



3.3.2 Number of research papers by teachers in the Journals notified on UGC website during the year

S.NO	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication
1	"An Improved Fast and Secure CAMEL Based Authenticated Key in Smart Health Care System"	Dr.Shaik.ShakeerBasha	CSE	UNIVERSAL WISER PUBLISHER(SCOPUS INDEXED)	2021-2022
2	"Optimized Robot Process Automated Path Navigation In Time Varying Networks"	Dr.Shaik.ShakeerBasha	CSE	Jilin DaxueXuebao (Gongxueban)/Journal of Jilin University (Engineering and Technology Edition)(SCOPUS INDEXED)	2021-2022
3	"A New Artificial Intelligent Based Deep Learning Model Using IOT For COVID-19 Identification"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Early Childhood Special Education (INT-JECSE)SCOPUS INDEXED	2021-2022
4	Brain tumor identification and classification system using convolution neural network	Dr.Shaik.ShakeerBasha	CSE	International Journal of Health Sciences, 6(S2), 7264-7275. (SCOPUS INDEXED)	2021-2022
5	Smart X-Ray interpreter for predicting epoch of healthcare using machine learning	Dr.Shaik.ShakeerBasha	CSE	International Journal of Health Sciences, 6(S1), 9284-9292. (SCOPUS INDEXED)	2021-2022
6	"IoT Framework with Support Vector Machine Learning Algorithm for Intelligent Health Monitoring System"	Dr.Shaik.ShakeerBasha	CSE	"International Journal of Early Childhood Special Education (INT-JECS) (SCOPUS INDEXED)	2021-2022
7	"Digital Anonymity Detection In Software Characterized Systems Using Onion Routing	Dr.Shaik.ShakeerBasha	CSE	International Journal of Early Childhood Special Education (INT-JECS)	2021-2022

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8	"Iot Enabled Health Monitoring Using WBAN Sensors In Non-Invasive Remote Environment"	Dr.Shaik.ShakeerBasha	CSE	Webology(SCOPUS INDEXED)	2021-2022
9	"Web Cross-site Inference Attack Detection and Avoidance using Defense Convolution Neural Network in Sensory Networks"	Dr.Shaik.ShakeerBasha	CSE	Turkish Journal of Computer and Mathematics Education(SCOPUS INDEXED)	2021-2022
10	"Analyzing The Performance Of Marketing Life Cycle Process Using Software Architecture Model "	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
11	"Deep Convolutional Neural Networks For Analyzing Electromagnetic Waves Using Maxwell Equation Model"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
12	"A Survey On Ai In Different Application Domains"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
13	Analyzing Various Graph Theory Applications Using Mathematical And Computational Intelligence Approach"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
14	"Development Of Machine Learning Techniques To Differentiate COVID-19 Indications From Serious Diseases"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
15	"Automated Visual Assessment From Optical Data Sets To Enhance The Accuracy Of Data Analysis"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
16	"Artificial Heavy-Duty Structural Technology For Ai Mobile Robots To Control Dynamic Programming"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
17	"Empirical View Of Financial Management Survey In Block Chain Technology Issues, Risk And Mitigation"	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022

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18	"Ubiquitous Management System For Monitoring E-Learning Applications	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
19	A Survey On Life Skill Challenges, Development And Implementation In School Education System	Dr.Shaik.ShakeerBasha	CSE	International Journal of Aquatic Science	2021-2022
20	Zero Voltage Switching techniques for Bidirectional DC-DC Converter	E.PRASANNA	EEE	INTERNATIONAL JOURNAL OF ENGINEERING INNOVATION IN ADVANCED TECHNOLOGY	2021-22
21	Back-to-Back HVDC Modular Multilevel Converter Operating as Power Quality Conditioning system	E.PRASANNA	EEE	OF ENGINEERING INNOVATION IN ADVANCED TECHNOLOGY	2021-22
22	Deep learning binary fruit fly algorithm for identifying SYN flood attack from TCP/IP	VankayalapatiNagaraju	ECE	Materials Today: Proceedings xxx (xxxx) xxx	2021-22
23	Side scan sonar image augmentation for sediment classification using deep learning based transfer learning approach	GurralaChandrashekar	ECE	Materials Today: Proceedings xxx (xxxx) xxx	2021-22
24	IS ENGAGEMENT INFLUENCED BY RESILIENCE? MULTIPLE MODERATOR ANALYSIS CENTRIC TO TN PSU TELECOM EMPLOYEES	Dr. B Nayeema	MBA	SHODHSAMHITA	2021-22

  
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25	IS ENGAGEMENT INFLUENCED BY RESILIENCE? MULTIPLE MODERATOR ANALYSIS CENTRIC TO TN PSU TELECOM EMPLOYEES	Dr. N.Ramana Reddy	MBA	SHODHSAMHITA	2021-22
26	Moderation analysis of stress on government hospital nurses engagement	Dr. B. Nayeema	MBA	Turkish Journal of Computer and Mathematics Education	2021-22
27	Conversion of plastic waste into fuel	Dr Y Ramesh	MECH	Gradiva review	2021-22
28	Conversion of plastic waste into fuel	M VENKATESWARLU	MECH	Gradiva review	2021-22
29	RDNN for classification and prediction of Rock/Mine in underwater acoustics	Jetty Bangaru Siddhartha	ECE	Materials Today: Proceedings	2021-22
30	Experimentation and Analysis of Natural Fiber Reinforced Polymer Matrix Composite	Ramesh BabuYeluri	MECH	International Journal of Mechanical Engineering (IJME),	2021-22
31	Investigation and Characterization of Graphite Based Carbon Reinforced Laminates	Ramesh BabuYeluri	MECH	International Journal of Research in Engineering and Applied Sciences (IJREAS),	2021-22
32	Experimentation and Analysis of Natural Fiber Reinforced Polymer Matrix Composite	M VENKATESWARLU	MECH	International Journal of Mechanical Engineering (IJME),	2021-22

  
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33	Experimentation and Analysis of Natural Fiber Reinforced Polymer Matrix Composite	KollaSumanth	MECH	International Journal of Mechanical Engineering (IJME),	2021-22
34	Experimentation and Analysis of Natural Fiber Reinforced Polymer Matrix Composite	G.vinodkumar	MECH	International Journal of Mechanical Engineering (IJME),	2021-22
35	Convolution Neural Network (CNN) Based Computerized Classification of Adulterated Fruits with SIFT and Bag of words (BOW)	L Shiva Shankar	CSE	IEEE Xplore	2021-22
36	Convolution Neural Network (CNN) Based Computerized Classification of Adulterated Fruits with SIFT and Bag of words (BOW)	AllaSravani	CSE	IEEE Xplore	2021-22
37	Convolution Neural Network (CNN) Based Computerized Classification of Adulterated Fruits with SIFT and Bag of words (BOW)	S. Rajender	CSE	IEEE Xplore	2021-22

  
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Research Article

## An Improved Fast and Secure CAMEL Based Authenticated Key in Smart Health Care System

Syed Khasim<sup>1\*</sup>, Shaik Shakeer Basha<sup>2</sup>

<sup>1</sup>Department of Computer Science & Engineering, Dr. Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, 523316, Andhra Pradesh, India

<sup>2</sup>Department of Computer Science & Engineering, Avanthi Institute of Engineering & Technology, Gunthapalli, Abdullahpurment Mandal, Hyderabad, 501512, Telangana, India  
Email: khasim716@gmail.com

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**Abstract:** Seeing as Smart Healthcare Systems provide cloud services for storing patient health records, data security and privacy are critical to the company's success, and patients do not want their identities to be revealed. The authentication procedure requires disclosing users' personal data, such as a username and password, on the authentication server in order to protect their identities. The patient's privacy may be invaded if the patient can be observed or linked to by the patient's unfortunate foes. As a result, we propose in this paper a system that gives patients anonymity, protection, and privacy of sensitive healthcare data from the Authorization Service and enemies. A camel-based rotating panel signature program was used in our proposed work to provide anonymity to health records while also adding extra security to the network layer. The effectiveness of the programs was assessed using theoretical analysis, which revealed that the program has a range of security characteristics and is resistant to multiple attacks.

**Keywords:** Smart Healthcare Systems, anonymous authentication, Camel algorithm, anonymity

### Abbreviations

ECC	Elliptic Curve Cryptography
RSA	Rivest-Shamir-Adleman
PCs	Personel Computers
SAGE	Scheme Against Global Eavesdropping
WBANs	Wireless Body Area Networks
CLS	Certificate less Signature
PKI	Public Key Infrastructure
VLR	Verifier Local Revocation
CSP	Cloud Service Provider
RS	Registration Server

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# 1. Introduction

With cloud computing expanding in popularity, many healthcare institutions are turning to it for a variety of reasons. Healthcare practitioners with substantial savings and computations are motivated to utilize cloud-based servers since cloud computing offers several benefits such as scaling and cost savings [1]. Many advancements in embedded systems, biosensors, and wireless networks have resulted in the outstanding development of wearable sensors in the human body to collect all health records such as blood pressure and heart rate in recent years. Hospitals offer their services via cloud servers, where data are evaluated in order to improve the data quality and the health of the sensors that are delivered here for data processing [2]. Figure 1 shows an example of a smart cloud-based healthcare system for patient identification and anonymous service access in smart healthcare systems. At the same time, we must solve some of the difficulties associated with sharing data on unreliable cloud servers, such as losing patient control over data, health, and privacy violation, and putting patient privacy and the cloud system for health care [3]. We need to create mechanisms to preserve users' privacy, eliminate the risks of losing physical control over data, and secure access to patients' data in a virtual environment from harmful users while maintaining their confidentiality and integrity. Due to the higher processing power, traditional techniques of safeguarding an individual's privacy may not be sufficient. Users' online actions are extremely risky since they can be used to examine cloud servers or eavesdrop on surfing histories and location footprints. Our solution includes an authentication procedure that allows patients to be identified across all health services [4].

