thickness of 6.0 mm using a traditional processing machine. The length and breadth of the aluminium work pieces are 100mm and 50mm. First the the two different plates are joined using friction stir welding process after that the welded parts are cut down for tensile and impact testing, and further taken for SEM analysis. After the cutting process the the separated pieces are tested against their ability to withstand how much load before breaking and their ability to acquire how much energy during their fracture,and analysed by scanning electron microscope(SEM).

*Keywords: Friction stir welding(FSW),Al 2014 and Al7075,tensile testing and impact testing, SEM*

## INTRODUCTION

Use of Al7075 and Al2014 combinations are common in the aerospace applications. We specically picked these two materials because these two have poor welding property and cannot be welded by normal welding processes like TIG and MIG.TIG and MIG like welding processes are used in the case where the materials have higher melting point but in the case low melting point elements like aluminium ,these process cannot be applies sice it melts from te heat release for that purpose we have decided to go for friction stir welding method because unlike the previous methods mentioned this method joins two metals by a rotating tool and the heat produced is way lower than the others so,the aluminium plates wont be melted. Al7075 is known to achieve a ultimate tensile strength of 572 N/sq.mm , this is higher than Al2014. After welding process the samples undergone three mechanical property analysis test such as tensile test,impact test and finally sem analysis.at some stages of the result we came to know that in some parameters the results were positive and negative in some parameters. Aluminium has many many advantages like light weight, fair formability and good amount of ductility and malleability and it is easy to cast. Aluminium is used in various applications from household materials to space vehicles. Aluminium in composite form is widely used for manufacturing of aeroplane upper body due to its light weight property

## FSW

Friction stir welding (FSW) is a new solid-state connecting process. A rotational h13 hexagonal shaped tool is used to join the metal plates materials like aluminium. This joining method is energy efficient, environment friendly.

Fig.1-*Milling machine*
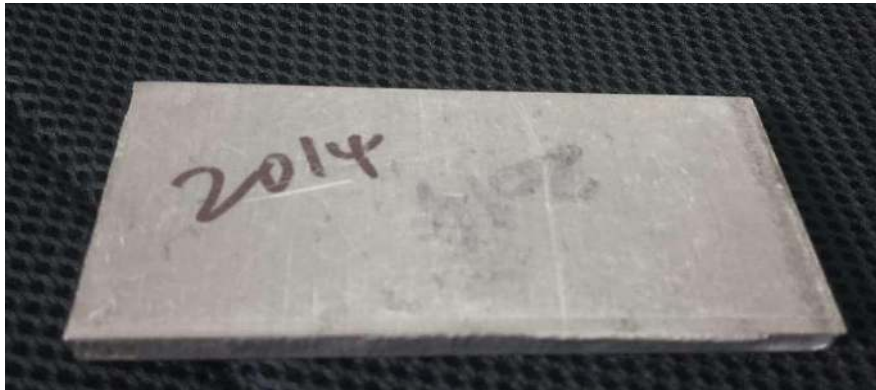


Fig.2 Samples used:Al-2014
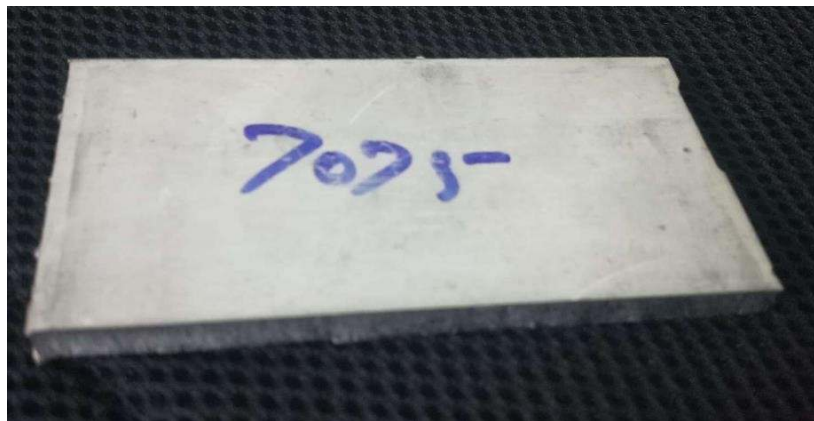


*Fig.3* al-7075

## TOOL USED

H13  type of material is a  work tool steel, which means , its strength and hardness up to a higher working temperature than most steelo tools.

**Fig 4 specimen**

**Table 1: Weld parameters**

| SI.NO | FEED RATE (mm/min) | TOOL ROTATIONAL SPEED (rpm) | MAXIMUM AXIAL FORCE (kN) |
|-------|--------------------|-----------------------------|--------------------------|
| 1.    | 25                 | 1000                        | 8                        |
| 2.    | 15                 | 1200                        | 6                        |
| 3.    | 20                 | 1300                        | 4                        |



*Fig.5 :* **Welded specimens**

## TENSILE TEST

Tensile Testing is a way of tension testing and is a destructible engineering and materials science test where limited tension is applied to a sample until it fails as a whole. This is a common mechanical testing method. Here in our project we used this technique to find out how strong a material is and also how long it could be elongated before it cracks.

## IMPACT TESTING

Impact test gives the result of the amount of energy acquired by the sample during the crack. This acquired energy is a measurement of a given material's hardness and behaves as a tool for studying temperature-based brittle-ductile transition. It is to identify the material whether is brittle or ductile in its nature.

## SEM TEST

Scanning Electron Microscopy (SEM) is a testing method where it reads a material with an electron beam to create a magnification of a image for observvation. This process is also called as SEM analysis and SEM microscopy.

## APPLICATION

The signals generated during electron microscopic analysis create a 2D image and discloses information about the sample, including external textures, chemical composition, when used along the Energy-dispersive X-ray spectroscopy feature, and orientation of materials making up the sample.

## RESULTS: TENSILE TEST

For tensile test When the tool is rotated at 1300 rpm and the given feed rate is 20mm/min and fixed at an axial force of 4kN the maximum load applied is 30kN when this amount of load is applied then the maximum elongation undergone by the sample is 1000mm.At this situation the cross sectional area of the sample specimen is 31.156 sq.mm, then we applied the maximum load at which the specimen can with stand which is 1.906 kN when this kind of huge amount of load is applied then the maximum elongation obtained by the material is 4.124 mm.

### Stress vs strain:
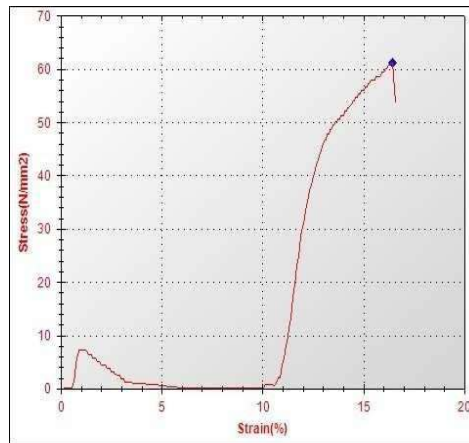


**Fig.6 -At 1300rpm/4kN/20mm/min**

So as a result the tensile strength observed is 61.173 N/sq.mm. Again another sample is subjected to the testing which the sample is welded with the parametersof 1000 rpm and with the feed rate of 25 mm/min and with an axial force of 8kN.Here the maximum load applied is 30 kN.when this amount of load is applied themaximum elongation of the sample is 1000mm.At this stage the possible cross sectional area of the sample undergone is 30.813 sq.mm.
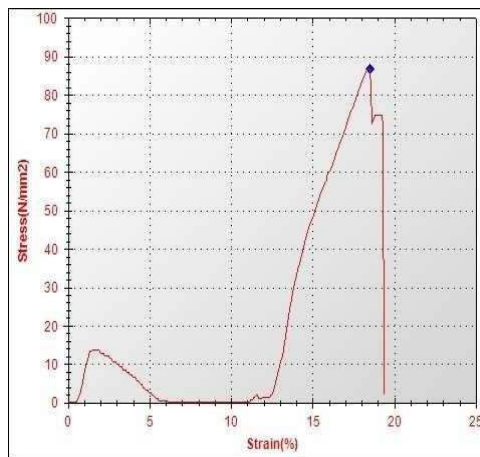


**Fig 7. - At 1000rpm/8kN/25mm/min**

Then we decided to apply the maximum load that the material cal withstand is applied that is 2.675 kN, when this load is reached ,then the maximum elongation reached when this huge amount of huge load is applied is 4.624 mm. So as a resultwe get the tensile strength of 86.807 N/sq.mm .

When the tool is rotated at 1200 rpm and the given feed rate is 15 mm/min and fixed at an axial force of     6kN  the maximum load applied is 30kN when this amount of load is  applied then the  maximum elongation       undergone by the sample is 1000mm.
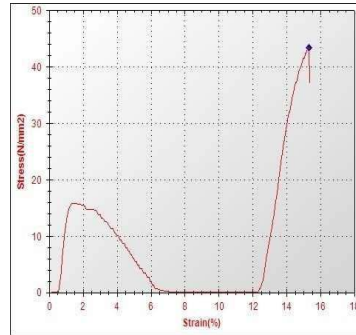


**Fig 8. - at 1200rpm /6kN /15mm per min**

At this situation the cross sectional area of the sample specimen is 30.277 sq.mm, then we applied the maximum load at which the specimen can withstand which is  1.313 kN when this kind of huge amount of load is appliedthen the maximum elongation obtained by the material is 3.127 mm.So as a result the tensile strength observed is 40.350 N/sq.mm.

 Six different samples have been  joined to make three pairs of various parameters.first two samples of al2014 and al7075 are joined at 1300 rpm and with an axial force of 4 kN and with a feed rate of 20 mm per min so that asa result of this parameter the impact test shows that the material absorbs 0 joules of energy.The dimension of the samples are 100mm in length and 50 mm in breadth and the thickness of the material is 6mm.

When the sample that has been joined with parameters of 1000 reveloution per minute and feed rate of 25 mm per minute and with the axial force of 8 kN. Whenthis sample is undergone impact test then the result obtained is that the sample

observed 2 joules of energy. Then another friction stir welded joint is tested with the impact tester. Here the parameters are 1200  rpm and the axial force applied on the sample when friction stir welded is 15 kN and the feed rate is also changedto 6 millimeter per min. Here also the results were same as the first sample sample here the energy absorbed by the sample joints is 0 joules of energy.

## CONCLUSION

As result of these two testing results.We have come to a conclusion that the materials which joined using the parameters we used 25 mm/min and also a rotational speed of 1000 rpm here in this we get a slightly stronger material than the original materials but in the tensile testing when tool rotational speed of 1300rpm and an axial force of 4 Kn is applied the materials joints obtained was not asstrong as the original materials they had an edge over the resultant.When parametrs of 1200 tool rotational speed of 1200 rpm is applied and the maximumaxial force of 6 rpm is applied and the feed rate was stood at 15 mm/min after applying all these parameters.The results obtained has no difference with the  original one,So the tensile strength of the  materials joined using the parameters of 25  mm/mm and the  rotational  speed of 1000 rpm and the  maximum axialforce applied 8kN is increased while others doesnt show any improvements.In impact test when the parametrs of feed rate 25 mm/min and the tool rotational speed of 1000 rpm and the maximum axial force was given at  8kN thwe result we obtained is that the samples aborbed that is the sample had withstood 2 joulesof energy thus it is quite stronger than the original material and when the materialswere set up at feed rate of 20mm/min and the tool rotational speed of 1300 rpm and the maximum axial force was given 4kN here we concluded that it absorbed 0 joules of

energy.Thus we conclude that few parameters were useful and gettingstronger than the original material and the weight has also reduced a bit.So those samples can be used to bulid aeroplanes due to its light weight but stronger.

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# Agile Technology and Artificial Intelligent Systems in Business Development

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*Abstract*-This article examines how Agile methodology and concepts are used to the delivery of artifical intelligence as well as how Agile has transformed over time. Artificial Intelligence (AI) are wide-ranging set of technologies that can promise various benefits for the company in terms off added business value and customer satisfaction.In earlier times, organizations/companies are increasingly turning to intelligence technology in order to gain more business value following a deluge of data as well as a strong increase in computational capacity. This is encouraging the incorporation of AI into business operations, but the effects of this adoption need to be investigated more thoroughly. The way that enterprises as well as consumers use information has evolved as a result of the internet's and smart devices' exponential growth in data volume. As a result, companies are starting to use AI technologies to embrace agility. Agile technique is the capacity to adapt quickly and effectively to these external situations in order to prosper in an industry that is frequently developing and unpredictable. This research focuses on the entire effects of AI on enterprises, including future changes in business models as well as research, innovation, and market deployment. Additionally, it focuses on several ways to incorporate artificial intelligence methods into scrum methodolgy.It also provides the information regarding iterative development process can be adapted to A.I evolvment well as the comparison of agile technology and artiofical intelligence in terms of business management development.

*Keywords:* *Agine method,Artificial Intelligence, Business development*

## I. INTRODUCTION

Today's society is increasingly dependent on technology, which is being fueled by a number of factors. Big Data, evolving algorithms, and the introduction of the Cloud all contributed to the computational power of technologies, which enabled the machine to operate significant amounts of information, and the development of the AI profession arose. It is a sophisticated idea that has gained a lot of popularity in speculative fiction, but it also incorporates new fields and uses in the commercial and financial sectors that are still growing today. In an effort to optimize the logistics connection and boost logistics efficiency, many contemporary logistics firms are attempting to implement artificial intelligence technology (AI)[1][2]. Understanding what AI accomplishes in the logistics space is a clever approach to comprehend and partially foresee the field of opportunities and, as a result, to prepare for it, reaping all the rewards and avoiding any potential hazards. This is true now more than ever.

Because the Agile Software Development (ASD) methodology as well as principles were published in 2001, the principles and goals have been interpreted and applied to artificial analytics (AI). The application of BI to AI is logical given the process' iterative and progressive nature.The goal of this paper is to help practitioners understand how BI delivery, quick analysis, and data science can all be done in accordance with the Agile principles[3]. The manifesto's core principles were outlined by Beck et al. (2001) and included prioritizing people and interrelations over processes and tools, Information exchange with the client beyond contract negotiations, functioning software over meticulous documentation, and flexibility over schedule adherence.Software development will become less conventional, more dynamic, and customer-focused as a result of upholding these objectives.

In contrast, artificial intelligence (AI) is an agile innovation that has a number of advantages for the logistics industry, including cost savings because AI technologies are more affordable and offer quicker, higher-quality, more dependable, and more durable solutions. Earnings rise as revenue quantities rise and as speed, a crucial factor in transportation and logistical situations, increases[4].The most significant benefit in logistics environments is increased flexibility, which can be particularly useful during peak periods. Because of this, companies have begun embracing quickness through AI technologies[1]. The rapid rate at which technological evolution that our society is experiencing calls

for speed, responsiveness, and the capability to comprehend the system - wide dimension of difficulties, regardless of the sector or perhaps the category of organizations as well as actors involved.

The goal of this study is to ascertain how far AI can be considered an agile development that can improve performance of supply chains in Moroccan logistics firms. Qualitative research and the analysis of research literature are examples of research approaches [14].

Focus on Agile concepts rather than particular implementation frameworks.

Because of all the reasons listed above, "established" Agile procedures or frameworks immediately run afoul of the realities of AI development. Agile does, however, fundamentally allow the types of iterative feedback loops that are essential to AI development. The Agile Manifesto as well as the Scrum Guide does not explicitly state much of what is seen as required "best practices" for Agile software development [5].

Finding the overlap between what is desirable, in terms of determining actionable, timely decision assistance for business stakeholders, and what is achievable utilizing the data that can be derived from the underlying data, is crucial to the success of AI projects. Data analysis and model exploration are necessary for the first stage of discovery. By having a common direction and vision, they can stay in sync. It is crucial to ensure communication and education between them because the insights from the two parts influence and constrain one another.

*1) Research Aim:* Here in this researchthe main objective is to provide information regarding how the artificial intelligence as well as Agile software development has made contributions to business management. The main objective of the paper is below.

1. Overall impact of AI on businesses including research, innovation, market deployment to future shifts in business management.

2. Incorporate Artificial Intelligence Techniques into Agile Development.

3. Comparison of agile technology and artificial intelligence in terms of business development.

## II. Literature Review

Supply chain management is only one of the many business sectors where artificial intelligence is becoming increasingly important. It involves streamlining corporate operations in three stages, including monitoring, evaluating, and acting, where businesses can boost productivity with the aid of insightful data. The following discussion includes a few of the requirements engineering research connected to artificial intelligence and agile software development.

*1) Supply Chain Management Using AI in the Agile Business World:* Numerous crucial functions for artificial intelligence are being played in contemporary supply chain management. In the current study, some of its key functions such as how artificial intelligence makes data analysis and tracking for company management easier to be learned. Through the generation of forecasts, artificial intelligence enhances supply chain management by identifying anomalies and faults. When used in management, it gives managers a specific level of flexibility and accuracy and aids in the organization's ability to forecast inventory, demand, as well as supply. AI revolutionizes the speed and effectiveness of supply chain decision-making. The study reveals that the use of artificial intelligence has a substantial impact on supply chain management.*[5].*

*2) Increasing data security and preventing data loss:* The ability to quickly adapt to changes in regulation, input costs, technology, and other aspects of the industry environment is collaborative agility, which is the most significant characteristic of manufacturing units connected with artificial intelligence. For mass production, machines and people are increasingly collaborating, which is crucial for products that focus on the needs of the consumer. Manufacturing facilities worldwide benefits greatly from artificial intelligence (AI), which has made the supply and value chains more connected and collaborative [6].

It has many uses in agriculture, including the idea of "e-plants in a box," which is excellent for small-scale, low capital-outlay, mobile plants that generate a narrow variety of goods yet at a reasonable price [6][9].

*3) Agile Development on different Project:* In order to reduce the issues associated with traditional software development techniques, agile software development methodologies were established. Software development projects use a variety of Agile methodologies, including Scrum, Extreme programming, and Kanban. Agile methodologies emphasize cooperation between clients and developers and promote self-organization in development teams. Different Agile practices can be used by teams in their projects to accomplish this. Some teams solely employ one practice, while others mix and match different techniques. Stand-ups, user stories, Burn down/Burn up charts, performance tuning, and Epic and User stories are the most often used techniques. The combined effect of practices throughout developing Agile software have an impact on team communication, project requirements, and project priorities, and more practices adopted are correlated with better project outcomes, according to this paper, which reports on the analysis of data gathered from people involved in development of Agile software teams [7].

*4) Agile concept for the Development of Intelligent Systems:* It emphasized and summarized certain crucial elements pertaining to the design and development approaches for intelligent systems. It then brought together relevant unresolved concerns related to the development as

well as design of autonomous systems in the future. The notion of agility, which has been taken from either the field of agile manufacturing, has been applied to these problems in order to highlight the advantages that may be attained through knowledge empowerment, adaptable system structures, and component integration. This served as the foundation for the creation of the conceptual model for the Agile Intelligent System (AgIS), which was built on these aspects. This goes against the idea of agility, flexibility, and leanness that is supported in the paper because it limits how much flexibility such implemented systems can have in terms of utilizing the power of relevant knowledge sources. The analysis of the software development process and other relevant software metrics, specifically for the creation of intelligent systems, were presented as further directions and research opportunities. These would take the shape of user-centered measures like productivity, usability, and knowledge augmentation metrics, which are both technical and user-centered.

## III. METHODOLOGY

For innovative items, it might be quite difficult to set the right product needs (algorithm). As a result, it is standard practice to get the product into users' hands as soon as possible and then base decisions on analytics and user input. It reduces risk, particularly, in the example of artificial intelligence, the hazards of investing a great deal of time and energy into developing the incorrect model, choosing the incorrect metrics to optimize, or exceeding the desired performance in any metric.
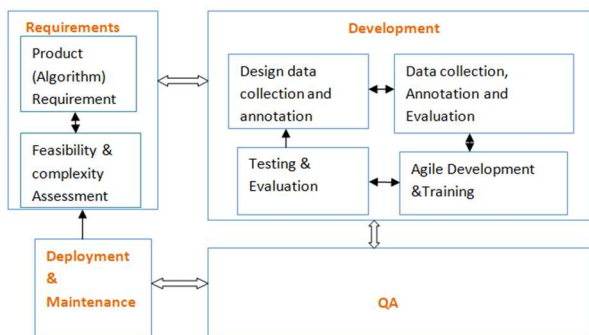


**Figure 1**: Artificial Intelligence Iterative process including Agile Technology

Working iteratively might get more difficult as a project develops and matures. Cycles must break between iterations. Low-quality projects will also be ones that are very difficult to pick back up on after halting for a number of months to get client feedback. As a result, agility is facilitated by high and unambiguous standards, procedures, and processes. By lowering the amount of "technical debt" you have to pay off before beginning each new iteration, these dramatically shorten the iteration time. The requirement to establish and enforce standards for development procedures, computer programming, etc. has generally gotten more significant as the product matures. The framework shown in figure 1 above can be used to adapt the iterative development method for artificial intelligence development.

Massive quantities of analysis and testing are frequently needed while developing AI and ML systems. Even when an algorithm performs flawlessly for some use cases, developers frequently discover that other areas require improvement. As a result, the technique must be repeatedly adjusted until all outcomes are ideal. Without the use of agile principles, such a lengthy procedure would be impossible to finish. Imagine spending months creating a sophisticated Iterative technique, only to test the result and discover that it does not function at all as you had anticipated. Agile is obviously beneficial to the advancement of AI, but AI may also assist organizations in becoming more agile.

Modern AI has made automation possible, which can significantly speed up and improve the effectiveness of software testing, monitoring, and updating. This reduces the overall amount of time needed to finish a project by allowing human programmers to continue coding and creating the foundation of applications. Software development is not likely to ever be characterized as we have stated. However, AI is unquestionably having a good effect.

When a company is adaptable, it may change to take care of these new needs before rivals recognize the trend starting. By implementing enough AI initiatives, firms may be able to become and remain at the forefront of their respective industries. Alternately, intelligence algorithms might be trained to spot abnormalities and anomalies that lead to higher or lower profitability, enabling firms to eliminate the non-value-adding operations and concentrate on the most productive ones. However, employing Agile approaches to develop AI is not without its challenges. It was created with the intention of dividing up extraordinarily complicated and difficult issues into digestible pieces.

In this method the deployment and maintenance are done based on the initial requirement protocols is used. The changes to the maintenance are made depending up on the chat bots from the customer. It has been widely agreed upon in the software development world that software should be built via an iterative lifecycle. This idea is supported by popular techniques like Scrum (Agile) and Lean.So here development training testing and all other parts related software development is under agile technology.

### A. Useful Ways to Incorporate Artificial Intelligence Techniques into Agile Development

It's a fact conventional software development will continue to exist. The key issue at hand is how to apply machine learning to improve our software development process. However, can use the following to incorporate ML approaches into your SLDC:

1. Coding Helpers: A developer spends the majority of their time reading documentation and debugging code. Developers can get immediate feedback and suggestions based upon that codebase with the help of intelligent coding assistants created using ML, resulting in substantial time savings. Excellent examples include Python's Kite and Java's Codota.

2. Computerized coding Refactoring: Having clean code is crucial since it makes working together much simpler. Additionally, maintaining clean code is significantly simpler than maintaining dirty code. Here's the thing: Agile methodology becomes a painful need whenever an organization scales.

3. Making Decisions Strategically: The selection of the features & products to prioritize takes up a significant portion of a developer's work. An AI model that has been trained using data from previous development projects may evaluate the performance of apps, assisting engineering teams and business leaders in finding ways to reduce risk and increase impact.

4. Offering Accurate Estimates: The field of software development is renowned for going over schedules and budgets. It's critical to have a thorough understanding of the context and the development team in order to produce an accurate estimate. Data from previous projects, such as cost estimates and feature definitions, can be used to train an ML model. This is highly useful for estimating effort and spending.

5. Analytics as well as Error Handling: Coding helpers built on machine learning (ML) can spot trends in historical data as well as spot common faults. The coding helper will highlight this if the engineer performs such a mistake while developing. After implementation, ML can also be used to examine logs and identify faults that can be corrected. The software developer becomes proactive in resolving issues as a result.

6. Rapid prototyping: It can take years or even months to turn business requirements into technology. However, ML is currently speeding up development by enabling others with less technical expertise to create new technologies.

7. Using AI with Project Planning: The neural network is an incredibly powerful repository of knowledge. Even more astonishing is the fact that our individual cognitive capacities vary. No two project teams will approach the same project with the exact same ideas. Come on ML. ML can provide numerous variations of a situation that are comparable to the brain by imitating human intelligence.
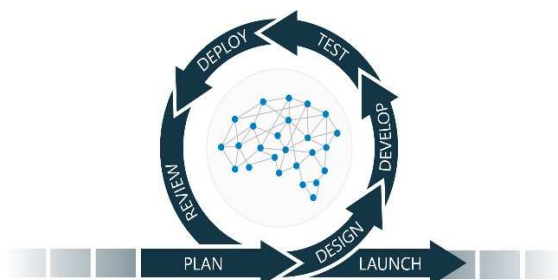


**Figure 2**: Incorporate Artificial Intelligence in Agile Technology

8. Risk Estimation: Informed risk estimation decisions in software development are difficult to make since

they must take financial and time restrictions into account. Healthy completion rates seem probable for every project at first. The real kicker, though, is that as soon as the project is launched, the surrounding environment and project dependencies change the probabilistic scenarios.

9. Project Resource Management: Having the correct individuals working on the project is essential for delivering a software solution. Once more, AI examines in-depth historical data on previous initiatives. It is now simple to identify developers who are prepared for deployment.

## IV. ANALYSIS AND FINDINGS

The complexity of today's software products business applications necessitates the highest level of thorough testing prior to its release, implementation, and go-live. For business owners to choose the best application for production deployment, tests for the application must go smoothly and produce positive results.
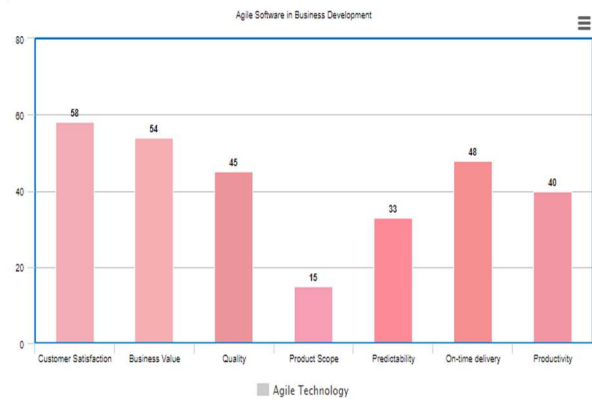


**Figure 3**: Impact of Agile Software in Management

From the graph it is clear that how it has influenced the market management techniques. Depending upon the need user the company can change quickly and feedback is also quickly so that customer satisfaction is obtained and this would lead to an increase in the quality and productivity of the organization.Agile methodology employs a developing strategy and seeks to adapt to changes. Teams may now learn among each new iteration thanks to this. The risk of spending extra time whenever a change is required is eliminated by the agile process.

Teams can now collaborate with customers directly instead of with other teams thanks to this. This enables them to purposefully accomplish a defined result. For a draft of a future project, team members can build a solution as well as process prototype. The flexible nature of the agile methodology boosts the performance of the PM team. Agility was viewed by companies from a variety of angles as being superior to the Waterfall approach. Agile methodology is well-liked outside of the IT sector in the industrial and automotive sectors.

Using machine learning, AI marketing uses tactical data analysis to make decisions more quickly depending on

campaign as well as customer context than its human counterparts. Team members now have more time to concentrate on strategic projects that will eventually guide campaigns with AI support. Chatbots and AI are now being utilized to support customer service representatives. Customers with simpler questions can use chat bots, which will respond immediately and accurately, making customer service more efficient. Using predictive modeling, which employs a combination of learning algorithms, techniques, models, as well as datasets to forecast future behavior, AI marketing solutions enable advertising marketers to make the best use of this data.

Digital marketing teams may benefit from having a better understanding of the kinds of things consumers will seek out, which will help them position their campaigns more effectively. By providing dynamic pricing, AI marketing can aid in increasing brand competitiveness. By analyzing vast amounts of historical information competitive data, AI platforms are able to provide real-time pricing recommendations for products. The retail industry has had particular success with this tactic. It enables businesses to raise sales, differentiate themselves from rivals, and modify prices to match the demand for particular products.
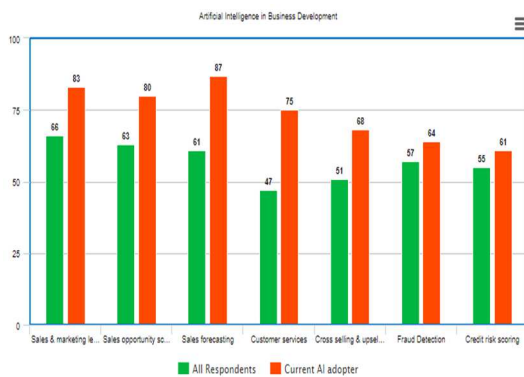


**Figure 4**: The impact of Artificial Intelligence on Business Management

By this way the sales and productivity will be increased as well as the company would be up to date with the market strategy.AI can assist in automating tactical procedures like the classification of marketing data, responding to frequent consumer inquiries, and performing security authorizations. Marketing teams now have more time to focus on critical and analytical tasks.

TABLE I: COMPARISON IN TERMS OF BUSINESS MANAGEMENT

| Business Management | All Respondents | Artificial Intelligence | Agile Technology |
|---|---|---|---|
| Customer Satisfaction | 59 | 83 | 62 |
| Quality | 49 | 64 | 59 |
| Productivity | 51 | 57 | 68 |
| Predictability | 49 | 64 | 61 |
| Business Value | 58 | 80 | 60 |

Table shows the comparison of Artificial Intelligence and Agile technology in business point of view. It includes the comparison in terms of marketing, customer services, fraud detection and how the maintenance deployment. It shows that AI has increased its demand in business due all its features. The table itself gives a clear picture that

Artificial Intelligence is one of the leading technologies in the market management in terms of productivity as well as in the customer satisfaction. This survey was focused only one particular company. Agile technology is also growing daily while compared to all other responses.

Modern times demand automated software testing, especially when success depends on quick time to market and excellent customer service. It may alter how testing is conducted and the approach approached. The testing ecosystem could benefit from a variety of AI-based possible solutions, including:

- Shorten cycle times for releases

- Switch from manually building test cases to automated processes.

- Use AI, data, techniques, and cutting-edge methodologies to improve testing.

The usage of AI is mostly focused on test automation and the idea of automatically developing test cases. With the built-in standards, it reduces its level of effort (LOE) and maintains the consistency of the process.The second beneficial application of AI focuses on automatically creating test code by comprehending user requirements as well as acceptance criteria.

## V. CONCLUSION

In conclusion, AI-based automated testing is a fantastic advancement from the perspective of testing and can significantly minimize the tester's labor. For any mobile and web apps, they quickly improve overall end user experience while reducing cycle time.

This study presents the results of the analysis of the information gathered from team members of an agile software development project. Companies utilizing an agile development approach can explore using alternate techniques while developing new projects by identifying these consequences. Agile as a methodology is being used more frequently, which suggests a larger acceptance of agile methods. Additionally, it focuses on numerous ways to incorporate artificial intelligence methods into agile development.Additionally, it offers details on how the iterative development method may be used to artificial intelligence development and compares agile technology with artificial intelligence in relation to business development.

Future research can be done to determine the effects of a particular agile methodology's practices used in software development projects. To evaluate and validate the results, this experiment could also be repeated in other nations. Upcoming projects can also be conducted to comprehend the approaches employed by various teams, including project managers and integration teams.

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# Analysis of blockchain technology based on digital management systems and data mining technology

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*Abstract*—**As information technology and wireless technology have developed, digital archive management systems have grown in popularity. Electronic files and data are mostly stated based on the access database, whereas old paper repositories, have inbuilt individuality and powerful tamper-proof alteration. With the use of the Internet, marketers can now connect with their current clients on a deeper level, create new online markets, and generate new desires. This active market participation targets clients more successfully using current technology. This study examines how blockchain technology might affect a company's marketing initiatives. This study combines distributed ledgers, consensus procedures, encryption methods, and blockchain technology. Businesses that desire to engage in green products have access to a number of incentives. Electronic information management is therefore necessary because of its ability to securely retain and access large volumes of data while keeping the confidentiality of computer system functionality.**

***Keywords: Digital Management, Blockchain technology***

## I. INTRODUCTION

Blockchain technology has the same kind of disruptive potential as the World Wide Web. The fundamentals of blockchain technology are currently being used for many other categories of purposes, like capital management, healthcare, banking, and insurance, to mention a few, in just a few years beyond the early cryptocurrency implementations. Through openness, immutability, and constancy, blockchain improves the accuracy of research from the perspective of these applications [1].

Unfortunately, the very characteristics of blockchains that make these advantages possible also present novel data management issues. Application developers and data engineers can improve the design and administer a broad operation system where a blockchain and a complementary repository may interact if they have a solid understanding of blockchains in aspects of how the data are handled and controlled. Additionally, it could prevent flawed designs, mistakes, and problems brought on by erroneous assumptions

about how blockchains operate [2]. In other words, a quick comparison of the performance and distinctive aspects of blockchain with databases has been made. These efforts are supplemented by our work, in which we further conceptualize the differences in accordance with how application developers often view the layers of software systems. For example, in terms of the blockchain as a data store and a processing network, the following open issues could be observed:

Blockchains use a variety of data models, including key-value and document stores, and they frequently combine these with "off-chain" data storage. Consequently, unlike the abstract and declarative query strategies in conventional databases, searching and retrieving heterogeneous data requires hand-crafted and ad-hoc programming efforts in blockchain-based systems. Knowing how to retrieve, consolidate, and analyze data in this diverse environment effectively is crucial given the rising need for blockchain data analytics at scale. Blockchain networks will eventually have to handle and store increasingly more data [10]. Furthermore, many current solutions exhibit significant latency, poor scalability, and low throughput. Additionally, public blockchains impose fees for both maintaining and altering data in order to cover the high cost of establishing confidence between parties to transactions through consensus and to deter the storage of inactive data. By closely examining the on-chain/off-chain data architecture choices made by a blockchain application, some of these issues can be resolved. Data storage with blockchain technology is both open to the entire network and everlasting. This raises a number of data governance concerns, including privacy and quality control. Although it is advised to store data in encrypted form, doing so may expose data to brute-force decryption assaults later on (for instance, advances in quantum computing may render present encryption technologies ineffective) or result in inadvertent privacy leaks [11]. It is crucial to seriously rethink these concerns in order to contribute to the creation of suitable frameworks for blockchain data governance that will support efficient administration and appropriate application of blockchain technology.

The idea of a blockchain, a decentralized distributed ledger, to control the circulation of his freshly formed cryptocurrency called Bitcoin over ten years ago [16]. Many studies on this new technology have been published in the last ten years. The literature on blockchain for science, however, is scarce. Mostly all scientific areas have written articles on the multidisciplinary notion of blockchain [1].

The growing number of blockchain-based solutions in a variety of areas is indicative of the demand for blockchain [3]. As it can provide a safe and apparent operation framework, blockchain has been utilized to provide a safe information handling atmosphere that facilitates private information exchange through encryption and access control. A number of studies have examined the technical and legal ramifications of using blockchain to create GDPR-compliant personal systems for data management [4]. Others have taken advantage of blockchain technology to suggest solutions that allow for secure data transmission, while actions on data can be verified and tracked for responsibility, visibility, and authenticity tracing [5].

This paper's objective is to provide an outline of how blockchain data management technology may affect scientific research.

Scholars, authors, and anybody else who supports the scientific community may find this analysis to be significant. Blockchain has been suggested as a potential remedy for this issue. The subsequent research query will influence the course of this study's investigation in order to further assess this solution.

Numerous studies on the subject of collaboration-inefficient digital management have been undertaken throughout the years. It was noted as a significant tactic to boost overall quality and gain competitive advantages. According to the literature, businesses must concentrate on various techniques in order to reap the full rewards of collaboration. Since cooperation necessitates the disclosure of sensitive information and open communication between the many stakeholders, several academics have noted that trust is a significant problem.

The objective of this study is to give organizations that operate as data controllers the tools and resources they need to strategically exchange personal data with other firms in regards to further their corporate purposes. The final principle of this research is to offer a safe option for transferring personal data that complies with GDPR's criteria for accountability and openness. We provide a structure for sharing personal data that aims to do the following in order to accomplish the stated goal and meet the mentioned criteria.

- Creating a protected data-sharing platform that offers openness and accountability of data and processes using the blockchain's architecture and programming style.

- Developing an identification and access control management system based on the blockchain.

- Implementing a reliable cryptographic-based strategy to impose access controls on the blockchain.

- Making use of Intel SGX to provide responsible decryption and record logging.

## II. Literature Review

Blockchain technology, which has emerged as the most significant innovation of the twenty-first century, has sparked the development of new identity management notions to address privacy and security concerns while enhancing decentralization and user control in blockchain infrastructure transactions. The three most well-known blockchain-based identity management systems—uPort, Sovrin, and ShoCard—are examined and analyzed in this article. Then, it assesses them in accordance with a set of characteristics of digital identity that define the effectiveness of an Identity Management solution. In order to make it simple for readers to choose the system that best fits a given case, the comparison analysis's findings are provided in a clear and plain manner [6].

In order to emphasize important concepts and considerations to keep in mind while integrating a blockchain as a data repository into a greater operating system, we will study blockchains from the standpoint of a developer in this study. The project aims to advance the expertise of the blockchain approach as data storage and to encourage a logical approach to its integration into substantial software systems. We should first recognize the basic architectural levels of a common operating system with data repositories in regard to visualizing each stages in terms of a blockchain. Second, we evaluate the placement and movement of data within blockchain-based programs. We look at data management concerns for blockchains in the third segment, particularly as distributed data storage. Fourth, we explain reliable data analytics enabled by blockchain technology as well as statistics of blockchain data. Finally, we look at the privacy and quality assurance concerns with data governance in blockchains [7].

In the present Information Technology (IT) revolution, ideas like blockchain and data mining are more than just trendy buzzwords. Cryptocurrency growth has actually made blockchain more well-known, although data mining has been a part of IT for a very long time. Big data can also refer to information that is recorded in a blockchain, and data mining techniques can be used to uncover information that is concealed there. In a summary, this article demonstrates how these two study fields interact. We reviewed methods for mining blockchain data in this article, but we also demonstrated a number of practical uses. Anomaly detection and fraud detection were given special consideration because they were found to be the most widespread uses of using data mining techniques on blockchain data. The obstacles to

further study in this area are discussed in the paper's conclusion [8].

In this article, we intend to outline the main challenges with current information-sharing platforms that rely on trusted third parties (TTP), as well as security and protection concerns related to them, and how they might be resolved using blockchain and data science technology. What are the tools, methods, and algorithms offered by blockchain technology or data science for information, network, and data security? Our focus will be on cyber security data science, which is basically similar to these fields in regard to security methodologies and intelligent decision-making in real-world implementations. Another goal is to demonstrate the benefits and drawbacks of Blockchain over data security in various organizational sectors [9].

## III. RESEARCH METHODOLOGY

We will conduct our investigation in accordance with experimental computer science methodology by bringing forth a solution to a real-world problem, creating solid evidence, and then evaluating the security of the suggested solution. First, it was essential to assess the pertinent body of expertise for safe information exchange and also the supplementary writings in the areas of identity management, access control, clarity, and integrity remedies in distributed systems in order to accomplish the research goals stated above. The difficulties that contemporary systems must overcome in the face of increasing security and regulatory constraints were then deduced. Then, we investigated the suitability of the blockchain approach, Intel SGX for trusted computing, and other cryptographic primitives in order to develop an information exchange architecture that complies with these demands. We suggest SeTA, an identity management, access control management, logging, and monitoring-based data-sharing framework. We outline and put into practice each module separately before using the outcomes to develop a theoretical use case that shows SeTA as a whole in a cloud federation paradigm.

We suggest SeTA in regards to make the sharing of personal data more secure, transparent, and accountable. Three different parts that each have their own functions make up SeTA.

Identity Control (Identification and Authentication): A user must first create some sort of identifier if they want to retrieve personal data (referred to as a token). The identity manager (IdMgr), a blockchain contract used to hold the tokens on the blockchain, registers the token's specific feature with it. The user must be able to confirm the validity of the token when the data provider tries to validate them.

Access Control (Authorisation): The user can declare their right to access a specific amount of information to the data provider using the validated token. The user's request is processed and private and encrypted data is sent to them when Access Control Manager (ACM), a blockchain contract used to record and assess access control policy on the blockchain, receives authorization.

Monitoring and Logging (Auditing): Using a cryptographic method, only authorized users can use the secret to reassemble the key and decrypt the information. The system creates a data access log during the decryption process. For responsibility reasons, the system keeps all logs and other data in the Log Storage as shown in Figure 3.1.
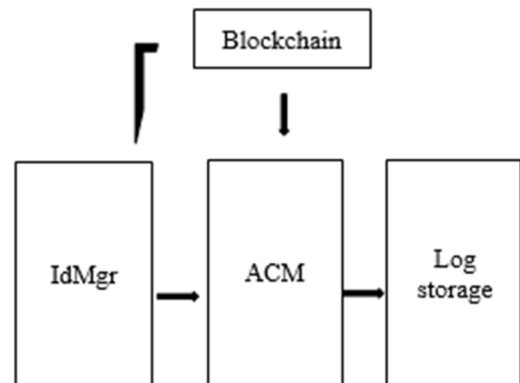


**Figure 1**. Overview of SeTA's functionalities.

In conclusion, SeTA runs cryptographic protocols on tried-and-true execution platforms like Intel SGX and blockchain to enable multiple individuals to transmit private information in a safe, usable, and dependable manner. SeTA empowers data providers—companies performing as data controllers—to disclose private information at various stages of granularity and authorization while upholding GDPR's standards for accountability and integrity [13].

Blockchain is a decentralized database that makes computations on data impossible to change. A group of nodes known as miners that operate a consensus process ensures the integrity of the data and computations kept on the blockchain. Therefore, blockchain architecture offers the necessary stage of security and clarity to run SeTA's components decentralized without depending on outside services. To facilitate access control and accountability, SeTA uses a federated identity manager built on blockchain technology. Each identification, known as a token, includes a single identity feature that a user (data consumer) can apply for. On personal data, data providers impose attribute-based access control measures. Data are encrypted using a symmetric key, and the user can only rebuild the key if they comply with the access control policy [12]. This is how policies are enforced using a cryptographic approach that provides efficient key management. Another contract devoted to preserving and analyzing access control policies is used to carry out the policy review procedure on the blockchain.