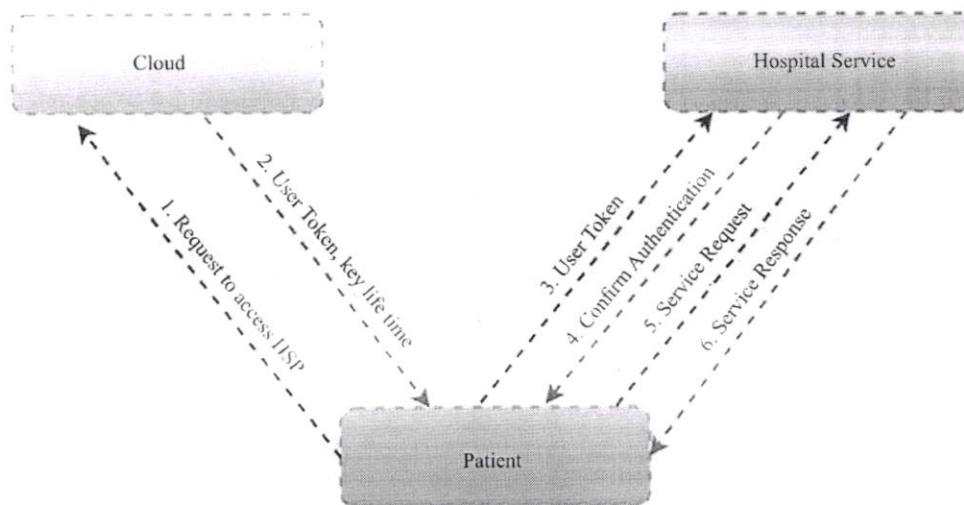


Figure 1. Smart Healthcare Systems for Patient authorization and anonymous service access. The operation of the proposed scheme is strong and attractive on cloud servers to store and hide the identities of patients giving priority to their privacy.

In recent years, a slew of privacy protection accreditation methods has been presented. Cloud servers, on the other hand, are incapable of safeguarding users' personal or sensitive data. When using internet services, offers a number of risks. When using cloud services in health systems, patients do not want to divulge their identities. Patients are hesitant to trust such apps unless the system guarantees complete privacy and security. Data that has been saved could be useful [5]. As a result, the program must be trustworthy and secure. Personal information, such as usernames, histories, and biometric traits, may be used to compromise a patient's identity and extract information from concealed forms, such as evaluating patient preferences or Internet traffic. The following is a list of goals for our work that we would like to attain [6].

Without giving any personal information, the patient is unanimously approved by the authorization server.

- Multiple requests from the same patient cannot be linked through an authorization server, but the patient can be identified through auditory, for example.



- The user in the middle, the computer, is immune to attacks such as back attacks and auditory attacks.
- Sending communications can be verified by the recipient.

The rest of the paper is organized as follows: Section 2 discussed a literature review of previous authentication secure health care system models. Section 3 discusses the proposed method. Section 4 shows and describes the test results of the proposed work. Finally, Section 6 completes the conclusion of proposed work.

## 2. Related work

This section elaborates on the various issues using different techniques of secure health care modules. In bunch signature, without uncovering the partial character, any substantial gathering part permits to sign quite a few messages in the interest of the gathering. Though, the bunch supervisor has rights to uncover the personality of the endorser when made trouble. Most of the gathering marks depend on customary cryptography like ECC, RSA, and discrete logarithm. On the off chance that quantum PCs arise, these plans would be effectively broken. The new character puts together, gathering marks based on respect to bilinear guides with some security properties. In this plan, the length of the marks is free and the size of the gathering public key on the size of the gathering. The plan was appropriate for huge gatherings where the gathering part can sign many messages utilizing a similar key pair. This plan has downsides. The personality based validation frameworks experience the ill effects of the key escrow issue. The key expected to encode or decode is held, and retained so that under particular conditions, an approved party might access the key. As the escrow specialist holding all the cryptographic keys, the key escrow frameworks are considered a security hazard and may spill data or a single disappointment point. Additionally, when a client's private key is compromised, it turns out to be exceptionally difficult to renounce the client [7].

The e-Health framework is imagined as a promising way to deal with further developing medical services through data innovation, where security just as protection is essential for an enormous scope organization and its prosperity. This paper tended to on a solid protection saving Scheme against Global Eavesdropping, named SAGE, for e-Health frameworks. The proposed SAGE can accomplish the substance situated security additionally the logical protection against a solid worldwide enemy. The SAGE has been exhibited effective as far as transmission delay. This plan had a significant disadvantage that it was unreasonable because of substantial computational overhead when straightforwardly applied to the conveyed medical care frameworks. The plan couldn't bear the weight calculations [8].

The proposed mysterious confirmation conspires in cloud climate for s-wellbeing. The reception of an e-Health Cloud has various advantages, particularly sharing, putting away, permitting, and trading data between different clinical establishments. decreasing expense, accessibility of data, lessening costs, quick administrations, and so on Furthermore, saving character protection is a critical test of safety in all conditions just as establishes especially an intense worry in cloud conditions. It puts to the main goal of the client while utilizing administrations. Without a doubt, a significant boundary to the reception or utilization of cloud clients is dread of security misfortune in the cloud worker, especially in an e-Health cloud where clients show restraint toward touchy information or data. Clients/patients may don't have any desire to reveal their characters to the Cloud Service Provider when utilizing its administrations. An approach to secure them is making them unknown to the workers. This paper proposed a versatile and adaptable methodology for patients' personality security to ensure an e-Health Cloud through a mysterious verification plot. This plan depends on blind marks which permit patients to devour cloud benefits namelessly over the world. The framework slacked to give any insights concerning client enlistment and denial. Conversation insights concerning security investigation are not given [9].

In research on application, arranged plan about Wireless body region organizations (WBANs). That is generally utilized telemedicine, which can be used for home medical care and continuous patients checking. In WBANs, the sensor hubs assemble the customer's physiological information. Send it to the clinical focus, the customers communicate it to the clinical focus, the customers' very own information/data is touchy and there are a lot of safety dangers in the additional body corresponds. Henceforth, the security and security of customers' physiological information should be ensured and guaranteed first. Many existing validation conventions for WBANs neglected to consider the key update stage. This paper proposes proposed a proficient verified key arrangement conspire for WBANs in addition to adding the key update stage in improving the security of the plan. In the confirmation stage, to decrease the calculated cost, meeting keys are produced during the enlistment stage and kept covertly. The plan was more productive and dependent



on bilinear pairings yet the repudiation cycle was not plainly characterized if there should arise an occurrence of debate [10].

Wireless Body Area Networks (WBANs) is assistance, which is proficiently utilized at present for giving productive and got medical care administrations. This paper included Certificate less over the remote organization plot for the security reason. Furthermore, a couple of safety conventions are being utilized in both end client and specialist organizations. This plan was proposed to carry out the mysterious light-weight confirmation convention. A WBAN client can without much of a stretch access the telemedicine framework through this convention. Utilizing WBAN administrations, the doctor gets refreshed and the constant data of the patient. The Certificate less Signature (CLS) conspire is nearly used to exceptionally satisfying the security saving needs in WBAN by certificate less encryption likewise intended to dispense with the downsides of the PKI based plan and it doesn't need personality based encryption and computerized authentication, i.e., no key escrow issue. CLS allocated the security by giving private keys to the patient due to that it is inconceivable for the outsider or the aggressor to get to the private data of specific meetings that occurred during validation measure. The plan additionally gave enormous disadvantage of denial method itemizing inappropriately [11].

An unknown verification conspires for remote organizations utilizing Verifier Local Revocation (VLR) bunch signature plot. In the progression of information driven advancements and the Internet of Things in gathering and dispersing tangible information, security and protection turn out to be generally significant and helpful needs. This worry is a direct result of tactile information ordinarily communicated on remote organizations to-ward server farms which is effectively or for the most part noticed for the objective I of organization traffic investigation. Also, the gathered information in server farm can be handily gotten two from different clients, programmers too, if the framework doesn't manage any legitimate security system. In this proposed unknown validation arrangement of blending bases verifier-nearby disavowal bunch signature plot that confirms remote hubs (i.e., sensor hubs) of a specific advantage gathering to the door hub in communicating information. An extra accomplishment is a mysterious verification for getting information to the server farm. Where the plan helpless against replay assaults additionally a noxious Group Manager can imitate a client [12]. The Table 1 shows the various smart health care secure systems comparisons between 2018 to 2022. due to its impact this proposed work has been started to implement.

Table 1. Comparison of Smart Health Care Secure System

Reference	Year	Description
[13]	2018	The need for a dependable end-to-end communication process it-based healthcare applications are discussed, as well as the development of communication technologies that can meet these requirements. Bacterial infections, heart disease, musculoskeletal injuries, and neuromuscular disorders are all represented in the study.
[14]	2019	A comprehensive examination of IoT-based software and systems in smart medical systems is offered. To provide meaningful insight into modern healthcare systems, various apps and services is explained in terms of their major goals and fields of application.
[15]	2021	A table summarizes the standards, specs, benefits, and drawbacks of the most recent WBAN-based healthcare applications. At the end of this paper, open concerns and major obstacles are tackled after mentioning it-based health care services and applications.
[16]	2021	The design of smart health systems is discussed, as well as the main requirements for these systems. Future directions and open topics are discussed at the conclusion of this study to ensure that smart healthcare systems evolve enough and quickly.
[17]	2022	Traditional healthcare system needs are discussed, as well as an overview of the smart healthcare infrastructure and the current state of new technologies employed in smart healthcare systems. The primary applications and services, as well as the obstacles of smart healthcare, are explored to provide a thorough understanding of the system's requirements and functions.

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### 3. Proposed methodology

The camel-based system was utilized in the suggested anonymous authentication scheme to prevent users from acting as unreliable authentication servers in smart cloud-based healthcare applications.

In the event of harmful activity, the suggested approach provides a means for detecting privacy violations with the least amount of risk. Each group has an expiration date and members are reminded to update their keys on a regular basis to speed up the authorization process. When a member's key is returned, they must reveal their previous credentials. Furthermore, anonymous authentication techniques are commonly seen as lonesome. By connecting to a physical location or a person, a cloud service provider operating on the Internet can connect subsequent requests through an IP address. As a result, the software used Camel, which gives network-level anonymity to users while reducing the amount of data available to the cloud service provider. Camel's hidden service cannot be reached anonymously.

It completes anonymous authentication processes with minimum information, allowing neighboring links to be connected to the service provider. Instead of using a direct connection, Internet users connect a series of virtual tunnels to shield the camel network from traffic analytics attacks, which can be used to infer who is talking to whom on the public network.<sup>3</sup> The camel, which is connected to the middle relay terminals via a relay terminal, transports traffic from the middle relay terminals to the exit terminals, preventing the entry and exit terminals from becoming acquainted.

The exit nodes, on the other hand, route traffic to the customer's desired destination. The encryption key for encryption is known by each node. We engaged Camel to work on the server side of our project, and there is a plan to run two secret services, which points to a strategy that uses elements of the CSP and RS protocols. The camel on the customer page can be used to encrypt internet traffic as a proxy application. It can cover the entire world by jumping via a succession of computers.

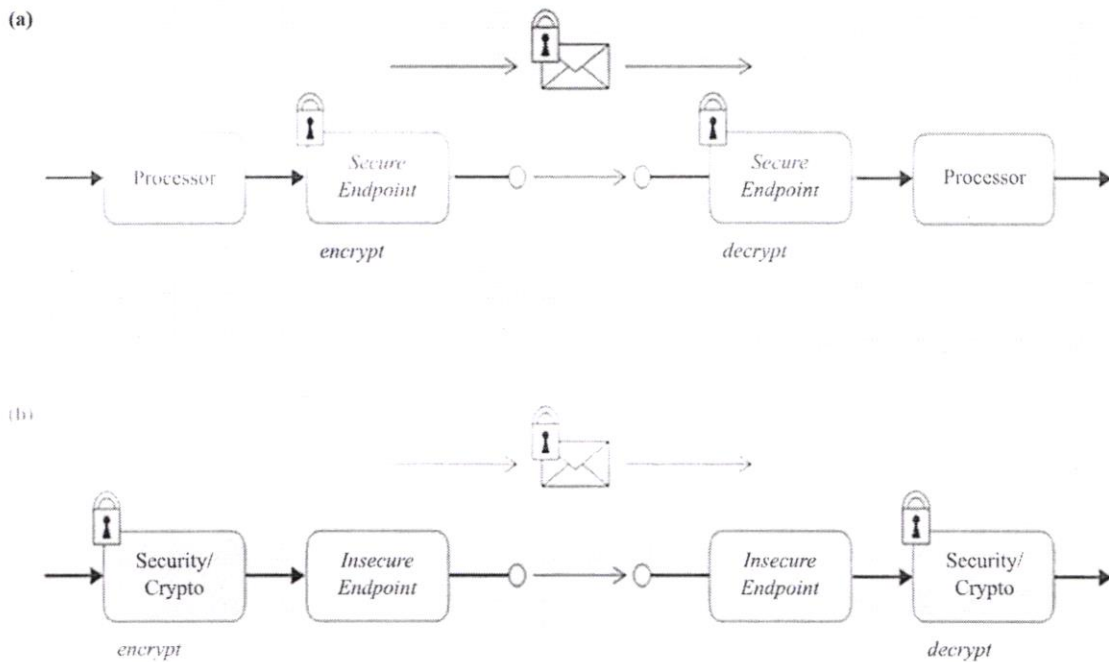


Figure 2. (a) and (b) Apache Camel Security Architecture [18]

Figure 2 The Camel algorithm provides a variety of security options and levels that can be used on Camel routes. These many types of security can be employed in conjunction with one another or on their own. It is simple to create Digital Signatures for Exchanges using Camel cryptographic endpoints and Cryptographic extension. Camel provides a pair of customizable endpoints that work together to establish an exchange signature in one part of the workflow and

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then verify the signature in another section of the workflow [18].

Part (a) of the endpoint security diagram depicts a message exchanged between two routers with secure endpoints. The producer endpoint on the left establishes a secure connection with the consumer endpoint on the right (usually using SSL/TLS). In this instance, both endpoints provide security. With endpoint security, it is typically possible to perform some form of peer authentication and sometimes authorization.

The payload security part (b) depicts a message transmitted between two routers with vulnerable endpoints. Use a payload processor that encrypts the message before transmitting and decrypts it after it is received to secure the communication from unauthorized spying in this situation.

### 3.1 Proposed design architecture

#### 3.1.1 Architecture description

a) Trento: Trento introduced as a facility, is confided in the party that re-appropriated its foundation to CSP. Liable for introduction, disavowal, key age, and evaluation.

b) Cloud Service Provider: CSP offers types of assistance to clients of key trading. It is an unbelievably element that can acquire a lot of data of the client during confirmation measure where data given by Trento and RS. The client may be ready to conceal their personality from CSP.

c) Registration Server: RS just does the enrollment interaction of the client to start framework entrance. It trades data to Trento and CSP according to mentioned.

d) User/Patients: User gets to the cloud administrations from CSP with approved records to RS. Client solicitations to CSP for administrations without revealing their personality with trading some keys given from Trento (Figure 3).

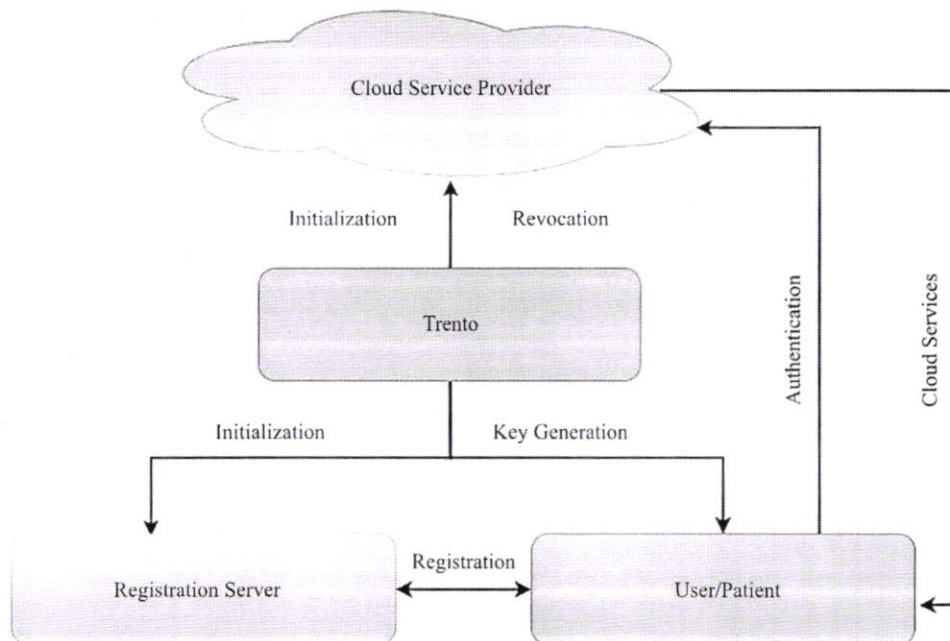


Figure 3. Proposed Design Architecture

### 3.2 Proposed design architecture

Anonymous Authentication scheme includes 5 phases [19]:

1. Initialization
2. Key Generation

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3. Registration
4. Authentication
5. Revocation

**Initialization:** Trent creates a private-public key pair and gives public half to CSP and RS. With a scope of pairings clients should utilize concurred pairings. When Trent sets up the framework, reinstatement is finished.

**Key Generation:** Trent produces bunch key that substantial for quite a while, ace gathering key and from that infers public gathering key which is somewhat arbitrary and some degree got from bunch chief key. Trent produces a marked endorsement containing data. Trent encodes and sends that endorsement to CSP and RS by utilizing its public key. CSP and RS unscramble and confirm that the authentication is really from Trent with the assistance half open key given past. Trent needs to refresh bunch keys each season of the same key age measure.

**Registration:** RS presently does the enrollment interaction of the client to start framework entrance. It trades data to Trent and CSP according to mentioned.

**Authentication:** A user wishes to demand assistance from CSP and starts the verification interaction. The client associates with CSP over an unknown organization and sends the gathering key to verify. CSP checks the gathering key matches a put-away authentication sent by Trent and ought not to be terminated. CSP produces an irregular number and sends it to the client. Client and CSP play out a zero information convention. The client produces a signature and sends it and solicitation to CSP. CSP proceeds to the subsequent stage if the balance remains constant/substantial mark in any case ends the association. CSP additionally makes sure that the client didn't play out the convention with the renounced key. CSP encodes and plays out the mentioned administration with an encryption key and saves it in the review log so that lone Trent might understand.

**Revocation:** When Trent tracked down that a client has been manhandling the administrations, he disavows the client's vital. Key disavowal fundamentally permits untrusted CSP who keeps a decoded log to interface the entirety of clients' associations and ought not to be utilized essential not by ending a customer's administration. Trent demands the enrollment log and review log from RS and CSP separately and decodes it to get demands. Trent utilizes bunch signature ace key and the rundown of record of interaction to separate which bunch part held marking key to mark the message and burned-through which administration. Trent tests for each record in enrollment log, if a match is discovered, Trent figures the relating boundary and adds it to renouncement log. Trent shares the following data for clients with CSP to disavow client's participation key. To permit CSP to get confirmations of participation made by client and deny offering administrations to him. RS eliminates clients from the rundown of adequate customers when Trent sends the client's character to it.

### 3.3 Proposed algorithm

#### 3.3.1 Key generation

Public key and private key generated.

The public key generation equation:  $Q = d \times P$

Where  $k$  and  $d$  is random number selected within the range of  $(1$  to  $n - 1)$ ,

$P$  is the point on the curve and  $Q$  public key and  $d$  is the private key.

#### 3.3.2 Encryption

Input

1. String = message  $M$  (plain text)
2. Public key = key Literal types as Plain text, encrypted text Output
1. START
2. Init = (ENCRYPT MODE, key)
3. Plaintext = Input message
4. Encrypted Text-do Final (plaintext)
5. Encrypted String = cipher text cipher text  $1 = k \times P$  cipher text  $2 = M + k \times Q$
6. Return encrypted String.