## IV. RESULTS

The throughput of the produce token function is shown in Figure 4.1 Create actions are more difficult and time-consuming than query operations because of the consensus algorithm. The ordering service's setup, such as the network's number of endorsers, has an impact on the chain code's performance. The latency increases linearly with the request rate, as can be shown. Less than one second is the typical response time for each request, which is still quick when your account the consensus protocol.
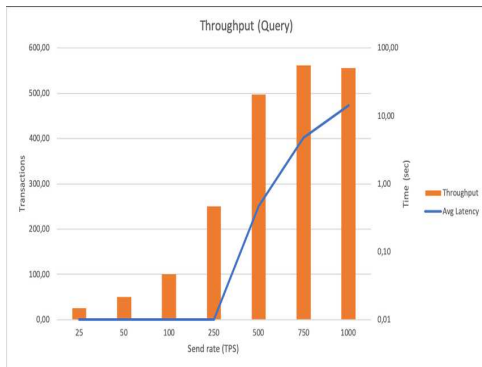
**Figure 2** Throughput for querying custom chain code

We use a single data point to describe the research since computations pertaining to other data points can be done in parallel because they are unique and identical. The average response time and throughput of the ACM for various request rates are shown in Figure 4.2. It shows that the throughput improves exponentially as the rate at which requests arrive and the requirements for each policy rise.
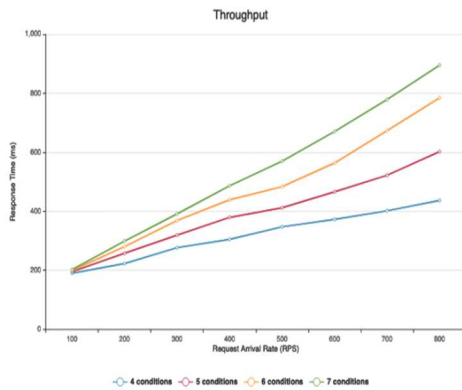


**Figure 3**. Throughput of evaluating policy for different request rates.

Figure 3 illustrates the response times for the policy assessment and publishing techniques in relation to the magnitude of the policy. As the count of restrictions in a policy rises, the response time to assess access permission against it rises, despite the fact that the response time to publish policies with varying policy sizes is practically constant. A policy with 10 conditions can be evaluated in significantly more than one second. The time required to obtain the identification tokens and then assess them in light of each policy requirement could provide a justification for this.
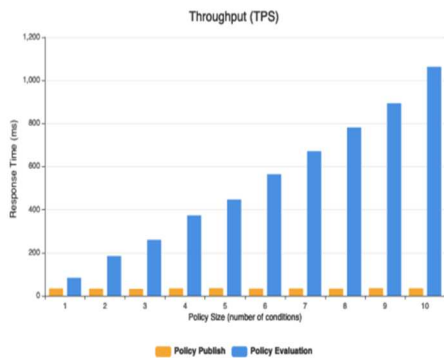


**Figure 4** The effect of policy size on the policy evaluation throughput.

The response time for publishing access control policies of various sizes is shown in Figure 4.4.(Different number of conditions per policy). A policy may have one to ten conditions, depending on the size of the condition. The reaction time, which averages 33.14 milliseconds, stays nearly constant as the variety of conditions per policy rises. This is mostly because, based on the consensus protocol and network setup, blocks in a blockchain system are submitted to the ledger at a constant rate and have the same size irrespective of the amount of the payments.
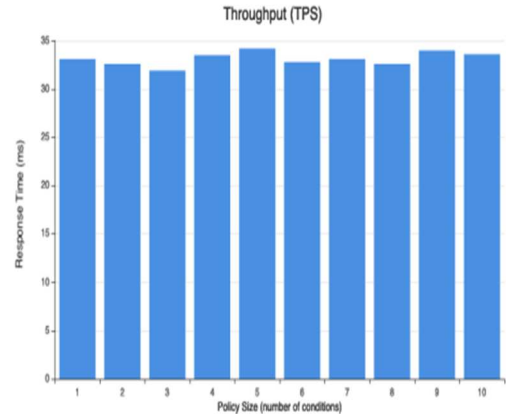


**Figure 5**. Throughput of publish policy for the various count of conditions per policy.

Table 1 displays the findings of the responsible decryption protocol that was applied 20 times to a single piece of data secured by a two-condition policy, with a group size of 1000.

TABLE I: THE AVERAGE COMPUTATION TIME FOR RUNNING ONE ROUND OF THE PROTOCOL.

| Computation | Time in seconds |
|---|---|
| Data encryption | 0.30643 |
| Key generation | 0.12689 |
| Log verification | 0.20642 |
| Log generation | 0.1001234 |
| Key derivation | 0.004321 |
| Data decryption | 0.1097234 |

The average time to produce the key and ACV on the side of the data supplier and to rebuild the solution from the KEV on the decryption equipment of the data consumer are both shown in Figure 4.5. When contrasted with a non-SGX environment, we see that executing Key Extract () in the SGX enclave results in overhead varying from 35% to 150%.
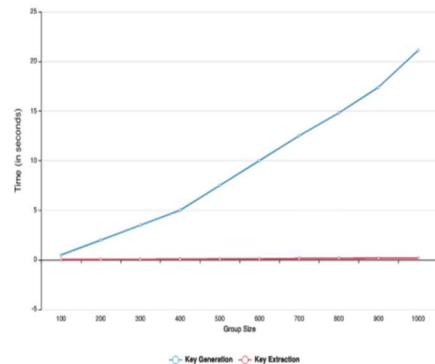


**Figure 6** Average key generation time for various group sizes.

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## V. Discussion

Blockchain opens a wide range of options for scientific data management. It is challenging to put changes into place or maintain a given standard because of the large number of stakeholders engaged in the research and publication operations. To ensure the calibre of their work, several research organizations, journals, publishers, and universities have developed their own standards and procedures. Determining the justification for these many stakeholders' adoption of this new technology is crucial. The suggested research design tries to uncover these justifications because of this as well [14].

When coding the papers to determine the traits, advantages, and difficulties of blockchain, some limits were found. The research supporting the possible rise in the cost-effectiveness of blockchain technology is sparse and mostly predicated on conjecture. Therefore, additional research is needed to verify the rise in cost-effectiveness. Additionally, because of private key restrictions, the private key is seen as a flaw in the blockchain. Moreover, the private keys open up many additional possibilities, such as allowing individuals to control their personal data and enabling academics to share their data with certain groups of individuals. There isn't much literature that describes the private key as a problem for blockchain [15]. Timing data has been kept apart from data handling due to the peculiarities of blockchain. Even though data timeliness is one of the data handling properties. It was decided to retain the timestamping feature separately because it is crucial for science. This enabled the timing feature to be coded with more precise information.

## VI. Conclusion

Further than the initial surrounding Bitcoin, we are seeing the development of blockchain systems. A blockchain is commonly utilized as astructural element in large-scale distributed operating systems to store information due to the technology's quick adoption. These systems hold data that express a variety of intricate application domain needs in addition to having a wide range of formats and contents. Therefore, evaluating blockchains to evaluate and comprehend their possibilities and difficulties as data storage is a current and pertinent field for the academic and industrial groups who are interested in exploiting the innovation. Before we complete, we'd like to emphasize a few of the most important lectures.If application developers initially have a solid knowledge of a blockchain as a data repository and are able to understand and estimate the properties of blockchains in contrast to the conventional data stores, they will be better able to build and execute a blockchain-based application. In this regard, we made three achievements: We did three things: (i) we provided a clear viewpoint on a blockchain as a data store, conceptualizing how its logical and physical layers differ from traditional data stores; (ii) we looked at different data options, recognizing how each design decision affected the system as a whole; and (iii) we emphasized the key tasks and tools intricated with running a blockchain as a data repository.Second, modern data management concerns for blockchains present both threats and potential if one looks above digital currency. Data analytics and data governance

were the two categories we chose in particular for consideration. The majority of the attention on blockchain approach has been on methods for creating modern applications. The use of blockchains to empower new kinds of data analytics and tools and techniques for evaluating blockchain data at scale are both developing fields. Another important topic that should get more attention from the research and business community is data governance.

Blockchain technology has promising futures in the funding of tokens and digital currencies. The latter gives the project team and company excellent business imagination. Although there are currently no large-scale commercial uses, it is anticipated that this will change as more people become aware of blockchain technology and as money is invested in its research and development. Because of this, blockchain technology and the financing method for cryptocurrency tokens should continue to draw the interest of both the market and regulatory agencies. In the meantime, regulators are wanted to actively inform, direct, and utilise blockchain technology in value innovation.

Of course, there are other areas that have not been thoroughly covered but merit future investigation, like the effective integration and indexing designs created for numerous heterogeneous blockchain data stores or a more thorough analysis of smart contract techniques and the proper application of it in data management. Some of these topics will be investigated in the future. To combine several blockchain data sources, for example, our current work involves researching architectural patterns and template designs.

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# Online Automobile Rental and E-Marketplace with Augmented Reality (AR)

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*Abstract*—**The major goal of this research article is to alleviate the suffering of people who need a temporary vehicle or are looking to purchase a new vehicle. Those who do not possess a car, owners of damaged or destroyed automobiles awaiting repair or insurance settlement, or out-of-town travelers, for example. The technology of augmented reality can be utilized to enhance user experience in the process of purchasing new automobiles. Also, being able to add their own cars to put up for sale, can be rewarding to users who want to get rid of their old vehicle easily.**

*Keywords- Augmented Reality (AR), E-Commerce, Automobile Sales, Car Rental, 3D View, Model-Viewer*

## I. INTRODUCTION

Augmented reality (AR) is a relatively new technology that allows humans and machines to communicate by superimposing virtual information on the real world. Potential applications can be identified in a wide range of contemporary research fields [1].

Many automakers have become interested in augmented reality (AR) in recent years, owing to its accessibility and potential for developing novel solutions. AR is a type of human-machine interaction (HMI) in which virtual components are introduced and superimposed on the real world, giving the impression of a more enhanced reality [2-4].

Automobiles are not among the items sold through electronic media such as websites and online shopping apps. However, as end-user comfort has become an important aspect of the shopping experience, several suppliers have begun sending vehicles straight to clients' homes.

This may become commonplace in the not-too-distant future, and dealerships and showrooms may be fully phased out of the supply chain model. While there could be a variety of reasons for this, the most important thing for us to focus on is making the process of buying a car as simple as getting groceries. The first stumbling block in this mega-evolution may be seeing the car in person.

## II. LITERATURE SURVEY

The existing car rental system prototypes and web-based applications only implement either car rental or sales. There is no single application to cater to all kinds to sales and rental application that leverages the power and usability of Augmented Reality [5].

There are a few products in the market pertaining to car rental and sales, but there is no single application that caters to wide ranges of automobiles, offering rental and sales to the customers at the same time, all on a web application which can be used on various system architectures.

Two case studies, Uber and Ola have been discussed below is shown in Fig 1.

## A. Existing System
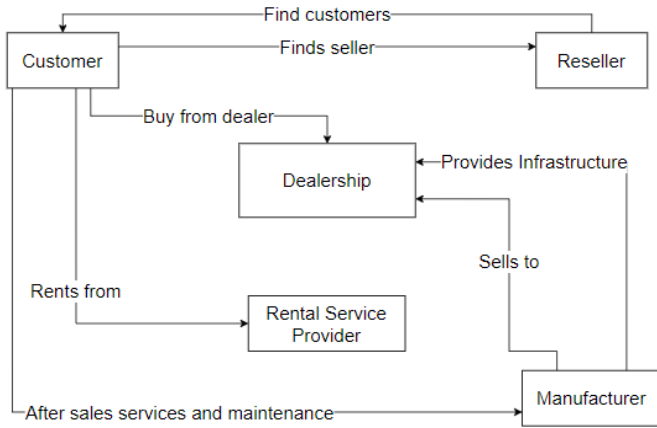


Figure 1: Flowchart explaining transactions in present system

- **Uber:**

"Uber drivers offer their customers "shared rides." The cost of each ride is paid for by the customers. The mobile app enables users to book rides and make payments online. After register in the uber App, they can request shared rides. Uber drivers may find ridesharing customers via the Uber driver smartphone app. This application does not provide automobiles for sale [6]. Ride sharing and rental is available.

- **Ola:**

Ola Cabs provides a selection of service tiers, from budget-friendly to opulent. The service can take both money and internet payments, and the cabs may be booked thru a phone app as well as their websites. There are no multi-platform web applications or virtual reality functionalities in this app [7].

## B. Proposed System

The proposed approach has the potential to cut travel costs to the company's automobile rental facility. Customers can download the app to their phones and create an account with a car rental provider. As a result, you only have to fill out the information once when creating an account. You may easily book a car using your phone, cancel the transaction, confirm the transaction, and receive an invoice after creating an account [8]. They have a single database where they may accept rental car applications and book automobiles as needed. The system creates statistics on the number of cars available for lease in a certain period, the amount of revenue received in that period, and the total cost of the firm during that period automatically. The system may provide reports that show how much each customer contributes to the company's annual revenue as well as forecast how many new customers will join each year. Authentication information must be provided by system users. Employees, in particular, have limited access to some menu items. As a result, each employee can only access content that has been granted to them, and each employee is

responsible for the transactions that they carry out is shown in Fig 2.
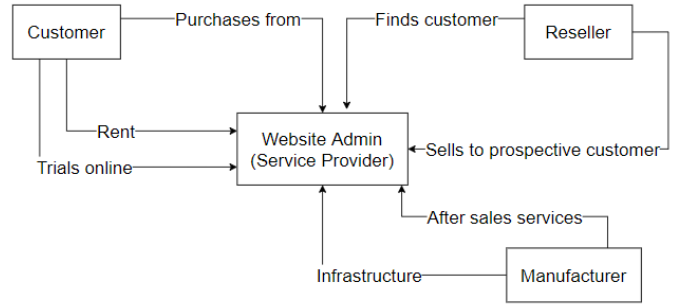


Figure 2 : Flowchart explaining customer-centric operations in Proposed System

## III. IMPLEMENTATION AND METHODOLOGY
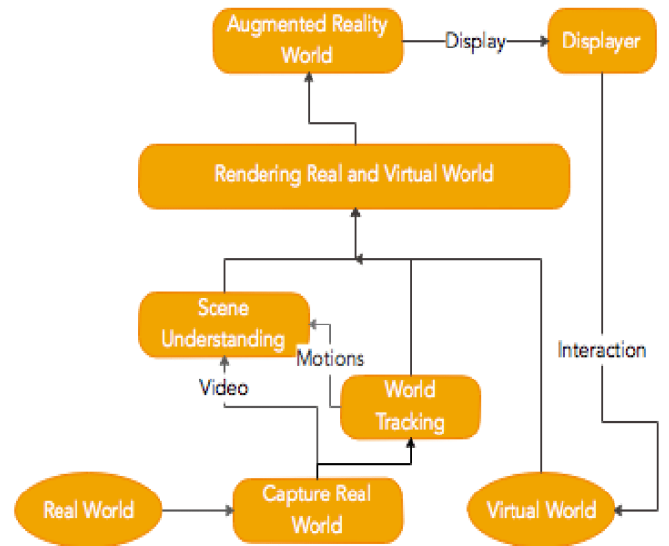


Figure 3: Internal working of the Augmented Reality Framework

Technological Requirements:
- MySQL
- PHP version above 5
- <model-viewer> web component supported browsers
- Android device with AR Services above Oreo 8
- WAMP Server requirements
- Bootstrap installed to server

What is the definition of a web component?

A web component is a one-of-a-kind HTML element created with the help of conventional web platform functionalities. For all intents and purposes, a web component is a standard element. It has a distinct tag, properties and methods, and the ability to fire and respond to events. To put it another way, you don't need any specific knowledge to use it. I'll show you some things that are unique to model-viewer> in this Figure 3.

<model-viewer> web component:

The <model-viewer> web component can be used to see and interact with 3D models on the web, as well as to place and interact with those 3D models in Augmented Reality. <model-viewer> is a Google maintained web component module that aims for better and easy implementation of 3D and AR in the web. To include <model-viewer> in a package, either one can install it via npm (Node package manager) or by including the package via script links from a CDN (ex: unpkg). The model viewer web component has been developed based on WebXR and Three.js.

Gltf:

Three-dimensional environments and animations frequently use the glTF file type. There are two possible file extension for glTF files:.gltf (JSON/ASCII) and.glb (GLB) (binary). While a.glb file is completely self, a.gltf files can rely on external binaries and textural elements or be extremely self themselves. This open specification, which supports 3D model geometries, presentation, scenario networking topology, and visual effects, was developed and is maintained by the Khronos Organization in Figure 4. It is intended to deliver 3D visuals quickly and easily while minimizing size of the file and application computation. Its creators have called it the "JPEG of 3D" as a response [9-12].



*Figure 4 : A gltf (gltf binary - GLB package) rendered on a Android 10 device*

Sample code for <model-viewer> web component:

```
<model-viewer src =
"folder/3dfilename.gltf" ios-src =
"folder/3diosfile.usdz" alt = "Alt text
incase element does not load">
```

User Modules:

- Homepage
- Car Catalog
- AR Experience
- Product Information Page
- User Login / Register Module

Registered User Modules:
- User Dashboard
- Booking / Purchase History
- Booking Status Page
- Payment Page

Administrator Modules:
- Admin Dashboard
- Admin Management
- Catalog Management

IV.    RESULTS

The use of AR [13-16] enabled automobile sales and rental systems, has a lot of leverage and enables users to make use of the best of the technology available to make automobile purchasing a good and intuitive experience. The web application developed has features like Booking, Sales, Rental and other website specific services like Testimonials, Booking History, Admin Management, and User Management in from Figure 5 to Figure 11. The Administrator can manage webpages, automobiles catalogues, and others.
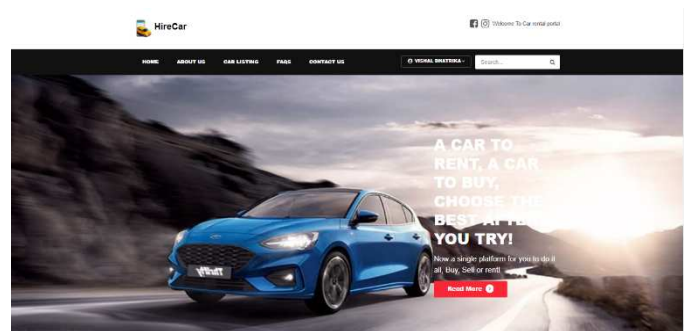


*Figure 3 : Home page screen grab with banner and nav-bar*

## Manage Vehicles



| # | Vehicle Title | Brand | Price Per day |
|---|---------------|-------|---------------|
| 1 | 24K GT | Datsun | 3453 |
| 2 | X300 | BMW | 859 |
| 3 | Terrano | Nissan | 560 |
| 4 | Lorem ipsum | Maruti | 5636 |
| 5 | ytb rvtr | Toyota | 345345 |
| # | Vehicle Title | Brand | Price Per day |

Showing 1 to 5 of 5 entries

*Figure 4 : Admin page for managing vehicles' entries.*



*Figure 7 : AR view in a mobile device*



**Vishal Dhatrika**

**GENRAL SETTINGS**

Reg Date - 2021-12-20 15:32:46

Full Name
Vishal Dhatrika

Email Address
dvishal35@gmail.com

Phone Number
9999888878

Date of Birth (dd/mm/yyyy)
dd/mm/yyyy

Your Address

*Figure 5 : User Profile Management page*



*Figure 8 : Product information page*



*Figure 6 : AR view loaded on a desktop/laptop, showing 3D view.*
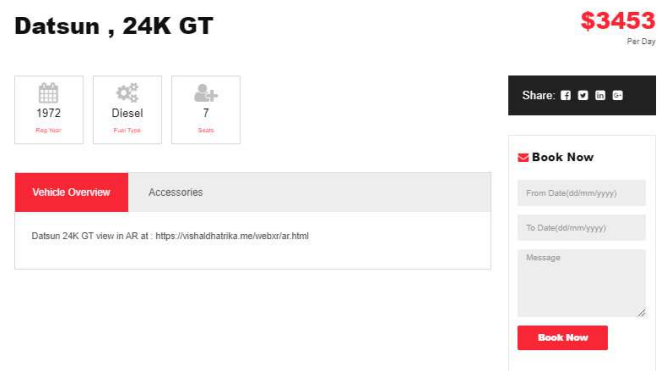


*Figure 9 : Product Information page contd.*

## V. Conclusion

This approach ensures that receipts and log books are managed with little or no paper. With the help of this technology, customers may easily rent a car whenever they need it [17-18]. The user can easily conduct the investigation. The automobile can be added by the administrator so that the user can see the available cars and book one. The administrator can manage the rent so that users can see it and book a car. The administrator can quickly review the feedback and respond to any questions. Angular can be used to create the front end user interface. On the web server, the data might be stored in databases.

Customers will benefit from the AR gallery to view autos in the actual world, as it will help them visually be drawn to the vehicle and acquire confidence before purchasing it.

## VI. Future Work

Extend the functionality to all types of browsers, and add support for laptop and desktop webcams to display AR material, bringing a diverse range of AR in E-Commerce applications to life.

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# Fraud Account Detection on Social Network using Machine Learning Techniques

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*Abstract:* **Nowadays, a person's impact is frequently determined by the number of followers he or she has on social media. To this aim, the prevalence of false accounts is one of the most pressing issues, with the potential to disrupt a wide range of real-world and economic activity. Bot followers are dangerous to social media as these could alter perceptions of popularity and influence, which can have a ample amount of impact on every sector. As a result, new approaches must be developed to enable the detection and classification of bogus accounts. This study gives novel method for distinguishing original profiles. The method uses information gathered automatically from huge data to characterize typical patterns of fake account.**

*Keywords-: Social media, Tweets and Hashtags, Security, Machine Learning,*

## I. INTRODUCTION

Instagram and other sites are trending now-a-days. Individuals and businesses use social media to express themselves, sell products, and outline future company and organizational policies. Many hackers try to hack the privacy of users and exploit their details by making false accounts, which has been a source of importance for public as the usage of social media grows. As a result, social media sites are working to identify problematic accounts, which cause more damage than any other type of cybercrime. The usage of similar methods those ignore the quality of shared buddy networks among users, despite the fact that we assume that the most connected the sharing bond networks of people are, higher their similarity. The data which is generating in huge amount daily is really challenging for machine learning. As the no of fraudulent users in datasets is less than the number of fake uids in prior works, some regular users were considered to be fake in order to execute the recommended methods.