### 3.3.3 Decryption

Input

1. String = cipher text
2. PrivateKey = key Literal types as Ciphertext, decrypted text Output
1. START
2. Init-(DECRYPT MODE, key)
3. Ciphertext-cipher text
4. Decrypted Text-do Final (cipher text)
5. Decrypted String-message (plain text)  $M = \text{cipher text} \times \text{cipher text}^{-1}$
6. Return decrypted String (Figure 4)

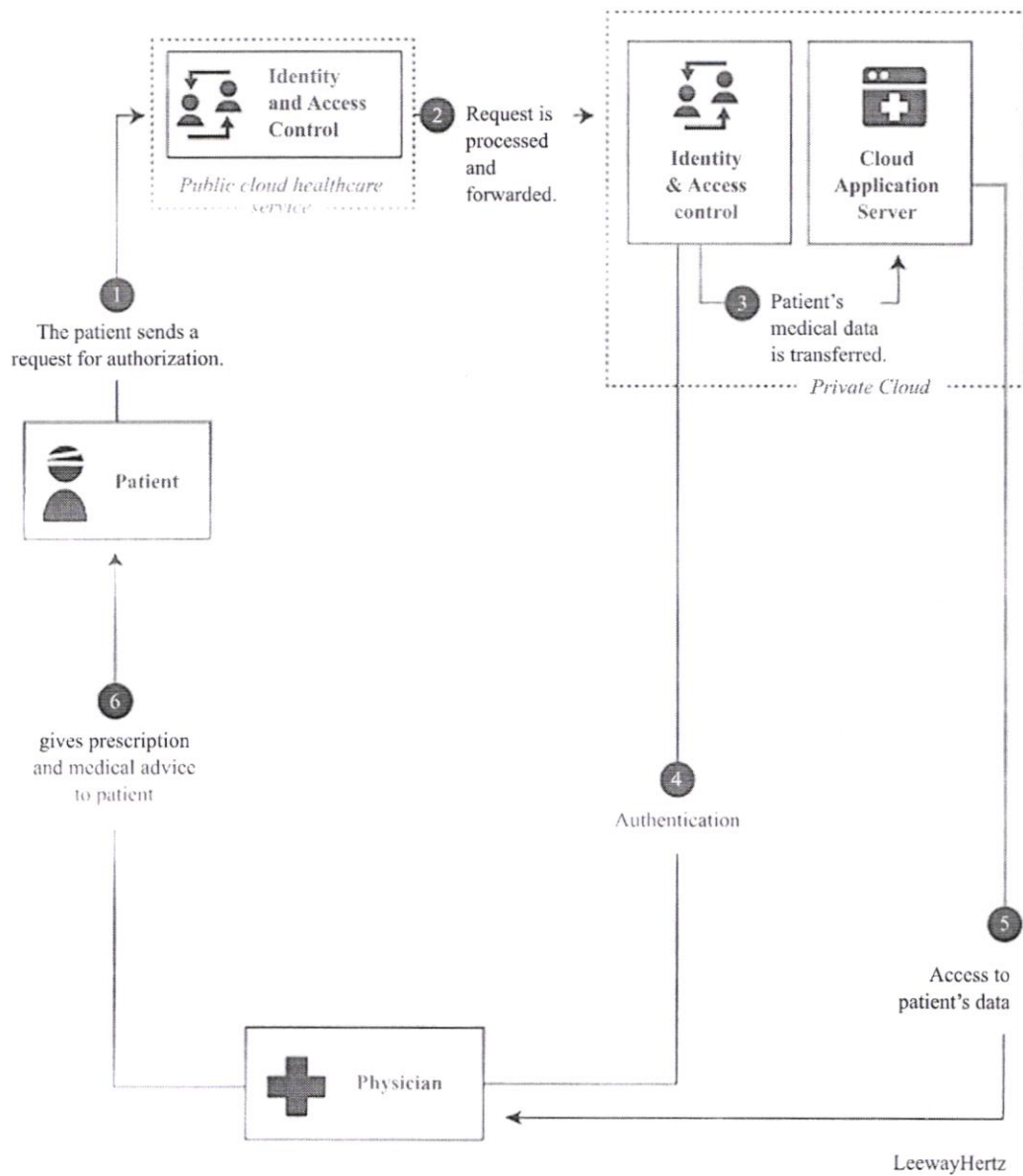


Figure 4. Architecture of private and public cloud communication scenarios [20]

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### 3.4 Requirement specification

1. Software Requirements Microsoft Windows 7 and Above Net Beans IDE 8.
  - 2 Java Development Kit (JDK) 1. 7 MySQL 5.5 onwards Application server, Tomcat 5.0
- The following steps of cloud-based architecture gives a complete idea of the overall workflow process.

#### 3.4.1 Stage 1: Patient requests authorization

Public cloud administrations are tended to exclusively by other clients like patients and outsiders like insurance agencies, drug stores, research medical services organizations, and drug producers. A patient is additionally expected to be an outside client. Thus, the signs on utilizing (username and secret word) addressing public personality and access control cloud administrations to put a solicitation for approval [20].

#### 3.4.2 Stage 2: Request is prepared at public cloud and sent to private cloud organization

In light of the solicitation type for capacity, access, or preparing wellbeing information, it is handled at the public cloud level and is sent to the character and access control administration from the private cloud.

#### 3.4.3 Stage 3: Request is either acknowledged or dismissed

On the off chance that a private cloud worker acknowledges the solicitation, it is sent to a medical care private cloud application worker. Unexpectedly, if the solicitation is dismissed, an advising message is sent indicating the solicitation's dismissal.

#### 3.4.4 Stage 4: Physician demands approval

The doctor is viewed as an inner client. In this way, he signs on to the private cloud benefits and sends an approval demand containing the client and secret phrase to personality and access control.

#### 3.4.5 The doctor's solicitation is prepared to get the information from the cloud application worker

When the confirmation is effective, private cloud administrations measure the solicitation, and doctors can get the information from the public cloud application worker.

#### 3.4.6 A clinical exhortation is straightforwardly shipped off the patient

A doctor can straightforwardly send criticism as far as clinical counselor medicine to the patient.

Growing such kinds of cloud-based medical care answers for provincial wellbeing and in case of debacles is significant. Also, caregiving organizations and clinical experts should start utilizing cloud-based clinical records and clinical picture chronicling administrations. This sort of arrangement's principal objective is to lessen the difficult undertaking of the specialists and clinical staff worked on clinical frameworks and successful patient consideration [21].

## 4. Results and discussion

This section discusses the performance evaluation of the implementation of proposed work and compared various algorithms with different features and parameters. In a hospital setting, all of the patient's health information will be gathered. We have created a patient health information form which should be filled out by a nurse or doctor in our suggested job. A table named the health status record will have a complete collection of data (PHR). The PHR is consolidated in the cloud architecture to offer the necessary health data for detection alerts and therapies based on medical professional analysis. IoT is used to integrate networking elements, displays, actuators, sensors, and other healthcare devices and equipment in a multidimensional system. This contributes to the primary trends on the Internet of Things-based medical industry, which focuses on wearable gadgets, robotic surgery, and other cutting-



edge technologies. Experimental results presented in the machine learning field frequently utilize statistical tests of significance to compare learning algorithms. These tests provide a sound response to the issue of whether one machine learning algorithm is superior than another at a given learning task. However, in machine learning contexts, determining the significance statistically is not always simple. Precision is a common metric in many software toolkits for general data analysis and machine learning. Utilizing qualified doctors, pathologists, or radiologists to review medical imaging and identify the underlying causes of clinical diseases is the current clinical standard.

Table 2. Comparison of Features

Features	KG [22]	ECA [23]	H [24]	E <sub>M</sub> [25]	Proposed
Anonymity	√	√	√	√	√
Mutual Authentication	√	×	√	√	√
Forward Unlink ability	√	√	×	√	√
Traceability	√	√	√	√	√
Revocation	×	×	√	√	√
Efficient Credential Update	√	√	√	×	√
Communication, Integrity	√	×	√	√	√
Resistance to Modification Attacks	√	×	√	√	√
Resistance to MitM Attacks	√	×	√	√	√
Resistance to Replay Attacks	√	×	√	√	√

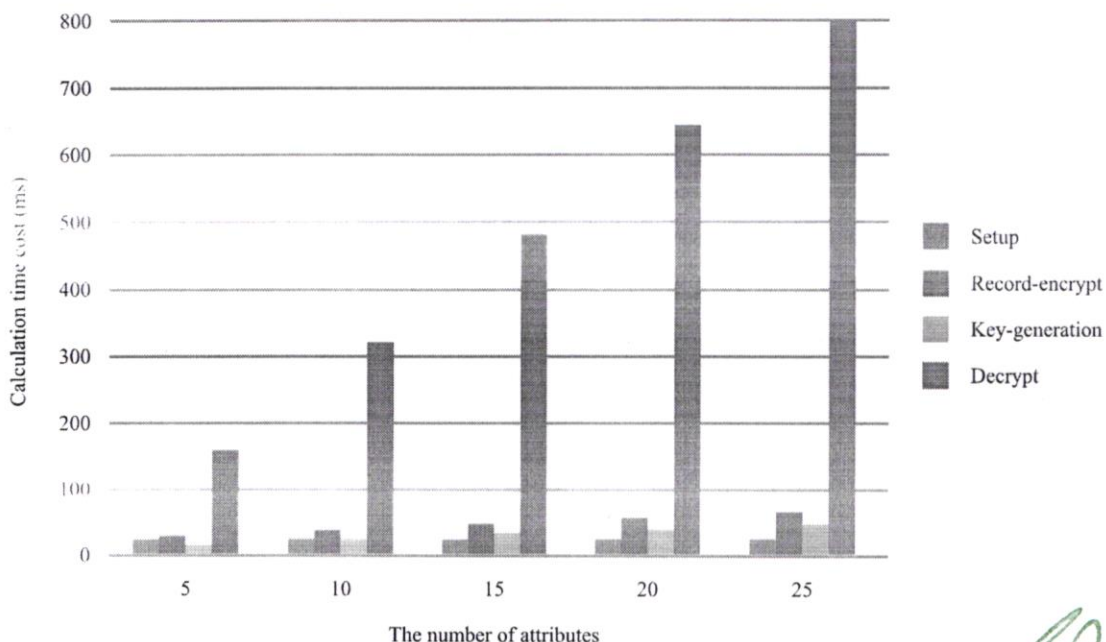


Figure 5. Higher efficiency of all attributes graph for health care system

*Handwritten signature*  
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 Annamalai Institute of Engineering & Technology  
 600060, Annamalai University, Kanchi, Tamil Nadu, India

- KG- Generate public/private key pair
- ECA- Elliptic Curve Addition
- H- Hash Operation
- $E_M$ - Modular Exponentiation

As shown in Table 2, our calculation gives the entirety of the ideal provisions and insurances against assaults. The calculation that comes nearest is that of which needs forward-unlink capacity. It very well may be found in that the pseudo personality created in enlistment is given as a piece of each validation bundle utilized, making the exchanges inconsequentially linkable. Additionally, for a few of the calculations recorded, the issue of accreditation renouncement isn't expressly tended to; nonetheless, in the event that it seems conceivable that the convention could give qualification repudiation, the plan is given to acknowledge for giving denial also. The Figure 5 shows a graphical representation of comparison of a number of attributes with time costs, for the effectiveness of higher efficiency of all attributes of the health care system.

Table 3. Comparison of Execution Time

Cryptographic Operations	Execution Time in ms
KG [22]	625
ECA [23]	496
H [24]	326
$E_M$ [25]	126
Proposed	30

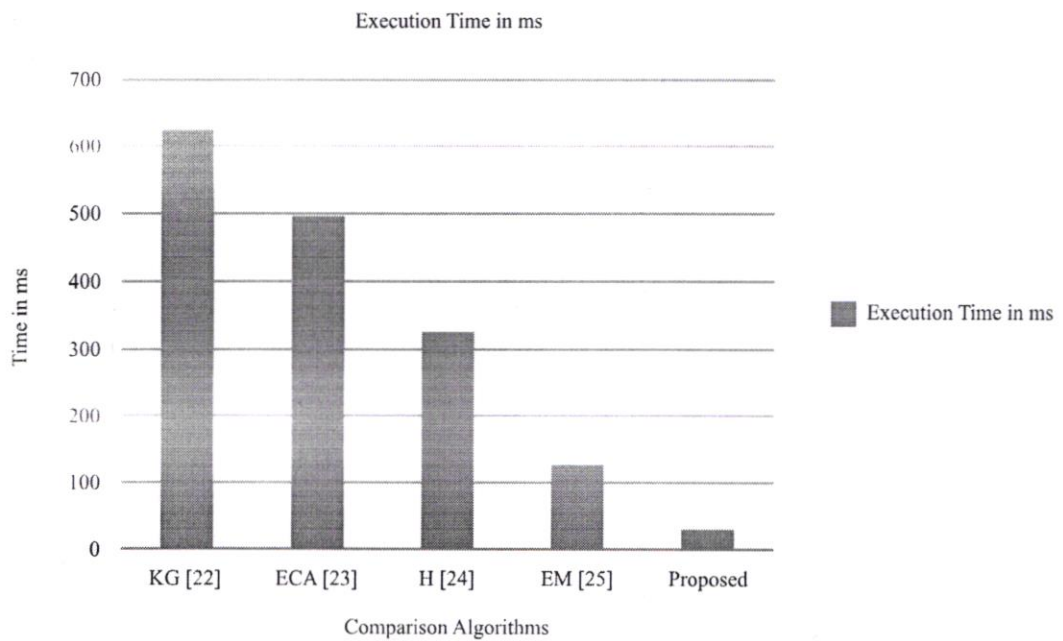


Figure 6. Comparison of Execution Time

Table 3 provides the execution times for each method, which can be used to evaluate the relative complexities.



In the start up and authentication phases, it can be seen that our approach is considerably faster than other algorithms, which is the only other algorithm that has the ability to unlink. In the revocation phase, however, it is slower. The Figure 6 shows a graphical representation of different algorithms execution time's from the reference [22] to [25] compared with proposed algorithm. The Figure 6 shows the effectiveness of proposed algorithm execution time has less than the previous algorithms.

Table 4. Communication overhead for Each Algorithm

Algorithms	Initialization (bits)	Registration (bits)	Authentication (bits)	Revocation (bits)
KG [22]	0	2592	7045	N/A
ECA [23]	544	1952	6914	N/A
H [24]	376	864	1856	N/A
E <sub>M</sub> [25]	368	768	1056	N/A
Proposed	1480	576	2368	1024

Then we compare (see Table 4 and Table 5) the algorithms we've looked at based on how many one-way communications are required for each step of the protocol. Table 4 displays the results. The number of patient records to be packaged in a single transmission from the database of physicians is denoted by the integer  $t$  in Lin's scheme. For the sake of initialization, it is assumed that each message publication necessitates a single transfer. The Figure 7 shows a graphical representation of different algorithms, communication overhead from the reference [22] to [25] compared with proposed algorithm. The Figure 7 shows the effectiveness of proposed algorithm communication overhead has higher than the previous algorithms.

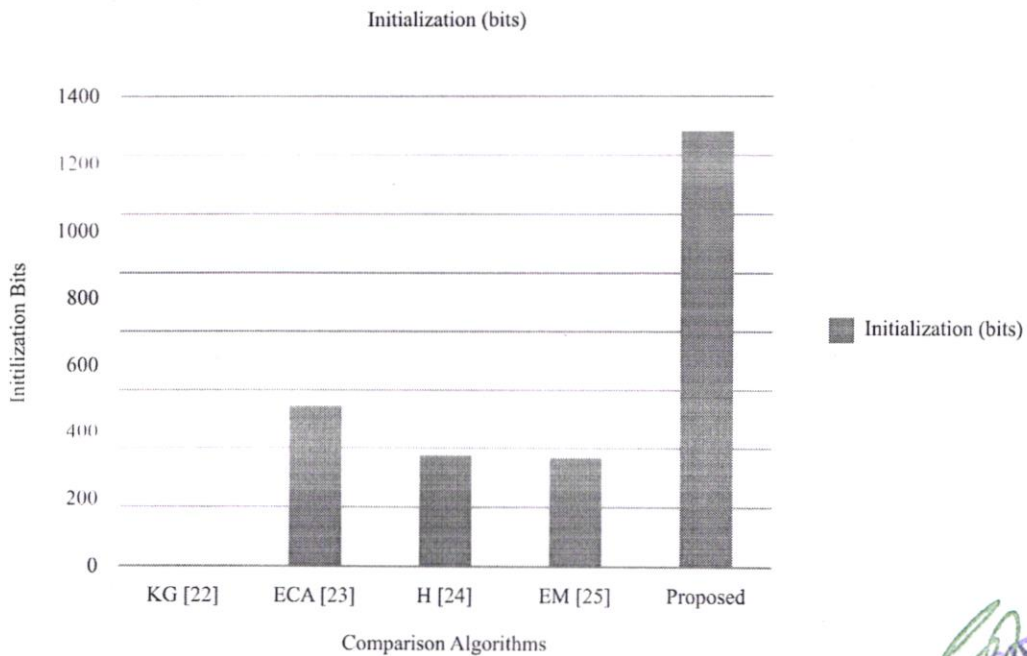


Figure 7. Communication overhead for Each Algorithm

**Table 5.** Performance validation of proposed with existing algorithm

Parameters	DES [26]	BLOWFISH [27]	AES [28]	Proposed
Network Lifetime	150 s	155 s	168 s	195 s
Latency	0.622 ms	0.56 ms	0.5 ms	0.46 ms
Scalability	0.59 ms	0.89 ms	0.73 ms	0.92 ms
Security	87%	82%	95%	97%
Encryption Time	52 ms	43 ms	39 ms	38 ms
Decryption Time	85 ms	82 ms	78 ms	77 ms

Because of the more modest key sizes utilized in Camel, the security of the framework can be effortlessly increased by expanding the critical size without influencing the computational intricacy. The plan adds an additional layer of security against traffic investigation assaults by a snoop by giving secrecy at the organization layer by utilizing TOR. The plan shields patients' delicate information from a snoop and untrusted cloud workers. One notable element of our plan is that the clinical application or specialist organizations can't uncover the character of the patient consequently securing the protection. In this paper, we have planned a viable framework that is secure and proficient. The proposed verification plot guarantees that the patients can devour administrations without uncovering their personality at the hour of utilization or reflectively.

## 5. Conclusion

The success of smart cloud-based healthcare applications hinges on the protection of patients' privacy. We present an anonymous authentication mechanism for a smart cloud-based healthcare application in this work. Patients' privacy is protected under the proposed approach when they use Cloud services. The proposed work employs a rotating board signature pattern based on a camel. The system fails due to the camel's small key sizes without affecting the computational complexity. This application adds an extra layer of security against a deaf person's traffic analysis attacks by hiring a camel to provide anonymity in the network layer. This application safeguards critical patient information from a deaf person and unstable cloud services. One of the most important aspects of our program is that medical use or service providers are prohibited from disclosing patient identities, ensuring patient privacy. We have devised a realistic, safe, and effective method in this paper. Patients can access the services at the time of consumption or without revealing their identity under the suggested certification process.

## Conflicts of 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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## OPTIMIZED ROBOT PROCESS AUTOMATED PATH NAVIGATION IN TIME VARYING NETWORKS

<sup>1</sup>Dr.SYED KHASIM and <sup>2</sup>Dr.SHAIK SHAKEER BASHA

<sup>1</sup>Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam.

<sup>2</sup>Department of Computer Science & Engineering, Avanthi Institute of Engineering & Technology, Gunthapalli, Abdullahpurment Mandal, Hyderabad.