The preceding premise is incorrect, and as a result, the logic of learning will be questioned. The purpose of this paper is to introduce a methodology for undoing the challenges presented and to increase the efficiency with which they are solved. The approach of preprocessing data by using the definition of comparable methods as we need to use the link's efficiency among user's circle increases the effectiveness in this research. To generate similar matrices between accounts, the introduced method based on the graph adjacency matrix was utilized, followed by the PCA algorithm. Finally, the method's performance was evaluated using a variety of classifier methodologies.

## II. LITERATURE SURVEY

Smruthi [1], they presented an idea for using natural language processing to detect bogus information. They used probabilistic context free grammar to detect bi-grams (PCFG). They analyzed their data using a variety of classification approaches in order to get the best model. They discovered that a model correctly identifies non-trustworthy resources 77.2 percent of the time. They suggested a simple method for detecting bogus news using a naive Bayes classifier. On the test set, the dataset was taken from a Facebook news article and had a total accuracy of 74%. This approach was used to analyze Twitter information from using unprofessional persons rather than journalists is good and far least expensive technique to quickly categorize true and false recollections on Twitter. They published an article in which they explain how social networks and machine learning (ML) tactics can be utilized to detect fake news [2]. They utilized a machine learning (ML) algorithm [3], implemented it in a Facebook, and tested it with a new dataset, attaining an 81.7 percent accuracy rate in detecting false information. Rishabh Kaushal applied three learning algorithms,

including Naive Bayes, Clustering, and Decision bushes, to some features such as tweet-degree and consumer-level features such as Followers, URLs, Spam Words, Replies, and Hash Tags. The general Accuracy, Spammers Detection Accuracy, and Non-Spammers Detection Accuracy are used to quantify improvement in unsolicited mail detection. Superior framework was used by author to identify fake information content. Initially, they used the Twitter API to extract content material capabilities and consumer services. Then, for classification and analysis, facts mining algorithms use functions such as statistics of network, upside-down photo searching, and checking of news sources [4].

This research aims to leverage several characteristics of the dataset that have not been thoroughly explored in the literature and to find a good means of detecting fake and automated accounts by utilization of various types of Machine Learning Algorithms. Rather of relying on a single algorithm to make a prediction, our system employs three separate classification algorithms to identify whether or not a given account is a phone account [5]. Support Vector Machine, Random Forest, and Neural Networks all produced positive findings, with the accuracy of prediction appearing to be higher when using Support Vector Machine in this case. These systems can be accessed via a client's web browser or via specialized host-site software [6]. It depicts the classification of Phishing detection methods. URLs, on the other hand, are analyzed and used to create a system that can predict if a URL is authentic or malicious. The blacklist and whitelist approaches are the most common methods for detecting phishing sites. Feature extraction, employed TFIDF and sentiment analysis techniques, as well as two classifiers: Neural Network and SVM The classifications were tested using several n-gram language models. Using both TFIDF and sentiment analysis, the network with 4-grams achieved 92.8 percent efficiency while the SVM with 5-grams achieved 89.3 percent accuracy [8]. discovered that Neural Network outperformed the SVM classifier, with an average f-score of 91.9 percent compared to 89.8 percent for the SVM. In addition, compared results to those of employed the dataset. As a result, deep learning techniques will be appropriate for bigger datasets, as they have been shown to outperform machine learning approaches on bigger datasets.

To count the number of times a word appears, term frequency is necessary, and inverse document frequency is used to assign weight to the words. It gives the most significant words the most weight and the least important terms the least weight. So, to save time and space in the detection, we combined both methods into a single method called tf-idf, which estimates the height of a certain wordThe train data is now classified into groups of comparable entities using three separate model algorithms: NB, SVN, et NNN. The test-data does not match the train data group with which it is matched [9].

Spam detection and filtration has attracted a sizable research community in the last two decades. The high cost and widespread impact in many instances, such as consumer behavior and bogus reviews, has prompted a lot of research in this field. The survey looks at a variety of machine learning algorithms and models that have been presented by various researchers. The majority of algorithms, according to this study, are based on supervised machine learning approaches. A labelled dataset is essential for supervised model training [10-11].

he prominent way for detecting bots and other unauthorized users is the feature-based classification method. It scales easily to huge OSNs and performs admirably. Fake users are often detected using graph-based techniques, although feature-based methods with profile attributes enable for early identification on SDN and bigdata is discussed in [12-14].

## III. PROPOSED METHOD

The research effort was done to discover and eradicate forty botched accounts, and the cyborg could not tell the difference between a human-created false account and a cyborg-created fake account. By establishing with false marking them, and acting as real as possible, we can readily separate phoney accounts. In this paper, we employ a mix of attributes to investigate extreme users and content adoption in social media, as well as forecast reciprocal reciprocity. Unique datasets containing millions of users were manually discovered, alerted, and suspended on Twitter due to their participation in extremist campaigns. The Machine Learning Element is currently being developed. We can easily distinguish a false profile by analysing data sets containing fraudulent profiles and determining if they are faux or real profiles. For the objectives of this work, library was used to change the data set into a data frame, making data manipulation and analysis easier. The Natural Language Toolkit (NLTK) is a tool that offers user-friendly interfaces to more than 50 lexical resources.

### A. ARCHITECTURE

The proposed architecture is shown in figure 1.
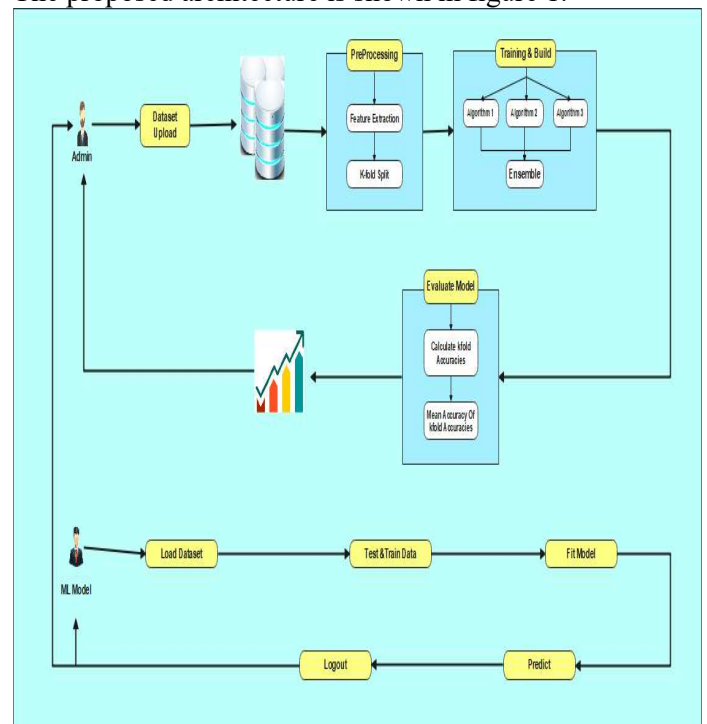
Figure 1. The Architecture of the Proposed Method

To ensure that the proposed strategy is effective, machine learning methods are applied. Methods were produced after the classifier was trained. The basic metrics and evaluation of classification models were presented in this segment, which first established the cross-validation technique and then offered the basic metrics and evaluation of classification models. A method for evaluating prediction models is cross-validation. The original data is divided into two groups using this technique: a training set for model training and a test set for evaluation. The original sample is divided into k equal-sized subsamples at random. The model is tested with one of these subsamples, while the rest are utilized to train it [15-17].

## IV. PERFORMANCE EVALUATION

The proposed method was tested on the Instagram dataset from Kaggle, which is a labelled dataset [18-19]. The Instagram data used to back up this study's findings is available on GitHub is shown in Figure 2.
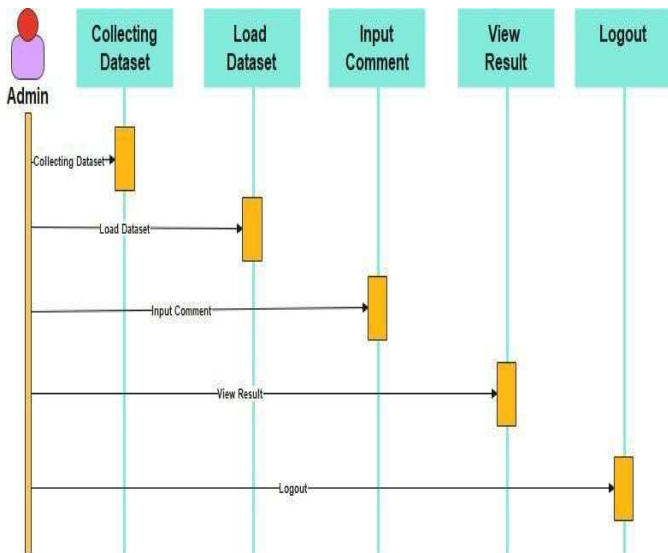


Figure 2. The process flow of the Proposed Method

This dataset has 5,384,000 people and 16,011,000 relationships between them. This dataset yielded 1,000 nodes, 991 of which were usual and 11 of which were fraudulent. In this set, the ratio of normal to erroneous nodes is 1:100. This data displays information on existing node relationships, after which the graph's adjacency matrix is produced, and measures of node similarity are calculated. Additional features are extracted using the PCA technique. This was then utilized to generate bogus data. When using this, the data distribution changes.

It means that the original 95 percent common users and 1% bogus users have been changed to 74 percent normal users and 28% frauds, and the information has been sent The FPR, TPR, accuracy, and AUC were calculated using the cross-validation technique to assess the model's performance is shown in Figure 3 & Figure 4.
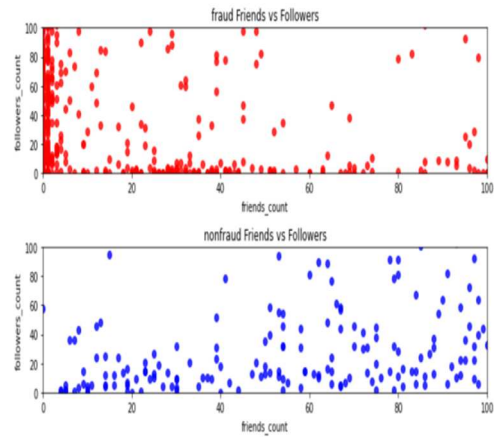


Figure 3. The Fraudulent Dataset
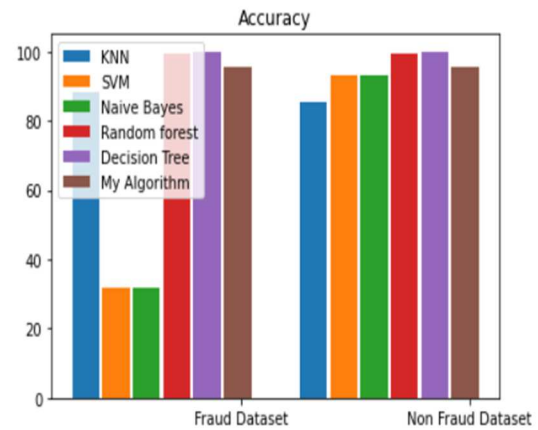


Figure 4. The Accuracy Analysis with existing Methods

## V. CONCLUSION

Technique dependent on the likeness contacts is presented to recognize phoney at Instagram. The adjacency matrix of the network graph was used to calculate buddy similarity criteria, and then new features were obtained using the PCA approach. This was used to equalize the data and send it to the classifier in the next step Cross-validation was used to train and test the classifier, and the results revealed that the Medium Gaussian SVM classifier performed well. The user buddy network structure was explored in the suggested method, and fraudulent users were discovered using similarity and classification methods. False accounts must function in the network in this way in order to be recognised as genuine or fake.

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# An Efficient Phishing Attack Detection using Machine Learning Algorithms

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*Abstract*— **Phishing is an illegal method which involves user's personal information at high risk. Phishing websites prey individuals, the cloud storage hosting companies and government agencies. Though there are various anti-phishing approaches like hardware as they are not cost effective and they don't choose these approaches. To overcome this, many software-based techniques are used. Zero-day phishing problem cannot be omitted with the existing models. To prevail over these issues and detect phishing attack an approach using heuristic methodology has been proposed. We classify whether a link is phishing or non-phishing based on the input features we take like Web Traffic and Uniform Resource Locator (URL). The proposed methodology is executed by retrieving datasets from phishing cases and Machine Learning model using algorithms like Random Forest, SVM, Genetic.**

*Keywords- Machine learning, web crawler, Phishing, Zero-day phishing Attacks.*

## I. INTRODUCTION

There is an exponential increase in number of internet users in many streams, like social media, e-banking, and online surfing. Alongside with it, there is a proportional escalation in cyber-crimes, which results in organization's information security risk. Study stated by a security rating company, indicated that there was a malware attack placing infrastructure at risk which resulted over 75% of the healthcare industry [1]. Hackers have stolen, user's personal information which includes names, dob, security questions, phone numbers, email addresses and password credentials from Yahoo, and also the company declared that there were around 500 million people. User's privacy and financial data are at stake due to Phishing attacks. To defraud internet users, fishers, create false websites which feel and look like the genuine ones. Attacking strategies are changed frequently by fishers to attack the system. One such strategy is social engineering which these attackers use. With this strategy, they also make the users to update the system forcefully. The false websites and spoof emails created by them look alike as an original company website. Moreover, they also threaten and demand ransom or to suspend the account. Hence, resulting in distrust on online business by individuals, business people. Though encrypted softwares are used for safety purposes there is still high risk for attacks. To omit these vulnerabilities and detect whether a website is benign or malicious, we have proposed a feasible model.

## II. Literature Survey

The Gogoi et al [1] explored to detect cyber-attacks on network trafficking data by using various existing machine learning techniques like supervised and unsupervised learning methods. A high false-positive rate was the outcome of the analysis.

The Peddabachigari et al [2] Support vector machine (SVM) and decision tree techniques were employed for intrusion detection. They have developed a model using DT predictions which led SVM boosted input data. By using support vector machine (SVM), decision tree, DT-SVM they approached an ensemble approach model. The outcome of the model shows that SVM has better performance than decision trees. The model had few false-positive rates in some cases.

The Lee et al [3] improved data mining pattern to detect attacks on the access systems. For calculating common patterns, extracting features they used data mining algorithm and then the extracted elements were applied separators for the acquisition model. Different feature sets were used for building differentiation models. DOS and probe attacks are part of time-based traffic model, whereas for slow probe attack was of host-based traffic model and R2L, U2R attacks for content models. The undertaken model detected new probes but the training database did not have U2R attacks.

The Ingre et al [4] model consisted classified dataset in which its divided into binary and five-class level. NSL-KDD dataset was applied to ANN to scale the performance. Intrusion detection accuracy was 81 percent, while attack type categorization accuracy was 79 percent.

The Boshmaf et al [5] discovered that socialbot framework intrusion is in danger due to the online social networks (OSN). Facebook was used as OSN delegate, where the consumers were duplicating the original bots of OSN which conquered the Facebook eventually when the consumers and bots had common allies. This led to not being able to detect such bots where privacy and negative consequences for other socially-aware software systems.

The Alomari et al [6] demonstrated that there was risk at the application layer where the botnet-based DDoS is part of the layer. Botnet-based DDoS attacks, as well as numerous attack type and tools, are discussed in the study. Botnets are distinguished based on DDoS assaults. The main disadvantage of the study was not ideal proposed methodology and had limitations in scalability.

The Sahay et al [7] for autonomic DDoS mitigation, suggested a DDoS defensive framework. The framework known as ArOMA was capable of network monitoring and abnormality detection., as well as using SDN to mitigate DDoS attacks. Scalability may be an issue in instances when a large number of mitigation requests must be addressed.

The Wang et at [8] used clustering for discovering DGA-based Botnets. DGA based on botnets are difficult to detect since they rely on DNS traffic patterns. The referred strategy is tested over a two-year period utilizing DNS data from an educational environment. The results were precise, but they were unique to the data set [24-26].

The Stevanovic et al [9] found out few bot detection techniques that made us of laptop getting to know in order to pick out botnet community traffic. The research looks at supervised learning strategies such as Support Vector Machines, Artificial Neural Networks, Decision Tree Classifiers, and Bayesian classifiers, as well as unsupervised learning strategies such as K-means, X-means, and Hierarchical Clustering. The visitors tracking and detecting goals are two features that are explored for the same. Botnets, communication protocols, and operational phases are amongst the traits stated. True positive rate, precision, false positive rate, recall, accuracy, error rate, and other factors are protected in the evaluation. Because the cost of false negatives is so large, there is a substantial penalty of error. This ought to end result in technical difficulties.

The Zang et al [10] proposed using the random forest technique to address imbalanced occupies in network intrusion detection system. To stabilize the dataset, they down sampled 10% of the normal and DOS classes. They examined the consequences of random forest algorithm on original and balanced dataset, in the balanced dataset, the ultimate error rate was reduced from 1.93 percent in the unique dataset to 0.06 percent.

The Patil et al [11] offered hybrid approach that collaborates Hidden Markov model and Fuzzy C-Means clustering method to know the suspicious activity. The model strategy was to note the invader behaviour usual usage patterns.

The Shadish et al [12] that hypothesis of a Meanshift algorithm can realize assaults interior an offline network trafficking dataset was once examined using a controlled experiment as outlined. The KDD 99 dataset is used in this study, and the MeanShift technique is used.

The Ozgur et al [13] have taken a dataset which is largely implemented in ML and intrusion detection systems researches. As a result, the KDD dataset was chosen for research based on its use in several articles, and another author was given access to the dataset.

The Pajouh et al [14] presented two-tire classification model that reduces the dimension in NSL-KDD dataset by adding classifiers such as KNN and Nave bayes. Their model had a higher detection rate but less computation time as the model was unable to handle user to root and remote too local.

Ranjan et al [15] used the K-Means method to locate the constraints which is k-medoids technique in an intrusion detection system. Cluster number dependency and centroid dependency problems were addressed and K-Means algorithm was enhanced by the authors. The results showed a detection rate of 90%. The authors believed that the detection rate of probe and user to root attacks can be improvised by implementing clustering algorithms. Various machine learning techniques were used for evaluating offline intrusion detection [21,22,23]

## III. Proposed Methodology

The figure 1, shows that the proposed methodology system flow with its components.
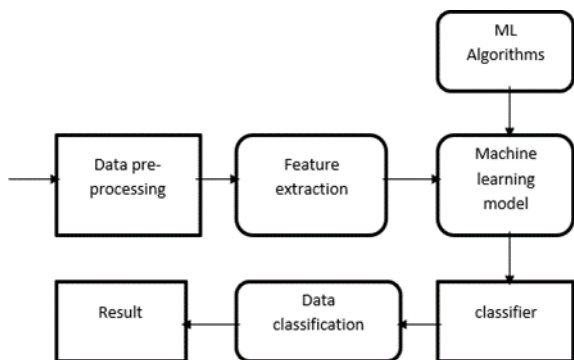
Figure 1. The Proposed Architecture of Attack Detection

## A. Data Collection

It starts from data collections, it is a collection of legal, criminal, and criminal theft cases. A set of features are used for checking to know whether the websites are real once's or not. Data is the input. URL is divided into four groups. The first part of group is based on number of attributes in each URL string, while other groups are based on a specific character unit [27]. The latter part of group attributes is based on URL resolution metrics and external resources such as the search index is shown in Figure 2.



Figure 2. The example URL Pattern

## B. Data Description

Dataset contains around 1871 sample phishing and non-phishing websites, in which 20% is used for the testing phase. Every website is labelled as phishing or non-phishing. The characteristics which were used in dataset are as followed:

- **Consisting IP address:** In URL, instead of domain name if IP address are used, like http://217.102.24.235/samples.html.
- **Shortening URL Service:** Using some techniques long URLs can be shortened. Such as, http://sharif.hud.ac.uk/ can be shortened to bit.ly/1sSEGTCB.
- **Length of Url:** To hide suspicious part of the address bar, phishers use long URL.
- **Usage of @ Symbol:** @ is an escape character which ignores everything preceding the symbol and original address will be mentioned after @ symbol.
- **// (double slash) redirection:** If there is // in the URL it means that the page will be redirected to another page.
- **Prefix and Suffix:** To let the users believe it's the legitimate website prefixes or suffixes are separated by (-) to the domain name. Like, http://www.Confirmee-paypal.com.
- **Sub Domain:** URL's Subdomain, separates and organizes content for specific function.

- **SSL State:** it checks for the identities of websites toconnect securely.
- **Domain Registration Length:** this means that howlong the website is going to live.
- **HTTPS token:** swindling "https" in URL. Such as,http://https-www-mellaat-phish.irr
- **URL request:** it checks if the external objects contain webpages like images, sounds and videos are being collected from another webpages.
- **Anchor URL:** it is represented by the < a > tag. This character is similar to URL request.
- **Tag links:** In every legitimate website's meta tag ispresent which will describe the Meta data.
- **Submitting Information to E-mail:** The user's details are redirected to the phisher through mail.
- **Abnormal URL:** From WHOIS database the abnormal URLs are extracted whereas in a benign link identity is within the URL.
- **Redirecting Count:** the count of the website redirected is higher than 4 times
- **Customization of status bar:** it uses java script and shows the users on the status bar that the URL is fake
- **Using Pop-up Window:** pop-up windows are shown on webpages.
- **Domain age:** when the domain age is lesser than a year or according to the renewal period.
- **Web Traffic:** based on the number of visitors we can state the popularity of website.
- **Page Rank:** based on the importance of the webpage on the internet ranking of the page is done ranging from 0 to 1.
- **Google Indexing:** This feature checks if the websiteis indexed or not.
- **Statistical Report:** It tells whether the considered IP is part of phishing IP or not

## C. Feature Selection

Feature extraction is an attribute extension. Where creation of more columns from URL's is done. Finally, models are trained using algorithms. Labelled dataset is collected. The remaining set of labelled data will be used for evaluating the model. For categorizing pre-processed data machine learning algorithms are used. The algorithms which we used are Random Forest, SVM, Genetic [28].