### ABSTRACT

The interaction between many empty vehicles is a very challenging topic from a theoretical and material point of view, with far-reaching indicators of scientific and commercial mechanical conditions. The difficulty of connecting the fastest time of multicopter UAVs includes pre-defined local routes depending on the equipment requirements. With the proposed solution, collaborative control is performed in the presence of time-varying communication networks, as well as strong temporary issues, such as simultaneous arrival at the desired terminals. The proposed definition solves the problem of time consolidation under the acceptance that trajectory generation and subsequent assembly of algorithms is provided for guaranteed integration conditions. Communication is processed in unexpected ways using the following method and targeted graph. Optimized Robot Process Automation is an algorithm for detecting very short routes, which is used to avoid / detect collisions / congestion in unexpected ways. Without the discovery of a collision, it does not seem to be compatible to avoid a collision because there would not be everything to avoid. The Dijkloyd algorithm is used to find shortcuts in a targeted graph with a positive or negative margin. The Primloyd algorithm is used to find shortcuts in a weighted non-target graph to overcome complexity in matrix coding. In case of overcrowding or collision the whole network is read about to all its contacts. Therefore, communication occurs unexpectedly in a secure way.

### Index Terms

Optimization, Path Navigation, Time Varying Networks, Robot Process Automation, Collision.

## 1. INTRODUCTION

With the proliferation of communication technology and embedded systems, space communications have greatly improved technology. Especially without human intervention, the planes are designed to fly high in space for commercial and surveillance purposes. The Unmanned Aerial Vehicle (UAV) is a type of aircraft with no pilot. Based on systematic data, the UAV can be remotely controlled [1]. In recent times, the automotive autonomous field has a wide range of research programs in the field of Sensor fusion, Multi-agent Liaison, Traffic Planning, Trajectory Production, Task Allocation and Planning and Collaborative Strategies.

The main goal is to completely avoid the pilot from using the UAV and to stay away from plane crashes. When a UAV is moved and controlled by systems built by the Air Traffic Controller (ATR), there are some difficult tasks that need to be done to reduce the distance between the first stop and the last stop. The number of available modes of flexibility may change the direction of the UAV during its boarding time from the normal route is a significant problem [2]. This paper focuses on controlling the existence of time-varying communication networks, as well as strong temporary issues, such as simultaneous arrival at the required final destinations.

The proposed solution solves the problem of time communication under acceptance



that the trajectory generation and subsequent algorithms meet certain stability conditions [3]. The Coordinated Path Following and Vehicle Coordination algorithm, solving the problem of temporary communication failure under Lyapunov-based theory [4]. In their presented work, development algorithms are developed in an extended area where sub-systems are different. The design action is based on the successive use of convex development tools. The proposed solution solves the problem of time communication under the assumption that the algorithm followed meets certain stability conditions [5][6].

POMDP and portable algorithms compared to large groups of flexible robots. Separating the Partially Observable Markov Decision Process (POMDPs) as long as the interdependence of multiple robots is maintained through the POMDP policy auction [7][8]. The task of avoiding obstacles, the ability of a method to avoid structural collisions with standing and flexible obstacles during its movement in the desired target area using the Hawk-eye method [9], while a strong and flexible control scheme. to deal with the indirect system and external disturbances due to the closed structure.

## 2. RELATED WORKS

Kalman's direct filter is introduced [10] to integrate local quadrotor measurements. The control strategy controls the flexible pay-out of the desired position while also controlling the aging to zero, the main idea behind the method is based on common strategies guaranteed by managing the flexible ring. Suitability of this method Communication is easy in the defined method [11]. Model-based and independent control methods are introduced in [12] to design independent quadrotors.

The parallel work includes Sliding Mode control theory [14], Model Independent Linking Strategy [13], stability structures for a group of mobile agents [15], a repetitive algorithm with local integration behavior using a vague programming solution in each recurring area. step and line matrix [LMI] imbalance combined with logic-based changes reflect light on various control strategies [16]. This limit has prompted us to change the approach to problem tracking in a different way.

The purpose of this paper is to provide a new solution to every defined or unspecified method using a tracking method and a targeted communication graph. Route can be accessed and communication is processed in unexpected ways using the following method and targeted graph. Optimized Robot Process Automation is an algorithm for detecting very short routes, which is used to avoid / detect collisions / congestion in unexpected ways. The Dijkloyd algorithm is used to find shortcuts in a targeted graph with positive or negative margins.

The Primloyd algorithm is used to find shortcuts in the indirect graph that weigh complexity over matrix coding. In case of overcrowding or conflict the whole network will be read so to all contacts. Therefore, communication takes place in unexpected ways in a given way. The purpose of this paper is to provide the best route conditions for all types of routes. Find a shortcut to both defined and unspecified routes. Avoidance / getting congestion / collisions in unexpected ways. This paper is structured as follows. In Phase II, we present the proposed project. In Section III, we describe the following problem by providing the appropriate set of algorithms. In Section IV, we construct a flow diagram; simulation results are described in Section V.



Finally, in Section VI, the main conclusions are presented..

### 3. PROPOSED WORK

At this stage, the proposed operation of the control algorithm that follows the UAV interoperability method is introduced. To overcome the problems that exist, here is a suggestion method of the Optimized Robot Process Automation algorithm used to find short free routes to the destination in unexpected ways.

#### 3.1 Overview of the Proposed UAV Environment

In this section, we propose the Optimized Robot Process Automation method for obtaining free short collisions on the weighted graph and the indirect weighted graph. Figure 1 shows a block diagram of the proposed system. A communication network is used to exchange information between vehicles. Once the connection is complete, the UAV will select Robert's algorithm to avoid collisions / congestion in unexpected ways.

After that the algorithm Dijkloyd and Primloyd were transferred by UAV which is the way it should go. If the path is clear the UAV will select the Dijkloyd algorithm and pass through the path we have already given which is the predefined path. If the path is unclear the UAV will select the Primloyd algorithm and pass the unspecified route. The unspecified route is identified by the path / node closest to the original / predefined path.

The following route allows each car to follow the route assigned to the desired speed profile. Once the route has been identified you will check the time alignment if it is clear that it will adhere to the route. If the timeline is not clear it will wait until clear ways are found. Time management controls a car in a time when one car will not collide. Time communication will check the reference generation whether there are cars on the road or not. If all is clear the car will move in the next direction.

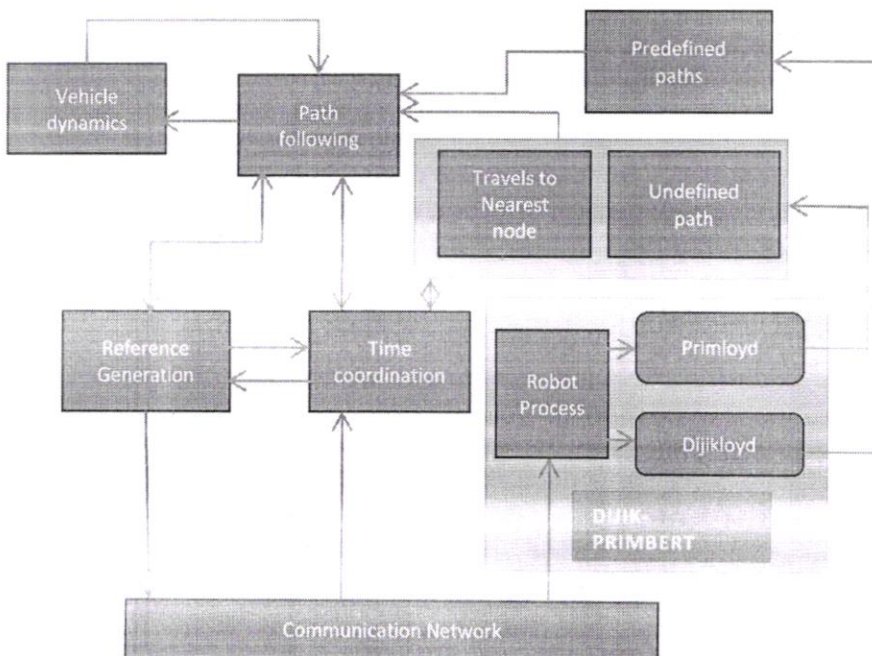


Fig. 1 Block diagram of proposed UAV environment and interactions between them.

#### 4. PATH-FOLLOWING: PROBLEM FORMULATION

We are now dealing with the next issue of multirotor UAVs. As mentioned earlier, the method can be found and communication is widely used and information across the network increases network topology. The Optimized Robot Process Automation Algorithm is used to find free shortcuts to source on unexpected routes.

##### 4.1 Optimized Robot Process Automation method algorithm for unpredictable paths

The Optimized Robot Process Automation method algorithm is a combination of Dijkloyd algorithm, Primloyd algorithm and Robert algorithm. Optimized Robot Process Automation is an algorithm for detecting very short routes, which is used to avoid / detect collisions / congestion in unexpected ways. Collision detection is simply the act of exploring a known area and identifying possible collisions. Without the discovery of a collision, it does not seem acceptable to avoid a collision because there would be no avoidance.

Collision avoidance is a system of action taken by the robot algorithm to avoid future collisions. As previously announced, there is no need for a collision avoidance algorithm if no conflict should be avoided. A node diagram for finding unpredictable route using the Optimized Robot Process Automation algorithm method is shown in Fig.2. Avoiding collisions, as opposed to colliding with a collision, is what is done after a detection that may be a collision. When making an effort to avoid a hindrance, there are many choices you have to make. The choices that are made will depend on the options available to the robot to prevent it. Finding the right method can be frustrating depending on which algorithm is used and the granularity associated with it.

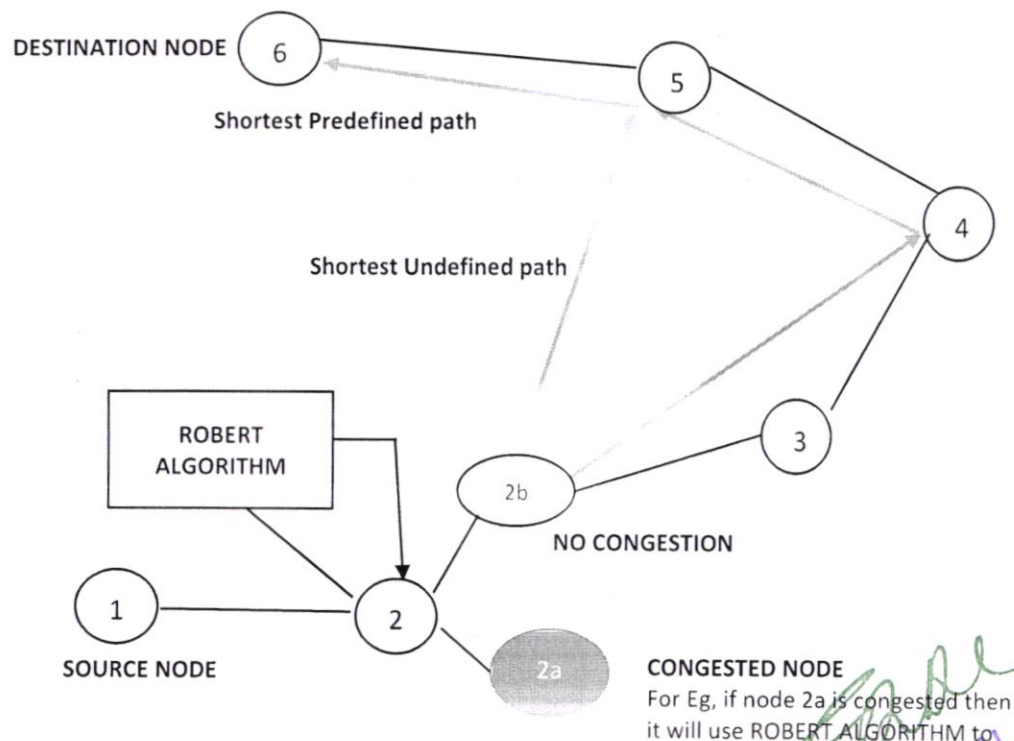


Fig. 2 Node diagram of the Optimized Robot Process Automation method algorithm for unpredictable paths.



#### 4.2 Dijkloyd algorithm for defined path

The Dijkloyd algorithm is a combination of a Dijkstra algorithm and a Floyd-warshall algorithm. The Dijkstra algorithm is a graph search method that finds a cost-effective method within the vertex and resolves the short-term conflict of a single source graph with the cost of the edge on a non-negative edge, producing a very short path to the local vertex. This algorithm is commonly used on the route and in the path below the other graph algorithms on the targeted graphs which are not negative. The Floyd-Warshall algorithm is a graph analysis method for finding shortcuts on a graph with a positive or negative weight. The Floyd algorithm is an example of flexible planning. The Dijkloyd algorithm is a graph search algorithm for finding shortcuts on a targeted graph with a straight and negative edge. The convenience of this algorithm is that it is easy to encrypt and quickly calculate finder networks.

#### 4.3 Primloyd algorithm for undefined path

The Primloyd algorithm is a combination of the Prim's algorithm and the Floyd-warshall algorithm. Prim's algorithm is a fast-paced algorithm that finds a small stretchable tree and arranges the edges with the weight of a non-targeted graph. This means that it acquires an existing subset that forms a tree that contains the entire vertex using a key line, where the total weight of all the corners of the tree is reduced. The Floyd-Warshall method analyses all possible graphs to determine an easy way between each pair of tweets. If there are negative times, the Floyd-Warshall algorithm can be used to identify them. The Floyd-Warshall algorithm usually only supports the length of the lines between all pairs of vertices. When a very short new path is found between two tweaks, a matrix that combines paths with high flow between vertices is updated. The Primloyd algorithm is used to overcome difficulties in matrix writing. The validity of this algorithm is simple and easy to code.

### 5. ALGORITHM AND COMMUNICATION FLOW DIAGRAM

Let the node at which the UAV is starting called the **initial node**. The **distance** from initial node to destination node is taken as **Y**.

#### Algorithm for finding unpredictable paths using Optimized Robot Process Automation method algorithm

Let the Optimized Robot Process Automation method algorithm is a decent version of one simple line and works well on simpler methods. The Optimized Robot Process Automation Algorithm will also provide initial node values and will try to find a short free step-by-step collision method.

*Announce input to social networks.*

*Check that the congestion / collision condition is  $y \leq n$ .*

*If the above condition is satisfactory then it will detect and correct the congestion / collision using the Robert algorithm.*

*The Primloyd algorithm is then used to track potential unexplained pathways and to obtain a shorter distance between tracked paths.*

*If the situation is not satisfactory then it will pass through the Dijkloyd algorithm.*



*The Dijkloyd algorithm is used to find the shortest method previously described.*

### **Algorithm for finding defined path using Dijkloyd algorithm**

Let the starting point of the UAV be called the first node. Let the Y-node distance be the interval from the starting point to Y. The Dijkloyd algorithm will provide initial length values and will try to improve them step by step.

*Assign a conditional range value for each node: set zero on the first node and infinity for all other nodes.*

*Mark all node intervals from the starting point and line.*

*Subtract an important distance from the line.*

*If any line is empty or has a long distance, get acquainted with the current location.*

*In the absence of a neighbor add a new neighboring distance range + current node distance.*

*If there is a neighbor calculate the negative aspect of the node i.e. the value of the threshold is greater than the negative value.*

*The new distance value must be less than the old in both case 5 and step 6.*

*If step 7 is satisfactory proceed to the next step, otherwise discard.*

### **An undefined discovery algorithm using the Primloyd algorithm**

Let the node we choose be called the first node. The Primloyd algorithm will also select the first range values and will try to find the unstructured method step by step.

*Start a tree with one vertex, allow a minimum distance in each area.*

*Focus on variables n, X, Y, number = 1. Set the input number of rows and start X = 1 and Y = 1.*

*Follow the possible routes and find the shortest distance between the trails.*

*If X is less than or equal to n and Y is less than or equal to n Print the numerical value and the increment number, Y.*

*If they see a candidate model and find the neighbor of the current node.*

*If X is less than or equal to n and y is not equal to n print n then increase the value of X.*

*If X is not less than n stop.*

### **5.1 Communication flow of Optimized Robot Process Automation method algorithm**

A flow diagram of finding a method described using the Dijkloyd algorithm is shown below in Fig. 3. Figure 4 below shows the flow diagram of the indeterminate path using the Primloyd algorithm. A flow diagram of finding an unpredictable route using the Optimized Robot Process Automation algorithm method is shown below in Fig. 5. The Optimized Robot Process Automation method algorithm is a decent version of one simple line and works well on simpler methods. The Optimized Robot Process



Automation Algorithm will also provide initial location values and will try to find the shortest free collision method. In the Dijkloyd algorithm, start with the first vertex with a zero distance. Trace the possible paths from the beginning of the vertex and get the shortest distance. Mark it as the next first term to add current and past grades. Repeat the steps above. In the Primloyd algorithm, start with the first vertex and follow the possible paths. Find the shortest distance between trails and adjust the shortest route. From the new vertex repeat the steps above and finally check all the vertices along the trail.

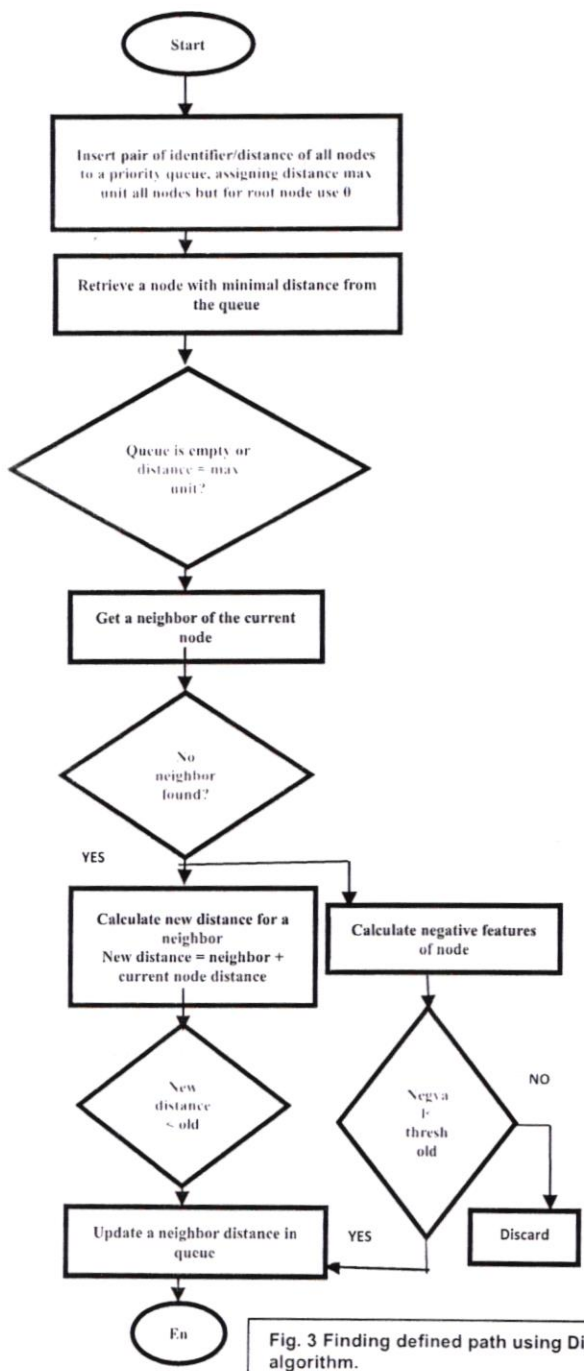


Fig. 3 Finding defined path using Dijkstra algorithm.