## D. Random Forest

Random forest is a supervised learning technique which is broadly used in classification and regression scenarios. It is based on ensemble learning, where we club different or similar algorithm various times to create a stronger prediction model [29-30]. Combining multiple decision trees, results in a forest, hence we call the algorithm as "Random Forest". Normally, in any algorithm there is a case of bias based on the attributes factor, but as there are multiple trees in this algorithm and a subset of data is trained to each tree, there is

no scope for bias. And as it mostly relies on "the majority/ the crowd" decision,bias is reduced is shown in Figure 3.

1. Though there is a new data point added into the dataset, it may affect one decision tree, but cannot impact on all trees. Hence, it is a "Stable Algorithm".
2. This algorithm best works in scenarios where you have numerical and categorical features.
3. Though there are missing values, this algorithm works well in such scenarios.
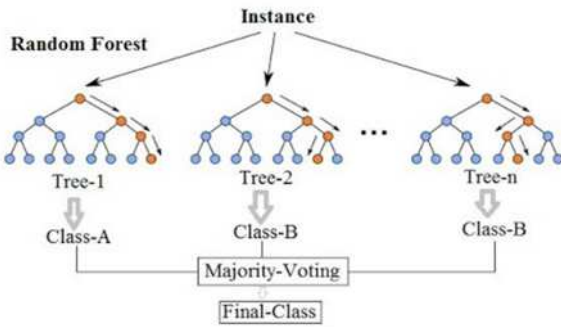


Figure 3. The Random Forest System Architecture

Higher accuracy can be achieved, when there are greater number of trees and also, we can omit overfitting problems.

### Random forest algorithm steps:

**Step 1:** From a data set of k records, N random records aretaken.

**Step 2:** For every obtained sample, construction of singletree is done.

**Step 3:** Each decision tree constructed obtains a output.

**Step 4:** On the basis of "Majority Voting" / "Averaging" result is taken into consideration for Regression and Classification respectively

### E. Support Vector Machine (SVM)

Support Vector Machine (SVM) is a supervised machine learning algorithm that can be used for both classification or regression challenges. In classification problems it is mostly used. In an n-dimensional [n being number of features you have] space with the value of each feature being value of a particular coordinate, plotting of each data item as a point is done. The one which divides the two classes is known as hyper-plane and it is found using classification. The SVM classifier is a frontier that best segregates the two classes (hyper-plane/ line).

### F. Genetic Algorithm
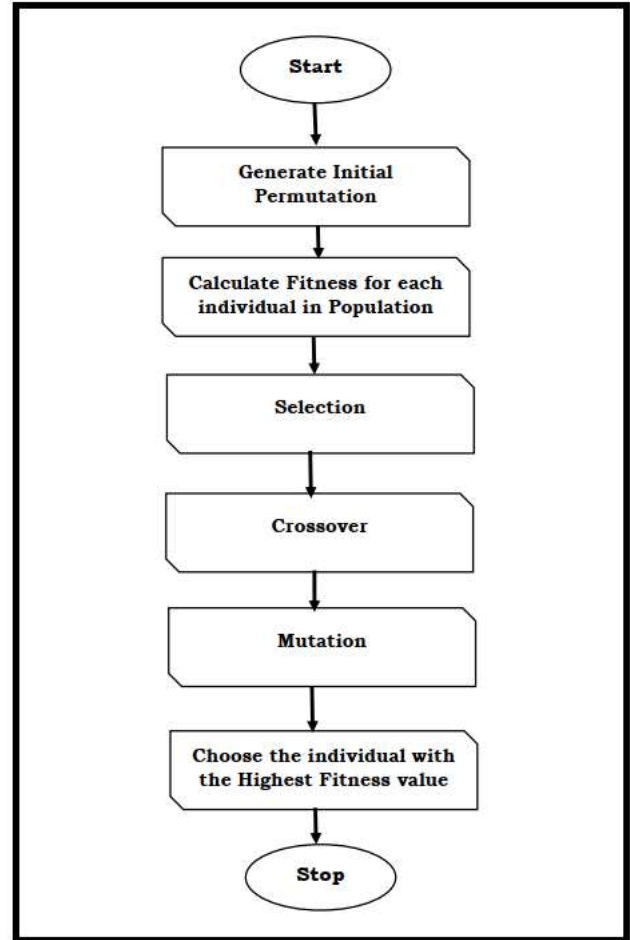


Figure 4. Genetic Algorithm Model

Optimization problems can be solved using genetic algorithm. Time taking complex problems can be solved using genetic algorithm making it one of the most important algorithms.

- For problems like search and optimization, genetic algorithms produce high-quality solutions when we simulate the process of mutation, reproduction, andnatural selection.
- Traditional algorithm drawbacks can be surmounted by this algorithm as it uses Theory of evolution effectively.

According to theory of evolution stated by Darwin, population of discrete entity which is varied from each other is maintained with evolution. Whichever adapts better to their environment have a greater chance of survival, passing, breeding their traits to upcoming generations [Survival of the fittest].

The flow of the genetic algorithm was discussed in fig 4. It start with initial population generation, then we have to calculate the fitness function of the population. Based on these functions, we can able to do the selection, crossover and mutation function to do the calculation of genetic algorithm.

## IV. PERFORMANCE Evaluation

The graph shows that random forest model has mor accuracy comparatively. The highest accuracy of 94.73% is acquired using Genetic algorithm is clearly explained in the fig 6. The results are showed from fig 5 to fig 8.
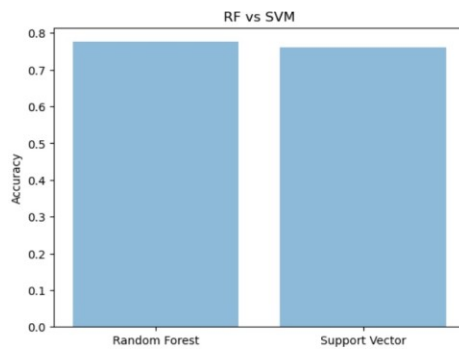


Figure 5. The Accuracy Analysis



Figure 6. Phishing detector webpage
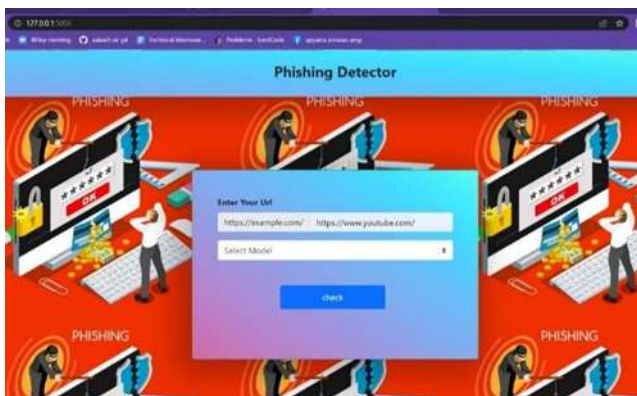


Figure 7. Type the URL which you want to test



Figure 8. Output of the link

## V. Conclusion

An accuracy of 94.73% is achieved with very low False-positive rate also we got to know that performance increases with increase in0 input training data. The future scope is to develop a model which will have a large network and protect the privacy of individuals and hybrid technology will be used to detect the phishing websites more accurately, for which random forest of machine learning and blacklist method is introduced in this article.

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# E-Governence Services using Artificial Intelligence Techniques

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Abstract

Document Sections

I. Introduction

II. Related Works

III. Proposed System

IV. Conclusion

Authors

Figures

References

Citations

Keywords

Metrics

**Abstract:**

In a wide variety of fields, AI technology (AI) has lately evolved to state-of-the-art levels. It still has a lot of obstacles to overcome before it can be ready for e-government applications, including setting up the systems and interacting with residents online. In this research, we tackle the problems with e-government systems & suggest a framework that makes use of AI technology to improve and streamline e-government operations. We first design a model for the administration of e-government information resources in particular. Second, we frequently create a variety of deep-learning algorithms with the intention of transforming numerous e-government services. Third, we tend to suggest an intelligent e-government platform architecture that facilitates the emergence and execution of AI e-government applications. Our overriding objective aims to advance this level of e-government services by using reliable AI approaches in order to shorten processing times, reduce costs, and raise public satisfaction.

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I. Introduction
AI (simulated intelligence) has been around for certain a very long time in a few hypothetical structures and convoluted

# Optimal Extreme Learning Machine based Traffic Congestion Control System in Vehicular Network

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*Abstract*—**Over the past decade, Smart cities have been advanced and minimizing traffic congestion become the main concern in the progression of smart cities. The rapid growth in the number of road vehicles has raised the number of road accidents and traffic congestion. To Solve this problem, Vehicular Network (VN) formulated several novel concepts which include traffic control, vehicular communications, and navigation. Machine Learning (ML) will be an effective technique for identifying hidden insights into ITS without being programmed clearly by learning from data. This article develops an Optimal Extreme Learning Machine based Traffic Congestion Control System (OELM-TCCS) in vehicular networks. The presented OELM-TCCS technique mainly focuses on the identification and recognition of traffic congestion in VANET. To perform this, the presented OELM-TCCS technique primarily designs a new ELM model to carry out the classification process. In addition, the presented OELM-TCCS technique executes the satin bowerbird optimization (SBO) algorithm for parameter tuning of the ELM method. To demonstrate the boosted performance of the OELM-TCCS model, a series of experiments were executed. The experimental outcomes indicate the betterment of the OELM-TCCS method over recent methods with maximum accuracy of 99.17%.**

*Keywords— Traffic Congestion Control; Machine learning; Vehicular Adhoc Network; Metaheuristics; Vehicular networks*

## I. INTRODUCTION

Recently, a considerable challenge has developed in metropolitan areas because of the number of vehicles and the quickly rising population, overcrowding, and traffic obstructions. Congestion issues and traffic jam affects public regular life on two-fold basis and directly increases travel cost [1]. Currently, the progression of information and communication technology (ICT) and the development of Artificial Intelligence (AI) applications have developed the road for ITS development [2]. This growth is intended to provide novel road transport services, involving infrastructure, mobility control, traffic congestion management, vehicles, and so on. This mostly involves wireless sensors and computing techniques employed by means of AI ability [3]. In most smart cities, ITS development provides different functions involving safety and traffic management. This involves emergency vehicle alert system, automated road enforcement, flexible sequence of traffic lighting, collision early termination system changeable speed limit, parking advice, pollution control, shifting system, weather reporting systems, and removal of bridges results in smoother vehicle flow [4].

Traffic congestion is the key challenge in developing nations that affects day to day life and harms societal and economic development [5]. At present, the most important problems of traffic congestion are traffic estimation and monitoring [6]. Smart Transportation systems provide solutions through prediction capabilities and analysis and provide adjustable solutions to manage traffic systems. Numerous studies have come up with solutions such as collecting information from various devices for detection of traffic jamming and speed for practical traffic conditions [7]. The vehicle adaptation from self-governed to smart Internet of vehicles (IoVs) provides bi-directional transmission that assists in building the basis for progressive vehicle techniques. Due to

the development of smart IoVs, a massive amount of vehicles and sensors contribute to connecting constantly with the internet [8]. It is crucial to analyse and gather real data for the system update and to discover solutions for traffic jamming. Machine Learning (ML) method is a robust method for finding hidden insight via repetitively learning from the dataset, without being programmed obviously. ML facilitates analysis to deduce knowledge and examine the information [9]. Also, it improves and utilizes knowledge with experience and over time. The primary objective of ML is to exploit and identify concealed patterns in training datasets. ML technique is more important in automation, decision making, and analysis [10].

This article develops an Optimal Extreme Learning Machine based Traffic Congestion Control System (OELM-TCCS) in vehicular networks. The presented OELM-TCCS technique mainly focuses on the identification and recognition of traffic congestion in VANET. To perform this, the presented OELM-TCCS technique primarily designs a new ELM model to carry out the classification process. In addition, the presented OELM-TCCS technique executes the satin bowerbird optimization (SBO) algorithm for parameter tuning of the ELM method. To demonstrate the improved performance of the OELM-TCCS model, a series of experiments were performed.

## II. LITERATURE SURVEY

Saleem et al. [11] projected a fusion-related intelligent traffic congestion control system for VN (FITCCS-VN) by utilizing ML approaches that accumulate route traffic and traffic data on obtainable routes for alleviating traffic crowding in smart city. The modelled scheme delivers ground-breaking facilities to the motorists that permit a view of road traffic flow and the capacity of automobiles accessible on the road the least bit, aiming to dodge traffic jams. The projected method advances traffic flow and cuts crowding. In [12], primarily, the authors define the mobbing control detached for NDN, which reflects necessities varieties for dissimilar contents. Formerly, the novelists project and advance a well-organized congestion control machinery related to DRL, specifically DRL-related DRL-CCP. This DRL-CCP empowers customers to mechanically study the ideal mobbing switch plan from past congestion regulator experiences.

A hybrid DL-enabled efficient congestion control system was modelled [13]. This hybrid DL technique has SVM and LSTM. The pertinency of the projected method was authenticated by pretending for one week by means of multiple unknown strategies, overloading conditions, and slice failure conditions. Siddiqui et al. [14] deliver a technique to predict traffic congestion of a DNN that reduces blockage and serves a vigorous role in traffic smoothing. In the projected method, data was composed and conventional by means of smart IoT assisted devices. By this model, facts of the preceding junction of signals are sent to additional junction and upgrade after that subsequent layer called intelligence calculation for congestion layer would gain data from sensors and cloud which was employed for finding the congestion point.

Majumdar et al. [15] present LSTM networks for forecasting congestion dissemination over a road network. Depends on vehicle speed facts from circulation sensors at 2 sites, this data estimates the proliferation of congestion over a 5-min retro in a busy town. Gomides et al. [16] recommend a novel VANET-related traffic management mechanism called CoNeCT: Predictive Congestion Control related to Collaborative data Sharing for VANET to support vehicles' association in managing congestion, investigating, and estimating. The presenetd mechanism has been modelled for decreasing the amount of messages by utilizing a new road segment load valuation that enhances traffic flow classification.

## III. THE PROPOSED MODEL

In this article, a novel OELM-TCCS method was formulated to identify traffic congestion in the VANETs. The presented OELM-TCCS technique mainly emphasizes on the identification and recognition of traffic congestion in VANET.

### A. Traffic Congestion Detection using ELM

At the primary level, the presented OELM-TCCS technique primarily designs a new ELM model to carry out the classification process. An ELM is learning mechanism for SLFN that elects weight connected the input to hidden units and bias to hidden node arbitrarily and reasonably describes the resulting weight (associating the hidden to resulting layers) through MP generative inverse [17]. Considered that trained dataset with $N$ samples $D = \{(x_i, y_i)\}_{i=1}^N$, where $x_i = (x_{i1}, x_{i2}, \cdots, x_{id}) \in R^d$ and $y_i = (y_{i1}, y_{i2}, \cdots, y_{im}) \in R^m$. It is recognized that $m = 1$ to classification and regression. In ELM, the hidden bias and input weight are arbitrarily chosen according to the probability distribution. Especially, it could arbitrarily choose the learned variable within [-1, 1]:

$$W = \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_L \end{bmatrix} = \begin{bmatrix} w_{11} & w_{12} & w_{1L} \\ w_{21} & w_{22} & w_{2L} \\ \vdots & \vdots & \vdots \\ w_{d1} & w_{d2} & w_{dL} \end{bmatrix}_{d \times L} \quad (1)$$

and

$$B = [b_1, b_2, \cdots, b_L]^T, \quad (2)$$

Whereas $L$ denotes the hidden layers count from SLFN. Fig. 1 demonstrates the architecture of ELM approach. Based on the method, the resulting layer weight from ELM approach is logically calculated by:

$$\beta = H^{\dagger y}. \quad (3)$$

Now, $H^\dagger$ denotes the MP generative inverse of hidden layer resulting matrix:

$$H = [g(x_i w_l + b_l)]_{N \times L}, \quad (4)$$

Whereas $i = 1, 2, \cdots, N$, $l = 1, 2, \cdots, L$, and $g(u) = \frac{1}{1 + \exp(-u)}$ indicates the sigmoid activation function as

$$Y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix} = \begin{bmatrix} y_{11} & y_{12} & y_{1m} \\ y_{21} & y_{22} & y_{2m} \\ \vdots & \vdots & \vdots \\ y_{N1} & y_{N2} & y_{Nm} \end{bmatrix}_{N \times m} \quad (5)$$

Generally, to disregard instance $\hat{x} = (\hat{x}_1, \hat{x}_2, \cdots, \hat{x}_d)$, an ELM forecast the outcomes $\hat{y}$ in the following:

$$\hat{y} = h(\hat{x})\beta, \quad (6)$$

Whereas $h(\hat{x}) = [g(\hat{x}w_1 + b_1), \cdots, g(\hat{x}w_L + b_L)]$ indicates the hidden unit resulting vector of $\hat{x}$.

On account of evading the iteration modification for hidden bias and input layer weight, the ELM training speed is more than individual of standard gradient based learning approaches. In the meantime, an ELM takes optimal generalized effectiveness. It is proven that ELM attains the generalized efficacy with typical SVM method.
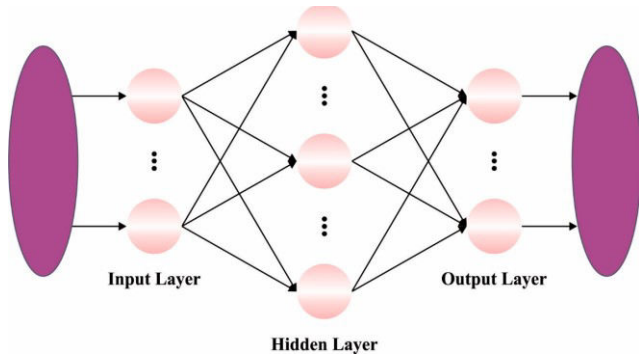
Fig. 1. ELM structure

### B. Parameter Optimization using SBO Algorithm

The presented OELM-TCCS technique executed the SBO algorithm for parameter tuning of the ELM model. The SBO is a metaheuristic approach which defines the global optimum for the optimization challenges [18]. The presented method is a population based method that is enormously easier, effective, and robust. Mainly, the formation of arbitrary bower method starts with the population creation of random uniform distribution by taking into the maximal and minimal bound parameters. Then, all the locations are defined using the dimension vector of variable which must be enhanced. The variable probability characterizes the attraction behaviour of the bowers. A female satin bower will choose a bower (nest) according to the likelihood and it could determine the likelihood of all the members in the population as follows:

$$Prob_i = \frac{fit_i}{\sum_{n=1}^{NB} fit_n} \tag{7}$$

$$fit_i = \begin{cases} \dfrac{1}{1 + f(x_i)}, & f(x_i) \geq 0 \\ 1 + |f(x_i)|, & f(x_i) < 0 \end{cases} \tag{8}$$

Now, $NB$ represents bower population size, $fit_i$ shows the fitness values of $i\text{-}th$ solutions, and $f(x_i)$ signifies the bower fitness values.
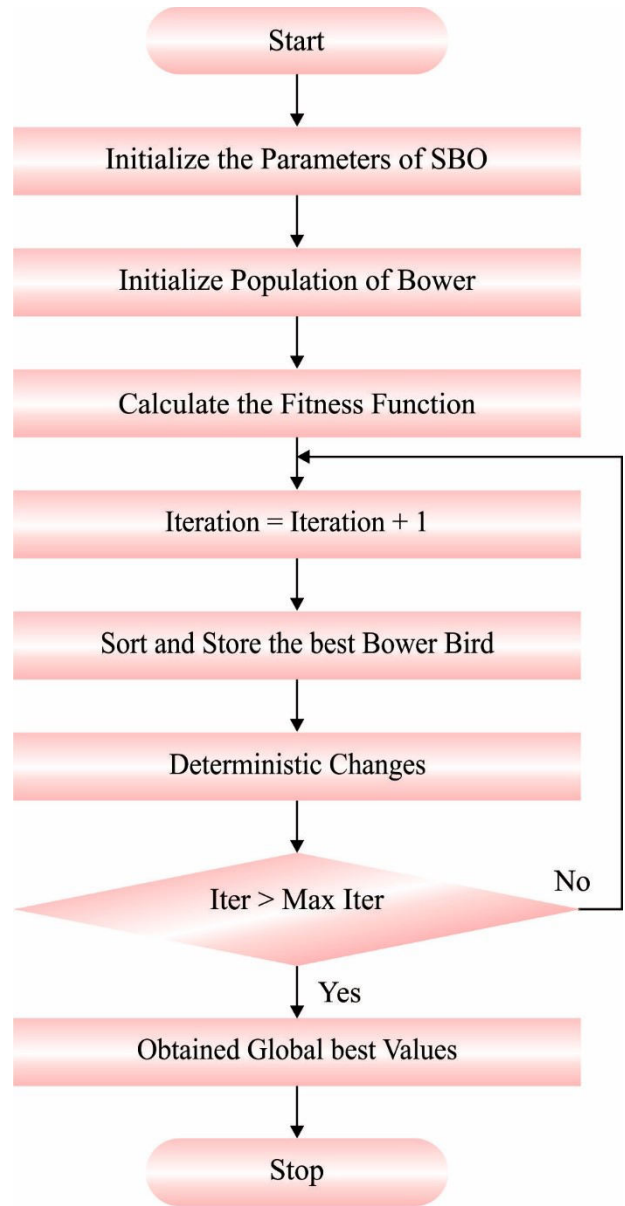


Fig. 2. Flowchart of SBO technique

The SBO technique exploits the notion that calculates the position of optimum bower and thus enables the optimum solution to be stored at all the levels of the optimization technique. The SBO methodology stimulates the conception of birds creating nests according to their regular nature. In the mating process, the male satin bower bird exploits the natural behaviour to build and decorate the bower by attracting females. It is demonstrated that the male bower is depended on the knowledge for affecting the novel conclusion in building the bower, as a result, extremely knowledgeable birds could build extremely attractive bowers than lower knowledgeable ones. In the presented method, the optimum made bower is regarded as the elite one. Since the elite position includes maxim fitness, it can impact other positions. The modification of each current bower, which defines a novel positon calculated through the position of optimum bower as follows.

$$x_{ik}^{new} = x_{ik}^{old} + \lambda_k \left( \left( \frac{x_{jk} + x_{elite,k}}{2} \right) - x_{ik}^{old} \right) \quad (9)$$

Whereas $x_i$ specifies $i$-$th$ solution vector (bower), $x_j$ is evaluated by the last solutions amid each solution in the existing iteration, $j$ can be defined by means of roulette wheel method, and $x_{ik}$ shows the $k$-$th$ members. $x_{elite}$ represents the elite location. Now, $\lambda_k$ represents the attraction of the target bower, whereas $\alpha$ signifies maximal step size and $p_j$ shows the probability accomplished as follows

$$\lambda_k = \frac{\alpha}{1 + p_j} \quad (10)$$

During the mutation, the end of all the rounds of the SBO approach, the arbitrary variation is applied $x_{ik}$ using the specific probability. The standard distribution $(N)$ in the mutating method is employed by means of the variance of $\sigma^2$ and average of $x_{ik}^{old}$, as follows:

$$x_{ik}^{new} \sim N\left( x_{ik}^{old}, \sigma^2 \right) \quad (11)$$

$$N\left( x_{ik}^{old}, \sigma^2 \right)$$
$$= x_{ik}^{old} + \left( \sigma^* N(0,1) \right) \quad (12)$$

$$\sigma$$
$$= Z^* (var_{max} - var_{min}) \quad (13)$$

Now $\sigma$ describes the proportion of space width, $var_{min}$ and $var_{max}$ indicates the minimal and maximal bounds allocated to the variable. The $Z$ parameter suggests the % of dissimilarities amongst the minimal and maximal limits. Eventually, the newly produced and primary population are evaluated, they are arranged and integrated according to fitness values. The novel population is produced according to the predetermined value, while the remaining one is removed. The procedure included in the SBO is demonstrated in Algorithm 1. Fig. 2 illustrates the flowchart of SBO.

| **Algorithm 1:** Pseudocode of SBO algorithm |
|---|
| Initialize maximum step size ($\alpha$), bower population size (NB), % of the variations, mutation probability (P) amongst maximal and minimal boundaries (Z), and proportion of space width ($\sigma$). Population generation. |
| Define the bower fitness values. Consider the initial value be the optimum bower. |
| While (ending condition is not fulfilled) Do |
|   Determine the probability of bowers based on Eqs. (7) and (6). |
|   For i =1 to all the bowers Do |
|    For j =1 to all the components of bower Do |
|    Choose a single bower arbitrarily using roulette wheel selection. |
|     Describe step size ($\lambda_k$) based on Eq. (10). |
|     Upgrade the bower position based on Eqs. (9) & (12). |
|    End for |
|   Describe bower fitness values bower. |
|   End for |
|   Arrange bower based on fitness value. |
|   Describe the existing global optima. |
| End while |
| Exhibits the optimum fitness values. |

## IV. EXPERIMENTAL VALIDATION

The experimental validation of the OELM-TCCS method can be tested utilizing a dataset involving 403 samples as represented in Table 1.

TABLE I

DATASET DETAILS

| Class | No. of Samples |
|---|---|
| Positive | 53 |
| Negative | 350 |
| **Total No. of Samples** | **403** |
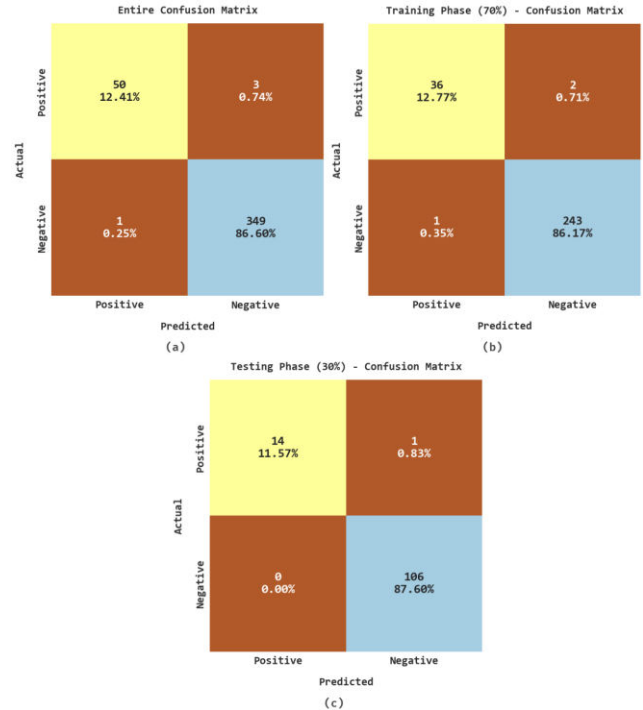


Fig. 3. Confusion matrices of OELM-TCCS system (a) Entire dataset, (b) 70% of TR database, and (c) 30% of TS database

The confusion matrices of the OELM-TCCS model are demonstrated in Fig. 3. With entire dataset, the OELM-TCCS method has identified 50 samples into positive and 349 samples into negative. In addition, with 70% of TR database, the OELM-TCCS technique has identified 36 examples into positive and 243 samples into negative. Also, with 30% of TS database, the OELM-TCCS method has identified 14 samples into positive and 106 samples into negative.

The entire classification outcomes of the OELM-TCCS model are revealed in Table 2.

Fig. 4 reports the classifier outcomes of the OELM-TCCS method on entire dataset. The OELM-TCCS model has recognized positive samples with $accu_y, sens_y, spec_y, F_{score}$, and MCC of 99.01%, 97.03%, 97.03%, 97.79%, and 95.61% respectively. Also, the OELM-TCCS technique has recognized negative samples with $accu_y, sens_y, spec_y, F_{score}$, and MCC of 99.01%, 99.71%, 94.34%, 99.43%, and 95.61% correspondingly.

TABLE II

RESULT ANALYSIS OF OELM-TCCS SYSTEM WITH DISTINCT MEASURES

| Class | Accuracy | Sensitivity | Specificity | F-Score | MCC |
|---|---|---|---|---|---|
| **Entire Dataset** | | | | | |
| Positive | 99.01 | 94.34 | 99.71 | 96.15 | 95.61 |
| Negative | 99.01 | 99.71 | 94.34 | 99.43 | 95.61 |
| **Average** | **99.01** | **97.03** | **97.03** | **97.79** | **95.61** |
| **Training Phase (70%)** | | | | | |
| Positive | 98.94 | 94.74 | 99.59 | 96.00 | 95.40 |
| Negative | 98.94 | 99.59 | 94.74 | 99.39 | 95.40 |
| **Average** | **98.94** | **97.16** | **97.16** | **97.69** | **95.40** |
| **Testing Phase (30%)** | | | | | |
| Positive | 99.17 | 93.33 | 100.00 | 96.55 | 96.16 |
| Negative | 99.17 | 100.00 | 93.33 | 99.53 | 96.16 |
| **Average** | **99.17** | **96.67** | **96.67** | **98.04** | **96.16** |
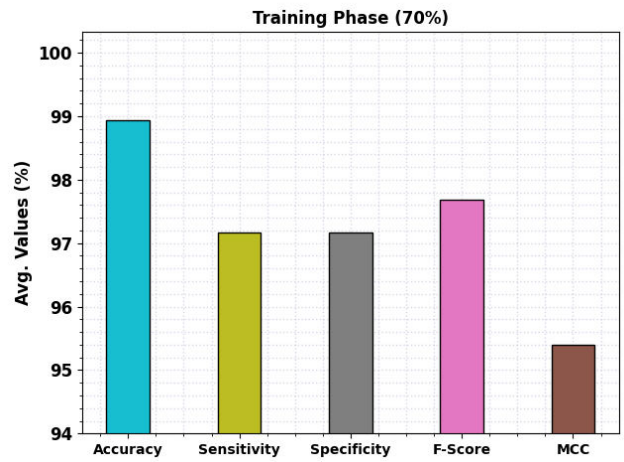


Fig. 5. Average analysis of OELM-TCCS system under 70% of TR database
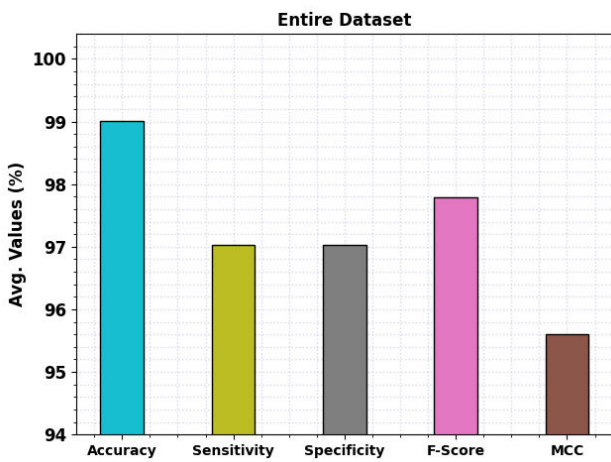


Fig. 4. Average analysis of OELM-TCCS system under Entire database
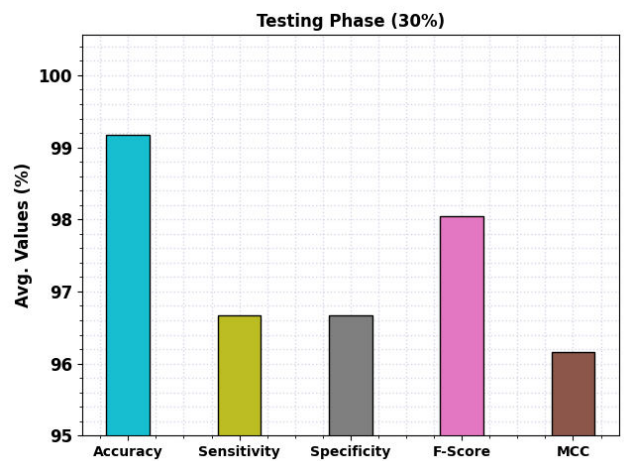


Fig. 6. Average analysis of OELM-TCCS system under 30% of TS database

Fig. 5 illustrates the classifier outcomes of the OELM-TCCS method on 70% of TR database. The OELM-TCCS approach has recognized positive samples with $accu_y$, $sens_y$, $spec_y$, $F_{score}$, and MCC of 98.94%, 94.74%, 99.59%, 96%, and 95.40% correspondingly. Likewise, the OELM-TCCS technique has recognized negative samples with $accu_y$, $sens_y$, $spec_y$, $F_{score}$, and MCC of 98.94%, 99.59%, 94.74%, 99.39%, and 95.40% correspondingly.

Fig. 6 reports the classifier results of the OELM-TCCS model on 30% of TS database. The OELM-TCCS methodology has recognized positive samples with $accu_y$, $sens_y$, $spec_y$, $F_{score}$, and MCC of 99.17%, 93.33%, 100%, 96.55%, and 96.16% correspondingly. Similarly, the OELM-TCCS model has recognized negative samples with $accu_y$, $sens_y$, $spec_y$, $F_{score}$, and MCC of 99.17%, 100%, 93.33%, 99.53%, and 96.16% correspondingly.

The $TR_{acc}$ and $VL_{acc}$ obtained by the OELM-TCCS method under test database is exemplified in Fig. 7. The simulation result exhibited the OELM-TCCS method has accomplished maximal values of $TR_{acc}$ and $VL_{acc}$. Mainly the $VL_{acc}$ is greater than $TR_{acc}$.
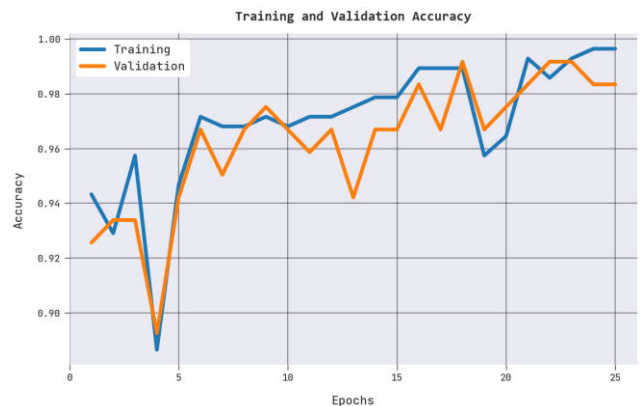


Fig. 7. $TR_{acc}$ and $VL_{acc}$ analysis of OELM-TCCS system

The $TR_{loss}$ and $VL_{loss}$ exhibited by the OELM-TCCS method in test database are established in Fig. 8. The simulation results implied the OELM-TCCS method has proficient least values of $TR_{loss}$ and $VL_{loss}$. Seemingly, the $VL_{loss}$ is lesser than $TR_{loss}$.
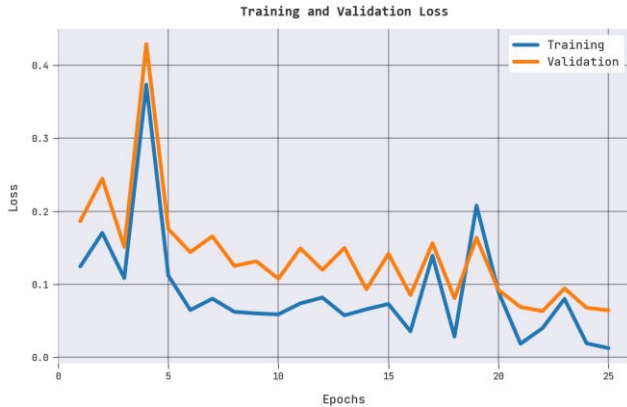


Fig. 8. $TR_{loss}$ and $VL_{loss}$ analysis of OELM-TCCS system

TABLE III

ACCURACY ANALYSIS OF OELM-TCCS SYSTEM WITH RECENT APPROACHES

| Methods | Accuracy |
|---|---|
| OELM-TCCS | **99.17** |
| KNN Algorithm | 96.40 |
| NB Algorithm | 98.83 |
| ANN Algorithm | 98.71 |
| LOR Algorithm | 98.93 |
| DT Algorithm | 98.59 |
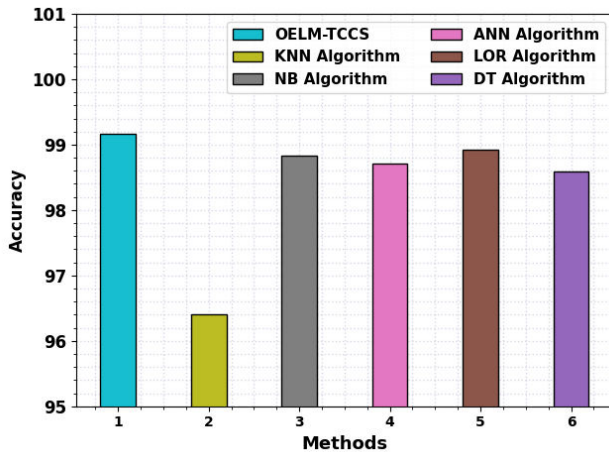


Fig. 9. Accuracy analysis of OELM-TCCS system with recent approaches

A comparative $accu_y$ examination of the OELM-TCCS model is performed with recent models in Table 3 and Fig. 9. The simulation outcomes indicated the OELM-TCCS method has reached improved performance with higher $accu_y$ of

99.17% whereas the KNN, NB, ANN, LOR, and DT models have obtained reduced outcomes with $accu_y$ of 96.40%, 98.83%, 98.71%, 98.93%, and 98.59% respectively.

## V. CONCLUSION

In this article, a new OELM-TCCS method was projected to detect traffic congestion in the VANETs. The presented OELM-TCCS technique mainly focuses on the identification and recognition of traffic congestion in VANET. To perform this, the presented OELM-TCCS technique primarily designs a new ELM model to carry out the classification process. In addition, the presented OELM-TCCS technique executed the SBO algorithm for parameter tuning of the ELM method. To demonstrate the improved act of the OELM-TCCS model, a series of experiments were performed. The experimental fallouts indicate the betterment of the OELM-TCCS model over recent approaches. As a part of future scope, feature selection and feature reduction processes will be integrated to improve the performance of the OELM-TCCS model.

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# Enhanced Particle Swarm Optimization based Node Localization Scheme in Wireless Sensor Networks

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*Abstract*—**Wireless sensor networks (WSNs) are widely examined recently because of their various applications in processes which has to scatter over a vast region. sensor's locations in WSNs generally must be known. WSN comprises great quantity of sensors thereby installing global position system devices in all of them does not accept. Some of the anchor nodes with well-known locations are generally utilized. Forecasting sensor node locations from radio strength signal index are regarded as a hard optimization issue. This article introduces an Enhanced Particle Swarm Optimization based Node Localization Scheme (EPSONLS) in WSN. The presented EPSONLS technique mainly aims to determine the location of the unknown nodes in the network. To do so, the presented EPSONLS model applies the PSO algorithm to identify the node position. In addition, the EPSONLS model determines the node location with the goal of minimizing localization error and time. An extensive-ranging experimental examination is performed and the outcomes are investigated under distinct prospects. The simulation outcome demonstrated the betterment of the EPSONLS model over recent approaches.**

*Keywords— Wireless Sensor Network (WSN), Node localization, Localization error, Computation time, Sensor nodes*

## I. INTRODUCTION

Wireless sensor networks (WSN) are broadly utilized in various regions [1]. WSN comprises of enormous number of sensor nodes that have capacity to gather different information like temperature, vibration, sound, and so forth from the climate. Other than gathering information, these nodes can speak with different nodes and do some calculations. One of the issues that influence WSNs is node localization [2]. By and large, gathered information is significant just with the data of position from where the information was taken. GPS module added to every node would work with position assurance [3]. Nonetheless, this arrangement isn't satisfactory due to the value, size, and energy prerequisites. The improved arrangement is to spread the word about positions just for a couple of nodes named anchor nodes (ANs)[4]. They can have GPS or their positions can be known in light of the fact that the sensors are put physically at precise positions. For assurance of places of other sensor nodes a few running methods, alongside information on places of ANs are utilized [5].

The sensor's positions are not really foreordained; they could be haphazardly scattered in a topographical region, called the "detecting area," relating to the area of interest for the peculiarity being caught [6]. In WSN, an enormous amount of sensors is conveyed in the organization, the data identified by the SN should be assembled and sent via multihop procedures for sinking [7]. and the productive work of WSN is opened distinct new examination areas for application, like environment expectation, investigation of rational, barometrical strain, etc., where some problems will tend to be in the WSN, for instance, energy minimization, pressure plans, nature of administration the executives and directing conventions.

Node localization is one of the significant difficulties of WSN [8]. The principal objective of node localization is assessing the node's zones with the first obscure zone data; to establish this, the cycle uses information on the outright spaces of dual nodes and intersensory estimations, for instance, distance and bearing estimations [9]. The nodes with obscure zone data are termed non-ANs, whereas nodes with known zone data are known as anchor or signals nodes. Self-localization ability is profoundly attractive in natural checking applications, for instance, street traffic observing, interruption discovery, well-being checking, and so on [10] suggest a multicriteria optimization scheme depends on a bio-inspired system termed Harris Hawks Optimization Algorithm (HHOA). It was displayed that the suggested pattern can increase the localization rate, along with that minimizes the node's power utilization. HHOA populations can share

information in a multi agent way for computing the trigger's position.

This article introduces an Enhanced Particle Swarm Optimization based Node Localization Scheme (EPSONLS) in WSN. The presented EPSONLS technique mainly aims to determine the location of the unknown nodes in the network. To do so, the presented EPSONLS model applies the PSO algorithm to identify the node position. In addition, the EPSONLS model determines the node location with the goal of minimizing localization error and time. A wide-ranging experimental analysis is performed and the outcomes are investigated under distinct prospects. The simulation outcome demonstrated the betterment of the EPSONLS model over recent approaches.

## II. RELATED WORKS

Sekhar et al. [11] presented an effective metaheuristic-oriented Group Teaching Optimization Algorithm for NL (GTOA-NL) approach for WSN. This technique mainly determines the location of the indefinite nodes through ANs in the WSN having higher localization accuracy and lesser localization error. This GTOA method is employed for optimization procedures with no loss of generality and can be stimulated from the group teaching method. In [12], the authors presented the idea of sensor nodes (SNs) localization in a 2D dynamic atmosphere with the use of one AN (static) in addition to virtual anchors for locating target nodes (TNs) (dynamic) through hexagonal projection method, and additionally, the predicted targeted node coordinates will be optimized through new naked mole-rat algorithm (NMRA).

Bharathiraja et al. [13] present an EOFFO-NLWN technique abbreviated as elite oppositional farmland fertility optimization-related NL methodology for radio communication networks. This presented EOFFO-NLWN approach aims to locate unidentified nodes in network with the use of ANs as an initial point. Hence, the authors have formulated the EOFFO-NLWN approach by integrating the principles of the agricultural fertility optimization algorithm (FFO) and elite oppositional-related learning (EOBL). In [14], Hydrozoan Optimized Algorithm (HOA)-and Sea Turtle Foraging (STFOA) oriented NLOS node positioning method was modelled by entrenching the exploitation abilities of STFOA into exploration tendency-imposed HOA methodology to attain reliable warning alert delivered at the time of emergency in vehicular networks. The abovementioned approach will adopt dynamic crossover operators by using the incorporated hybrid method for enhancing the exploration tendency.

El Khediri et al. [15] modelled a technique to make many node clusters through an enhanced K-means clustering approach termed Optimal K-means (OK-means). A single hop transmission mode was used for intra-cluster transmission whereas a multihop transmission mode was leveraged by the inter-cluster transmission. Srikanth et al. [16] present a new Chaotic Whale Optimization Related NL for WSN (CWOLN-WSN) allowed indoor transmission. The CWOLN-WSN technique aims to recognize the position of the unidentified nodes by using recognized nodes with higher performance and lower error. This above mentioned method includes the model of CWOA approach by integrating chaotic ideas into the conventional WOA.

## III. THE PROPOSED MODEL

In this study, a new EPSONLS technique intends to determine the location of the unknown nodes in the network. To do so, the presented EPSONLS model applies the PSO algorithm to identify the node position. In addition, the EPSONLS model determines the node location with the goal of minimizing localization error and time.

### A. Energy Model

Using the assured sensible signal-to-noise ratio, the power consumption for directing node data can be represented by Eq. (1) [17]:

$$E_{Tx}(n,d) = \begin{cases} nE_{elec} + n\varepsilon_{fs}d^2, & d \le d_0, \\ nE_{elec} + n\varepsilon_{mp}d^4, & d > d_0, \end{cases} \quad (1)$$

Now, $n$ denotes the amount of bits transmitted, $d$ characterizes the transmission distance, $E_{elec}$ characterizes the power exploitation for sending or receiving 1-bit data, $\varepsilon_{fs}$ symbolizes the coefficient of power exploitation to intensify radio at free space mode, $\varepsilon_{mp}$ specifies the coefficient of power exploitation for amplifying radio at multi-fading modes, and $d_0 = \sqrt{\varepsilon_{fs}/\varepsilon_{mp}}$ characterizes the thresholding value of distance.

The power exploitation of data attained using the node is given by:

$$E_{Rx}(n) = nE_{elec} \quad (2)$$

As a consequence of the massive difference of data among clusters, data integration amongst clusters isn't considered. The assumption of the data integration model in the cluster is CH accomplishes $n$ bit data transferred through each member node and compressed into $n$ bit data nonetheless of the node amount in the cluster:

$$E_{Fx}(n,d) = nE_{elec} \quad (3)$$

Now, $E_{DA}$ (nJ/bit) denotes the power exploitation for integrating 1-bit data. In the presented technique, communication power exploitation technique variable set to $E_{elec} = 50nJ/bit$, $\varepsilon_{fs} = 10pI/bit/m^2$, $\varepsilon_{mp} = 0.0013pI/bit/m^4$, and $d_0 = 87m$.

### B. Overview of PSO Algorithm

In general, PSO is represented as an optimization method that relies on the foraging behavior of birds and randomly initializes population in addition to systematic addition of searching process [18]. While examining an enhanced result, all birds are considered a particle without volume and mass. While processing a search process, the particle is able to record the current greatest location (*pbest*) in addition to global finest location (g*best*).
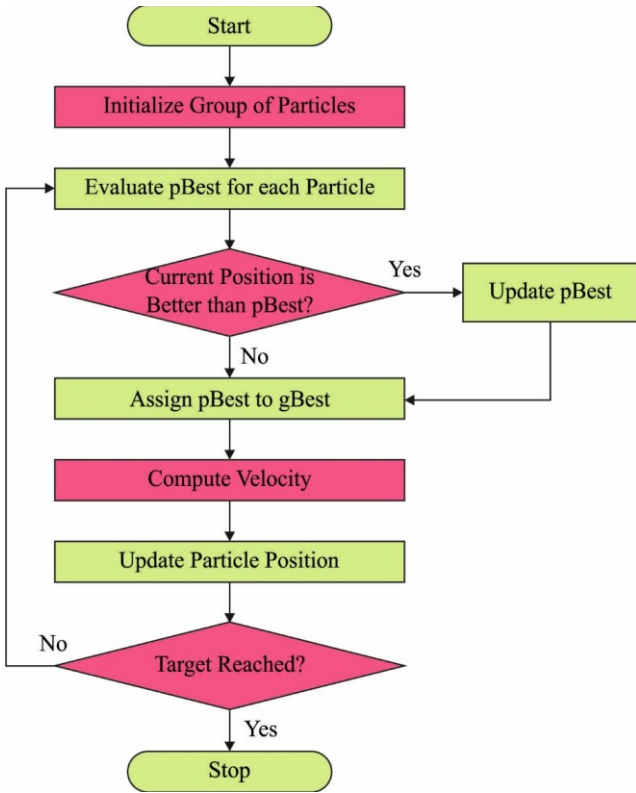
Fig. 1. Flowchart of PSO

Fig. 1 illustrates the flowchart of PSO technique. The position and Velocity of all the particles are evaluated by the following expression:

$$v_i^{z+1} = w \cdot v_i^z + c_1 \cdot rand \cdot (pbest - x_i^z) + c_2 \cdot rand \cdot (gbest - x_i^z), \quad (4)$$

$$x_i^{z+1} = x_i^z + v_i^{z+1}, \quad (5)$$

From the expression, $v_i^z$ and $x_i^z$ represent as present position and velocity of $i^{th}$ particle at $j$-th iteration, $c_1$ and $c_2$ represented as acceleration coefficient that assists in managing the impact of $pbest$ and $gbest$ in search process, rand indicates an arbitrary value within $[0, 1]$, $pbest(z)$ denotes the presented optimal location of each particle in $t^{th}$ iterations, $gbest$ indicate an optimal location through the particles, and $w$ denotes the inertia weight.

*C. Steps Involved in EPSONLS Technique*

The EPSONLS localization method was exploited for approximating the coordinate point of the sensor in WSN. The objective is to determine coordinate point of TNs with reduction of objective function [19]. The procedure comprised in the EPSONLS approach is shown below:

i) Arbitrarily initialize $N$ unknown node and $M$ AN in the sensing area having transmission radius $R$. Each AN defines the sending and locating of the coordinate points to neighboring nodes. To every iteration, the node that settles down eventually was identified as reference node and the role as AN in the subsequent iteration.

ii) The collection of 3 or superior to 3 ANs occurs in the transmission radius of nodes were determined by localized nodes.

iii) The distance amongst TN and AN can be determined and achieved rehabilitated via additive Gaussian noise. The TN calculates the distance with $\hat{d}_i = d_i + n_i$ whereas $d_i$ indicates the actual distance viz., determined among the location of TN $(x, y)$ and position of beacon $(x_i, y_i)$:

$$d_i = \sqrt{(x - x_i)^2 + (y - y_i)^2} \quad (6)$$

Whereas $n_i$ denotes the noise affects the distance from $d_i \pm d_i \left(\frac{P_n}{100}\right)$ wherein $P_n$ characterizes ratio of noise in proposed distance.

iv) The TN was termed as NL once it has 3 ANs in communication range of TN. On the basis of the trigonometric law of cosine or sine, coordinate point of target node was evaluated.

v) The SSA-DE method has been exploited to determine the $(x, y)$ coordinate point of TN that reduces the localization error. The localization problem is average square distance amongst the TNs and ANs is minimalized through the following expression:

$$f(x, y) = \frac{1}{N}\left(\sum_{i=1}^{N} \sqrt{(x - x_i)^2 + (y - y_i)^2} - \hat{d}\right)^2 \quad (7)$$

If $N \geq 3$ represents the AN count that broadcasting range.

vi) The optimum measure $(x, y)$ has been evaluated through EPSONLS approach.

vii) The whole localization error has been evaluated through localizable TNs $N_L$. It is authorized as average square of distance from determined node coordinate point $(X_i, Y_i)$ however actual node coordinate point $(x_i, y_i)$ is defined by:

$$E_L = \frac{1}{N_1}\sum_{i=1}^{N} \sqrt{(x_i - X_i)^2 + (y_i - Y_i)^2} \quad (8)$$

viii) Steps 2-5 advance and iterated still the location of TN has been detected. The localization approach was reliant on maximal localization error $E_1$ and unlocalized node count $N_{N_L}$ which can be evaluated using $N_{N_L} = M - N_L$. The minimal score of $E_1$ and $N_{N_L}$ outcome in proficient localization effectiveness.

IV. RESULTS AND DISCUSSION

In this section, the localization results of the EPSONLS model have been investigated in detail.

Table 1 represents the localized node (LDN) analysis of EPSONLS system with existing approaches under distinct transmission ranges.

TABLE I

RESULT ANALYSIS OF EPSONLS TECHNIQUE WITH EXISTING METHODS

| Trans. Range (m) | EPSONLS | SSOA-NL | BOA | GWO | FOA | M-BAT | PSO |
|---|---|---|---|---|---|---|---|
| 10 | 161 | 144 | 132 | 134 | 129 | 122 | 93 |
| 15 | 181 | 180 | 137 | 150 | 160 | 140 | 115 |
| 20 | 199 | 181 | 157 | 172 | 134 | 144 | 102 |
| 25 | 214 | 192 | 189 | 158 | 185 | 162 | 141 |
| 30 | 225 | 208 | 208 | 184 | 189 | 185 | 136 |

| 35 | 234 | 207 | 178 | 195 | 209 | 177 | 122 |
| 40 | 244 | 210 | 219 | 191 | 190 | 192 | 132 |

Fig. 2 portrays a comparative LDN examination of the EPSONLS model with other localization schemes. The results implied that the PSO algorithm has depicted poor localization results with an LDN of 93. Then, the FOA and M-BAT models demonstrated slightly enhanced efficiency with LDN of 129 and 122 respectively. Afterward, the BOA and GWO models displayed moderately closer LDNs of 132 and 134 respectively. Along with that, the SSOA-NL model has reached competitive LDN of 144. Contrastingly, the EPSONLS model has shown enhanced performance with maximum LDN of 161.



Fig. 2. LDN analysis of EPSONLS system under 10 transmission ranges

Fig. 3 depicts a comparative LDN examination of the EPSONLS approach with other localization schemes. The outcomes implied that the PSO algorithm has shown poor localization results with LDN of 115. Then, the BOA and M-BAT techniques established slightly enhanced efficacy with LDN of 137 and 140 respectively. Then, the GWO and FOA models displayed moderately closer LDNs of 150 and 160 correspondingly. Along with that, the SSOA-NL method has reached competitive LDN of 180. Contrastingly, the EPSONLS model has shown enhanced performance with maximum LDN of 181.



Fig. 3. LDN analysis of EPSONLS system under 15 transmission ranges

Fig. 4 depicts a comparative LDN investigation of the EPSONLS model with other localization schemes. The outcomes implied that the PSO approach has depicted poor localization results with LDN of 102. Then, the FOA and M-BAT models demonstrated slightly enhanced efficiency with LDN of 134 and 144 respectively. Next, the BOA and GWO techniques have exhibited moderately closer LDN of 157 and 172 respectively. Also, the SSOA-NL model has reached competitive LDN of 181. Contrastingly, the EPSONLS model has revealed enhanced performance with maximum LDN of 199.



Fig. 4 LDN analysis of EPSONLS system under 20 transmission ranges

Fig. 5 represents a comparative LDN inspection of the EPSONLS model with other localization schemes. The results exhibited the PSO algorithm has depicted poor localization outcomes with LDN of 141. Then, the GWO and M-BAT methods demonstrated slightly enhanced efficiency with LDN of 158 and 162 respectively. Later, the FOA and BOA models exhibited moderately closer LDN of 185 and 189 respectively. Moreover, the SSOA-NL model has gained competitive LDN of 192. Contrastingly, the EPSONLS model has shown enhanced performance with maximum LDN of 214.
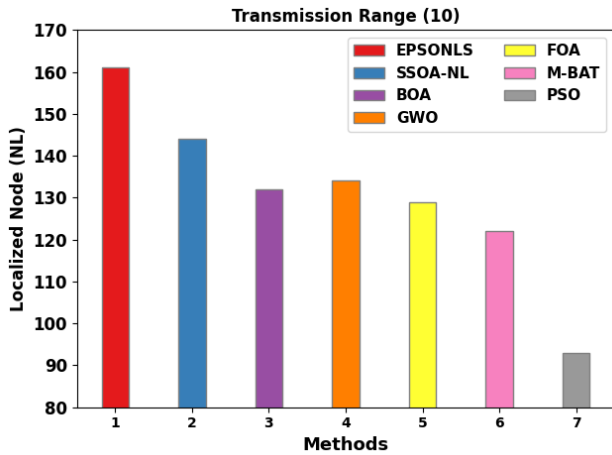
Fig. 5. LDN analysis of EPSONLS system under 25 transmission ranges



Fig. 6. LDN analysis of EPSONLS system under 30 transmission ranges

Fig. 6 portrays a comparative LDN examination of the EPSONLS technique with other localization schemes. The outcomes implied that the PSO algorithm has depicted poor localization results with LDN of 136. Then, the GWO and M-BAT methods have demonstrated slightly enhanced efficiency with LDN of 184 and 185 correspondingly. Next, the FOA and SSOA-NL models have displayed moderately closer LDNs of 189 and 208 respectively. Also, the BOA model has reached competitive LDN of 208. Contrastingly, the EPSONLS method has revealed enhanced performance with maximum LDN of 225.

Fig. 7 portrays a comparative LDN examination of the EPSONLS model with other localization schemes. The results implied that the PSO algorithm has depicted poor localization results with LDN of 122. Then, the M-BAT and BOA models demonstrated slightly enhanced efficiency with LDN of 177 and 178 correspondingly. Afterward, the GWO and SSOA-NL models displayed moderately closer LDNs of 195 and 207 respectively. Along with that, the FOA model has reached competitive LDN of 209. Contrastingly, the EPSONLS model has shown enhanced performance with maximum LDN of 234.
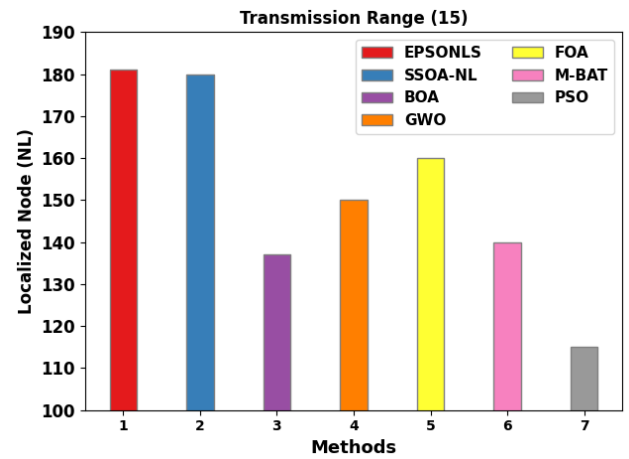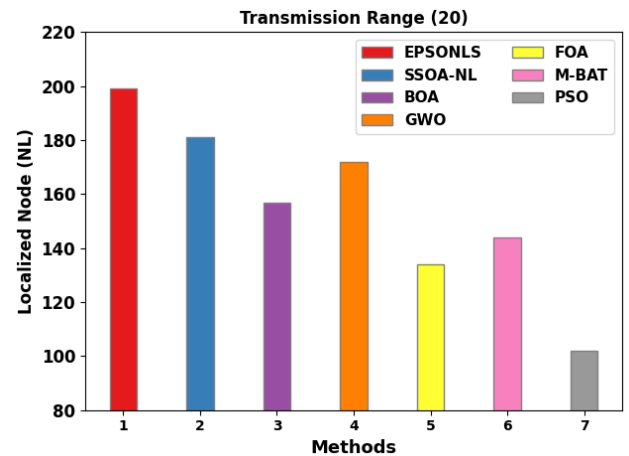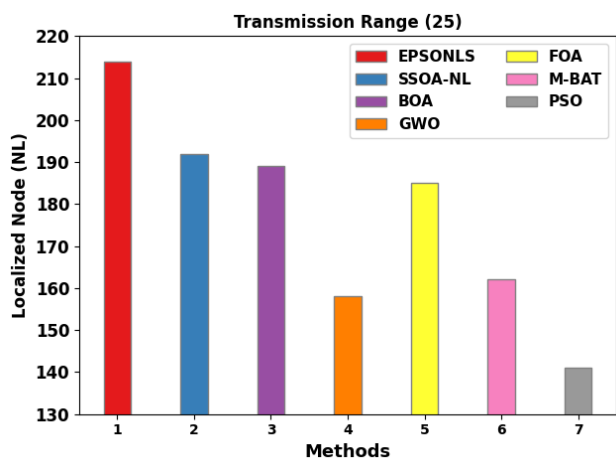


Fig. 7. LDN analysis of EPSONLS system under 35 transmission ranges

Fig. 8 depicts a comparative LDN examination of the EPSONLS model with other localization schemes. The results implied that the PSO algorithm has depicted poor localization results with LDN of 132. Then, the FOA and GWO models demonstrated slightly enhanced efficiency with LDN of 190 and 191 correspondingly. Subsequently, the M-BAT and SSOA-NL models have displayed moderately closer LDNs of 192 and 210 correspondingly. In addition, the BOA model has reached competitive LDN of 219. Contrastingly, the EPSONLS technique has shown enhanced performance with maximum LDN of 244.
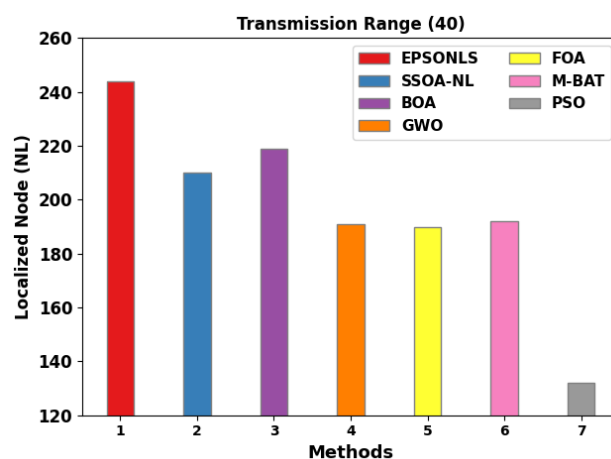


Fig. 8. LDN analysis of EPSONLS system under 40 transmission ranges

Thus, the EPSONLS model is found to be an effective tool for node localization process in WSN.

## V. CONCLUSION

In this study, a new EPSONLS method has been developed to determine the location of the unknown nodes in the network. To do so, the presented EPSONLS model applies the PSO algorithm to identify the node position. In addition, the EPSONLS model determines the node location with the goal of

minimizing localization error and time. A wide-ranging experimental analysis is performed and the outcomes are investigated under distinct aspects. The simulation outcome demonstrated the betterment of the EPSONLS model over recent approaches. Therefore, the EPSONLS model can be applied for effective node localization efficiency on the network.

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# Classification and Segmentation of Mitotic Cells using Ant Colony Algorithm and TNM Classifier

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*Abstract*—**Breast cancer develops from breast tissue and leads to abnormally growing cells in the chest. Doctors usually look for tumors on a mammogram, and some mammograms contain abnormal macrocalcifications and microcalcifications when the image quality is very poor. The presence of these abnormal amounts of calcium deposits in the breast is a sign of early breast cancer and should never be ignored. The image quality should be of the highest quality for an accurate interpretation of this mammographic deposit. Proposed research work is ongoing, exploring other screening methods and the stages of breast cancer. Improved Adaptive Fuzzy C-Means (IAFCM), Ant Colony Algorithm (ACA), and TNM (The size of the breast tumour (T), adjacent lymph nodes and Metastasized methods are used which builds the proposed medical image processing systems into an efficient way. Modified Poisson Inverse Gradient, Metastasized classifier (MPIG) has been used for classification. More than 500 image modalities are involved in all of the approaches. Clinical practitioners who make decisions based on photographs are predicted to benefit from the findings of this study.**

*Keywords—TNM, IAFCM, ACM, MPIG, Malignancy*

## I. INTRODUCTION

This paper explains about the importance of Breast cancer. It's very important to find the Breast cancer at earlier stage. All over the country U.S is mostly affected with this disease In India, for every 4 minutes the woman is diagnosed with this disease. And a woman dies with this disease for every 13 minutes.

This disease is more common with the people living in rural area while comparing the people in urban area. Therefore it is very important to find and treat this disease as early as possible. According to the affected areas and severeness of the problem this cancer is divided into different stages, with the different stage it is divided into different types, the earlier identification of cancer is more treatable while comparing the later stages.

In Fig 1 the complete proposed frame work has been suggested. [1, 2].

## II. RELATED WORKS

Jiyo S. Athertya et al. (2016) has established CT image contours from fuzzy structure. In this method the automatic initialization of contours has been demonstrated using active contour method. Fuzzy corner gave an accuracy of 80% with high Dice coefficient and low Hausdroff distance. This algorithm is suitable for noisy images and also it has the complexity in finding of corners of the image. Elisee Ilunga Mbuyamba et al. (2018) narrated the technique with active cuckoo search algorithm and with contour model to overcome the drawbacks of noise occurrence. The algorithm has been tested and implemented on MRI images. Euclidian distance and Huffman coding is used to find the distance between all the matrices. This method requires lesser iterations, robust and more effective. It takes more computational time for computing the iterations.[3] Agus Pratondo et al. (2016) delivered improved robust. Edge Detection Algorithm has also been plays a major role in assisting and finding the disease when the image has poor boundaries. In this method the new ESFs has been used which has gradient information as well as probability scores to classify the mass. This method was evaluated using two quantitative measures namely Jaccard index and Dice coefficient. This method converges faster and gives global contours but it is a complex method. Mean filters, Median filter, Wiener filter and linear filter are used for preprocessing among these filters median filter provides best results. Image segmentation is performed through thresholding technique and K-Means algorithm. The tumor edges are detected using canny edge detection technique. This algorithm results in a higher accuracy. The limitation of this method is the difficulty in finding blurred image edges

## III. PROPOSED METHOD

The first step is to remove the speckle noises by preprocessing. The morphological strategy for tumour segmentation is proposed in the second stage, and the Otsu thresholding method is adopted to cluster the cancer image, which is employed to decrease intra class variation

and maximize inter class variance. It translates a grayscale appearance to a binary image.[4]

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┌─────────────────────────────────────────┐
│ Development of Medical Image Processing  │
│ Schemes for Breast Cancer Detection and  │
│ Staging                                  │
└─────────────────────────────────────────┘
                    │
┌─────────────────────────────────────────┐
│ Image Acquisition (Mammogram, PET and    │
│ CT Images)                               │
└─────────────────────────────────────────┘
        │                       │
┌────────────────┐      ┌────────────────┐
│ Image          │      │ Image          │
│ Pre-processing │      │ Pre-processing │
└────────────────┘      └────────────────┘
        │                       │
┌────────────────┐      ┌────────────────┐
│ Image          │      │ Image          │
│ Segmentation   │      │ Segmentation   │
│ on using       │      │ on using       │
│ Improved       │      │ Improved Ant   │
│ Adaptive Fuzzy │      │ Colony         │
│ C Means        │      │ Algorithm      │
└────────────────┘      └────────────────┘
        │                       │
┌────────────────┐      ┌────────────────┐
│ Feature        │      │ Feature        │
│ Extraction     │      │ Extraction     │
│ using          │      │ using DWT      │
│ Connected      │      │                │
│ Component and  │      │                │
│ Region         │      │                │
│ Properties     │      │                │
└────────────────┘      └────────────────┘
        │                       │
┌────────────────┐      ┌────────────────┐
│ SVM Classifier │      │ TNM Classifier │
│ for Normal and │      │ for Tumor      │
│ Abnormal Tumor │      │ Staging        │
│ Classifications│      │                │
└────────────────┘      └────────────────┘
        │                       │
┌─────────────────────────────────────────┐
│ Improvements in Finding of Breast Cancer │
│ Masses, Boundaries and Staging of Tumor  │
└─────────────────────────────────────────┘
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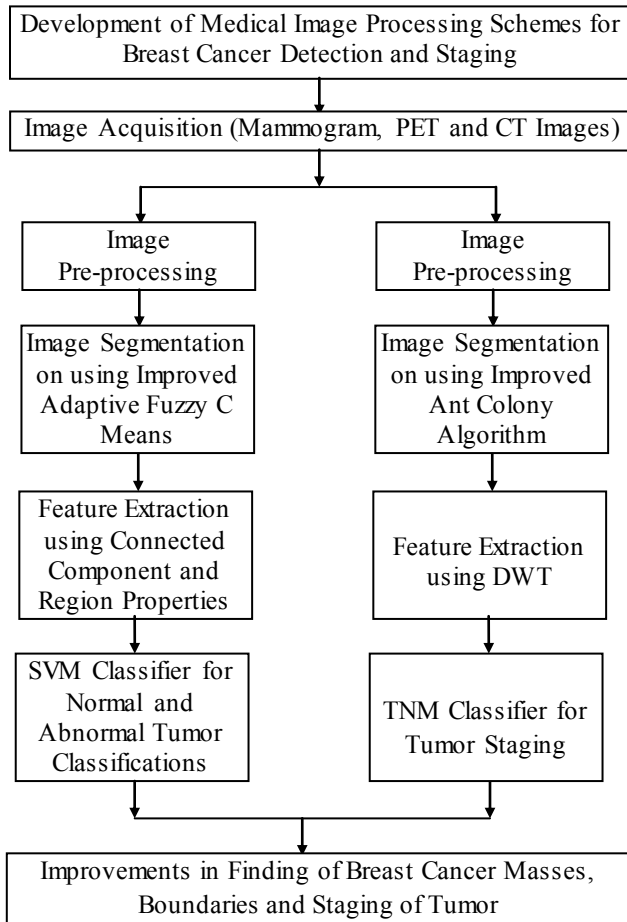
Fig.1 Proposed Research Frame work

By means of applying the linked component technique in the third phase, the background and tumour portions are labelled as black (background picture) and white (tumour portion). The tumour part is identified in the fourth stage using approaches such as Improved Adaptive Fuzzy C-Means and region growing-pixel based image segmentation.[5] The initial seed points for surrounding pixels are selected and compared with the other pixels in the region growing-pixel approach, and then the pixels are grouped based on the seed points.

Image preprocessing using morphological operations

Step 0: Read the DICOM breast image as input and convert it to grayscale.

Step 1: Set up the structuring parts and the opening and closure, then move on to the next step.

Step 2: Determine the breast image's tophat.

Step 3: Determine the Tophat breast image's threshold value and apply it. Binarization standard deviation

Step 4: Close the binary image to reconstruct the breast image.

Step 5: Obtain the breast image's bottom hat.

Step 6: Determine the Bottomhat breast image's threshold value and apply it. Binarization standard deviation

Step 7: Open the binary image and reconstruct the breast image.

Step 8: Find the binary image with the noise eliminated.

Step 9: Use morphological techniques to eliminate the little items, such as Erosion and dilatation are two different things.

Step 10: Attach the connected image to the complement of the binarized image.

Step 11: Using the canny operator, determine the breast cancer boundaries and estimate the tumour area, perimeter, and diameter

The advised IAFCM approach is used to create fuzzy segmentation of snap shots with depth inhomogeneity, in addition to an iterative set of rules for minimizing brightness adjustments as a result of inhomogeneity. To keep away from the usage of multigrid approaches, the multiplier area is brought for every new release of the set of rules. Taking the goal feature's first derivatives with recognize to United Kingdom m (i, j), and vk and equating to 0 yields 3 required standards for the goal feature to be at a minimum, the segmented result of the image from mini MIAS database has been shown in the Fig 3 and Fig 4, where the background image labels has been filtered, noises has been avoided and the affected region has been segmented.[6]
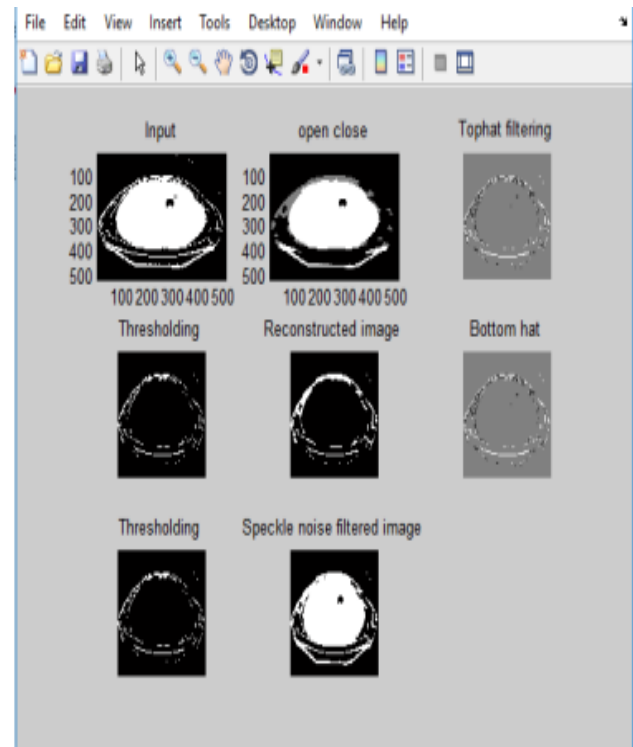


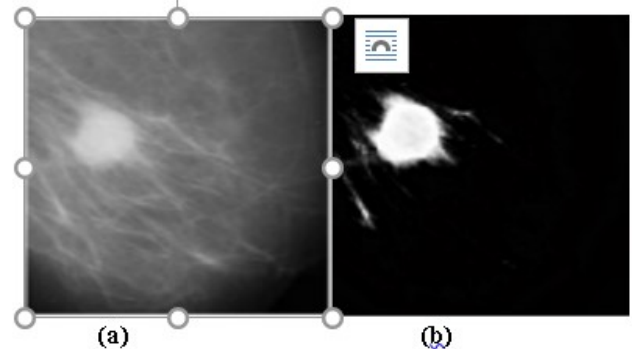Fig 2: speckle noise removed image



Fig 3: (a) Mdb 206: Obtained Mammogram, (b) Resultant Mammogram

Additionally, utilizing the most extreme and least qualities in the arranged rundown generally brings about the level enlargement and disintegration of the picture, separately[.7] These two tasks are viewed as a feature of the morphological activities, and are talked about in the following sub – section, By iteratively refreshing the group habitats and the participation grades for every main informative element, FCM Iteratively moves the bunch places to "one side" area inside an informational collection. Exhibitions rely upon introductory centroid. [8]

For a powerful methodology there are two different ways which is depicted underneath

1) Using a calculation to decide the entirety of the centroid.

2) Run FCM a few times each beginning with various starting centroid.

The reasonable end standards can set with a money order regardless of whether the goal work is under a specific resilience esteem or on the other hand on the off chance that its improvement contrasted. With the past cycle is under a specific limit. [9] Additionally, the most extreme number of emphasis cycles can be utilized as an end measure as well.
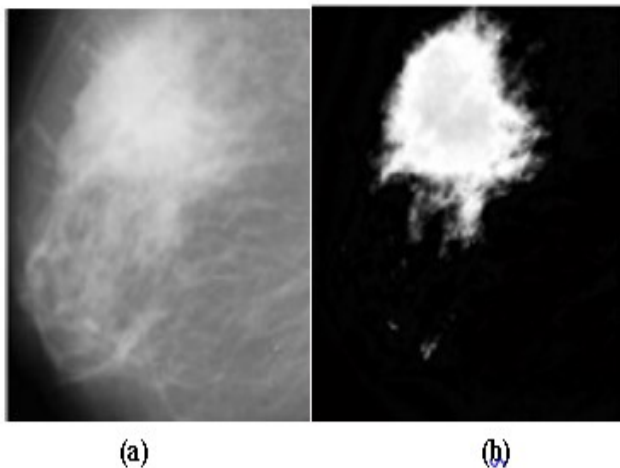


Fig 4 (a) ) Mdb 254: Obtained Mammogram, (b) Resultant Mammogram

## IV. FEATURE EXTRACTION USING CONNECTED COMPONENTS

A 2-Dimensional quincunx wavelet change exists carried out by means of high pass and low pass channel banks like a 2D divisible wavelet change, the thing that matters is that the low and high-pass pieces cannot be isolated into two one-layered pieces.[10] Albeit divisible wavelet changes have a straightforward and surely known execution, there are a few contemplations in by means of a non-divisible wavelet disintegration: detachable wavelet deteriorations have vertical and level shorts though the non-divisible disintegration can take a cut-off on some point, additionally, non-divisible channel banks can be deftly custom fitted for specific commitments, for example, taking straight stage

The high and low pass filter banks used in our research is,

$$
g_0(n_1,n_2) = \begin{pmatrix} & & 1 & & \\ & 2 & -4 & 2 & \\ 1 & -4 & -28 & -4 & 1 \\ & 2 & -4 & 2 & \\ & & 1 & & \end{pmatrix} \tag{1}
$$

An ordinary class comprises of normal areas of various densities and intricacies. A strange class is more assorted since it is a bunch of various bosom malignant growths, like micro calcifications and speculated sores.[11] It is normal that the dispersion of an element might not remain uni-modular also might not act like a Gaussian because of the mixed qualities of normal and strange classes. On or after the histograms and dissipate schemes of a portion of the highlights, we see that a few conveyances really do show up as multi-modes.[12] Highlights are typically changed to standardize the disperse of the circulation what's more improve the division detachment among the two classes. Minor notable changes is the "brightening" change used to make the changed elements "in dependent." The power capacity can remain utilized to standardize two conveyances to consume comparable fluctuation, in this way decrease the impacts of anomalies. Alpha and beta are the parameters used to find all the feature extracted values

## V. CLASSIFICATION

The proposed classification task is done through SVM Classifier and TNM Classifier and it is nontrivial to isolate typical districts from numerous kinds of strange locales. To start with, the class of strange locales is a heterogeneous blend of, outlined commonalities, speculated injuries, micro calcifications and different anomalies.[13]

Secondly, ordinary locales of high thickness represent an expected deterrent to isolate from tumors. It is normal that the circulations of ordinary and strange elements won't in a perfect world act as uni-modular appropriations and some sub-examples may be shadowed by ruling examples. Well-defined classifier may not be adequate to separate each sub-design.[14] A solitary classifier will in general over-fit the preparation information with high mistake when utilized on the intricate and heterogeneous preparation information. In our work, we planned an exceptional classifier mix strategy that moves along the general presentation and decreases misclassification mistakes. The objective of our classification is toward expand the TNV, the right classification pace of typical mammogram districts, with an exceptionally low FNF, the misclassification pace of strange mammogram locales as ordinary.

Since TNV + FPV = 0.9 and FNV + TPV = 0.9 by way of depicted in Segment, the beyond objective is equivalent to limit the F P F with an extremely high TPV. We follow the standard of limiting the FPF in our classification plan to accomplish expanding TNF. The explanation is to ensure that we have an exceptionally high TPF, for example an extremely low FNV, since it is awful in the event that unusual is named typical while performing ordinary discovery by the side of the transmission.[15] We custom multi-stage dipping in our classification to enormously decrease the FPV, for example to drastically

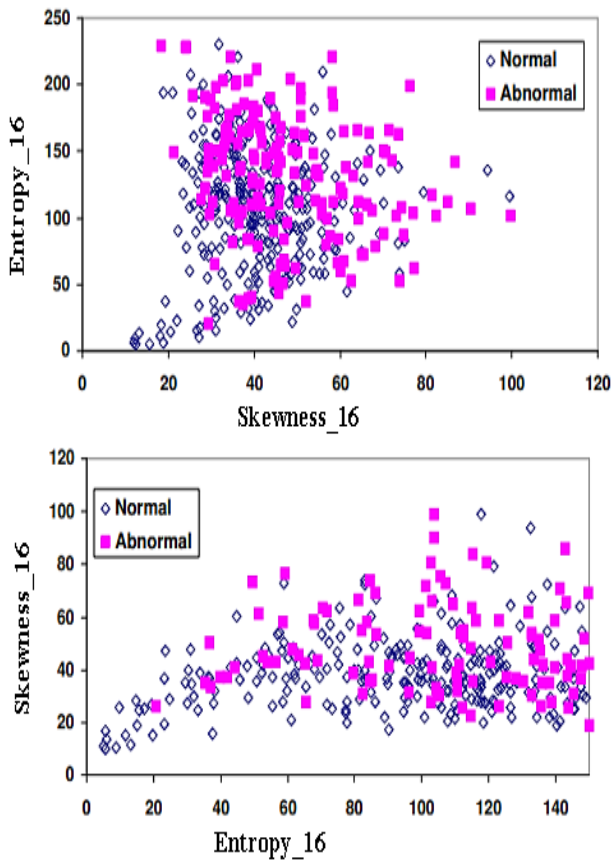expand the TNV. With its covered construction, group of the loaded speculation or the course speculation.



Fig 5: The Scatter Region ion Comparison, A.skewness Vs entropy, B. Entropy Vs skewness

The prepared and shown classifier was with 164 ground-truth malignant growth districts and 256 typical areas. Among the 164 ground-truth malignant growth districts, 52 are masses, 52 are speculations and 54 calcifications images. Figure 7 illustrates, the factual appropriation of the appraisals of the 164 diseases and the comparison result between TNM Classifier and SVM classifier.[16]. The nuance rating in the DDSM is utilized to show the noticeability of a disease by a radiologist. The most reduced nuance. Implies the malignant growth is exceptionally unobtrusive and generally hard to recognize.[17] The first-stage choice tree classifier was cost-obliged to accurately characterize almost every disease locale. This brought about a True Positive Fraction (TPV) of 0.99 at False. As far as would be expected examination, 89.2% of ordinary mammogram Districts are accurately recognized, while the misclassification pace of strange as expected is just 3.6%. At the working point displayed in the 6th section of Table 1, we have TPV = 0.908 or 90.8%, FPV = 0.063 or 6.3%, TNV= 0.925 or 92.5% and FNV = 0.092 or 9.2%.As far as would be expected investigation, 93.5% of typical mammogram districts are accurately distinguished, though the misclassification pace of unusual as would be expected is just 9.1%. Henceforth, we accomplished expanded TNV through lessening FPV utilizing the multi-stage classification. It plainly show that our novel multi-stage falling classifier work. Fig9, shows the comparative results of TNM Classifier and SVM Classifier.[18]This

picture division informational index comprises of 7 classes Each class has an aggregate of 330 cases: 30 preparation and 300 test information. Each occasion has 19 constant highlights. In our test, the "malignant growth" class is foliage, the "typical" class comprises of grass, sky, and windows to reproduce the heterogeneous blend.[19]We accomplished Az = 0.99 utilizing our two-stage falling classifier, looking at with Az = 0.90 of a solitary straight classifier.

TABLE 1: PERFORMANCE FRACTION OF FOUR PARAMETERS

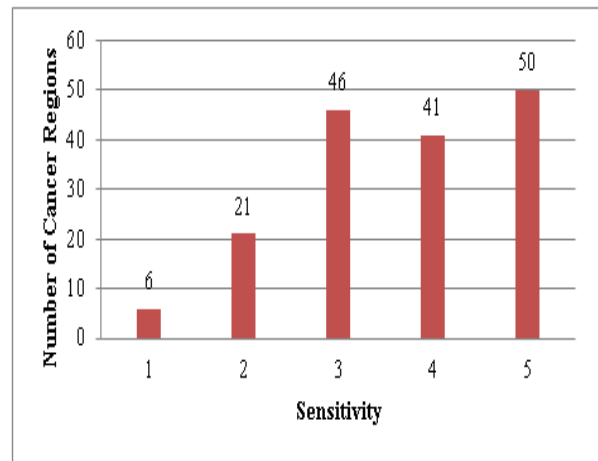| TPV | FPV | TNV | FNV |
|---|---|---|---|
| 0.988 | 0.291 | 0.709 | 0.012 |
| 0.982 | 0.267 | 0.733 | 0.018 |
| 0.982 | 0.216 | 0.784 | 0.018 |
| 0.976 | 0.172 | 0.828 | 0.024 |
| 0.963 | 0.108 | 0.892 | 0.037 |
| 0.909 | 0.064 | 0.936 | 0.091 |
| 0.860 | 0.020 | 0.980 | 0.140 |
| 0.756 | 0.010 | 0.990 | 0.244 |
| 0.530 | 0.003 | 0.997 | 0.470 |
| 0.299 | 0.003 | 0.997 | 0.701 |
| 0.104 | 0.000 | 1.000 | 0.896 |



Fig 6: Comparison result of sensitivity with cancer affected regions
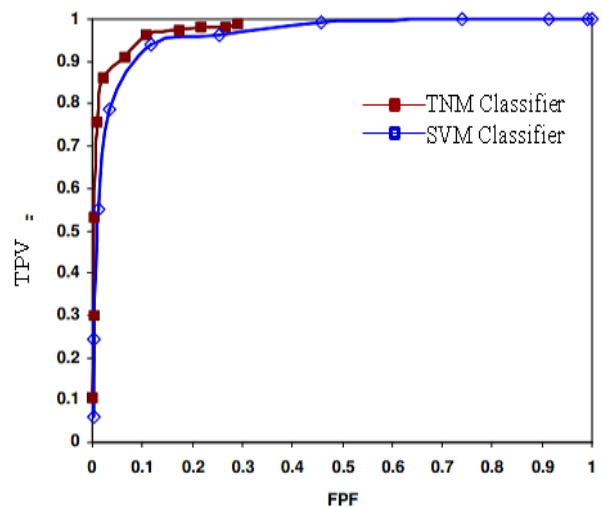


Fig 7:Comparison, result of INM Classifier vs SVM Classifier

Table 1 shows the different values of performance fraction using the above mentioned four parameters.[20] Fig 6 explains about the sensitivity and other cancer affected region values, where sensitivity is used to evaluate the classification metrics performance.

$$TPV = \frac{Abnormal\ Regions\ Correctly\ Classified}{Total\ Abnormal\ Regions} \qquad (2)$$

$$FPV = \frac{Normal\ Regions\ Classified}{Total\ Normal\ Regions} \qquad (3)$$

$$TNV = \frac{Normal\ Regions\ Correctly\ Classified}{Total\ Normal\ Regions} \qquad (4)$$

$$FNV = \frac{Abnormal\ Regions\ Classified}{Total\ Abnormal\ Regions} \qquad (5)$$

## VI. CONCLUSION

Here the proposed work has produced well and better diagnose rate which comparing the existing research works. Here the quality of the image gets improved and undergone further segmentation, where it's very helpful in proper diagnosis. The proposed Improved Adaptive Fuzzy C Means (IAFCM) algorithm with proper threshold value selection was very helpful in segmenting the affected breast region. The region growing properties and other techniques has made the identification and feature extraction of breast cancer portion easier. The substantial features like perimeter, area and diameter are estimated from the segmented tumour portion has also been discussed. The comparative results between the classifiers has been made to show that the proposed work produces better result. After feature extraction, the classification has been done to identify the abnormal and normal cells. The classification rate has been identified by calculating the parameters like sensitivity. It's finally concluded that the outcome of the proposed research work helps in better diagnosis and treatment process.

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