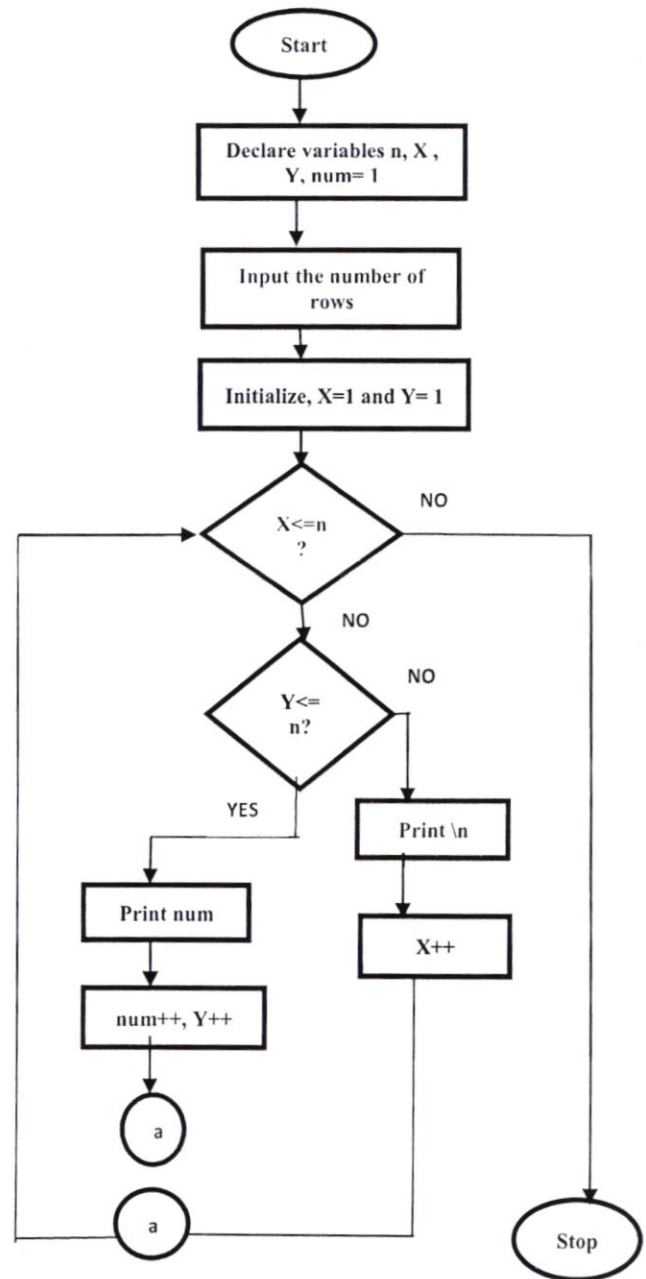


Fig. 4 Finding undefined path using Prim's algorithm.

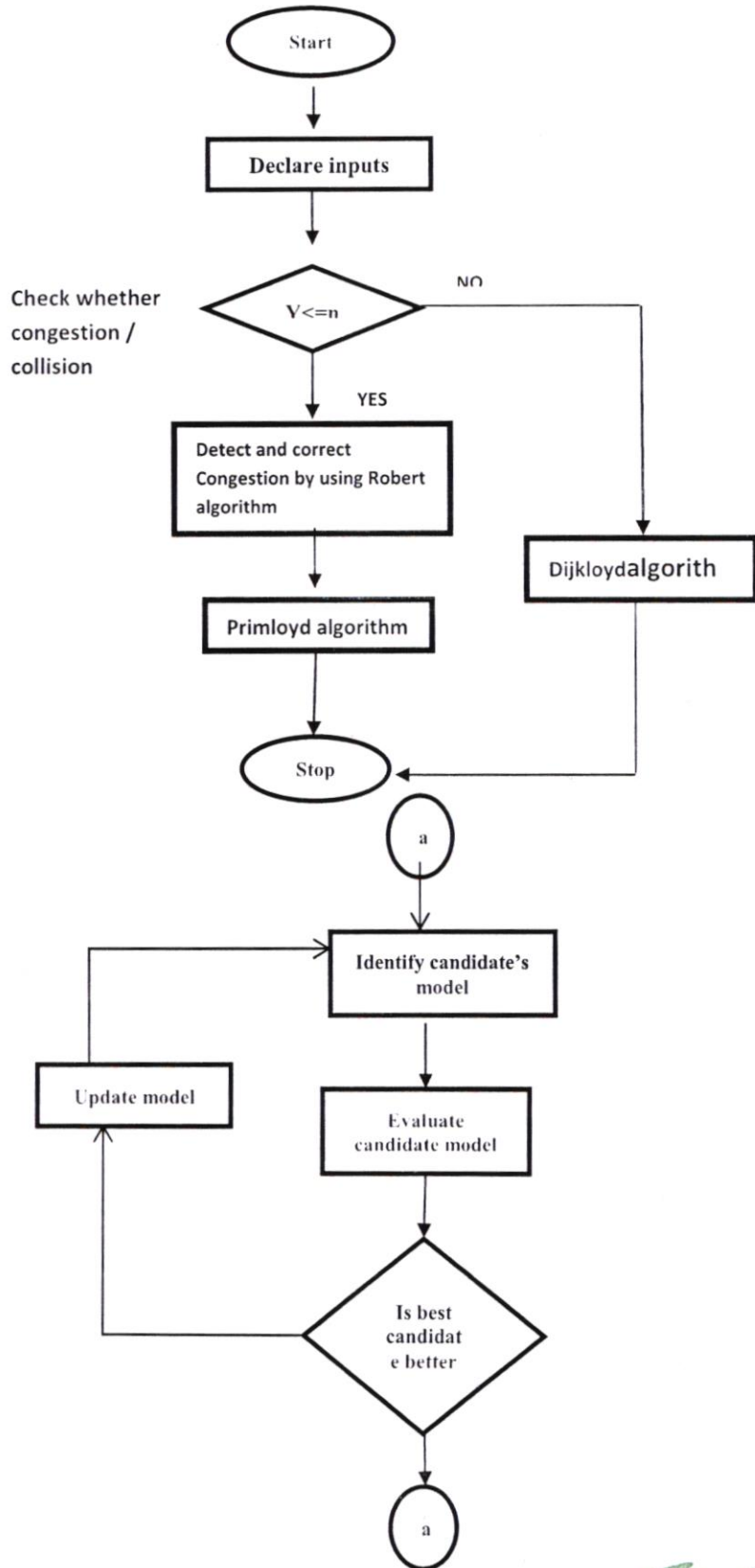
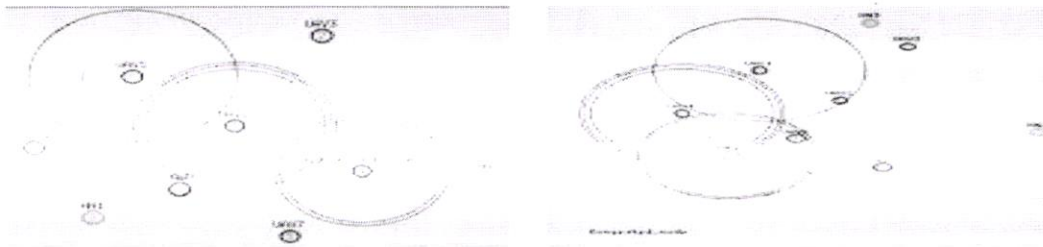


Fig. 5 Finding unpredictable paths using Optimized Robot Process Automation method algorithm.

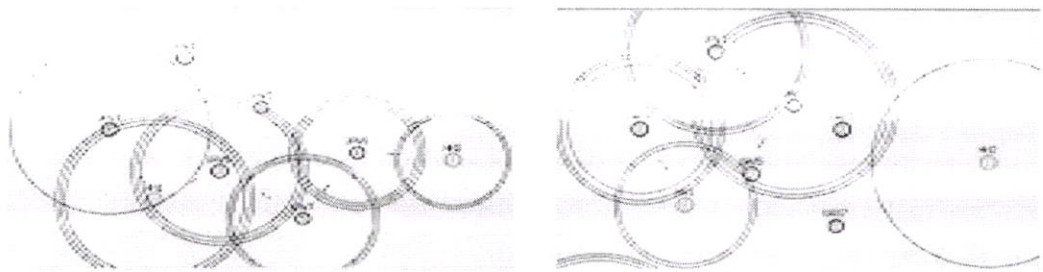


## 6. EXPERIMENTAL RESULTS AND OUTPUTS

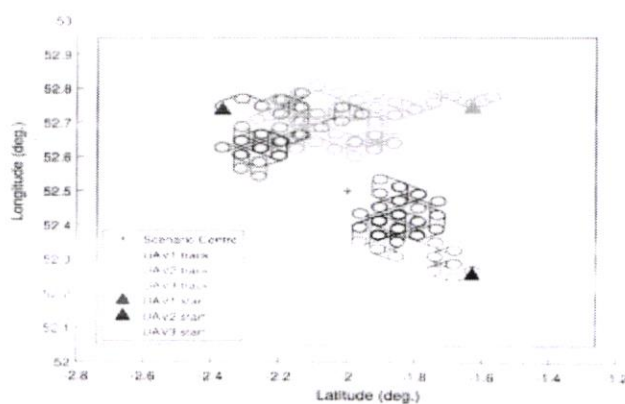
In this section, we present the simulation results of the Optimized Robot Process Automation algorithm method operated in MATLAB and NS2. Here nine nodes are produced, three acting as header nodes and seven as UAV nodes. The Optimized Robot Process Automation Algorithm is used to find free shortcuts to source on unexpected routes. Initially it defines a command window to display defined and unspecified methods with low cost of calculation and further communication.



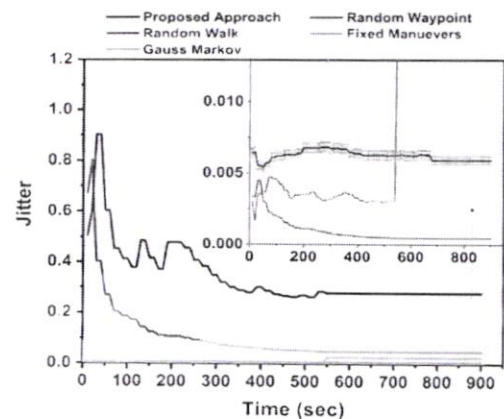
6 (a) UAV6 is congested due to packet loss and it is removed



6 (b) UAVs communicating in a predefined and undefined path

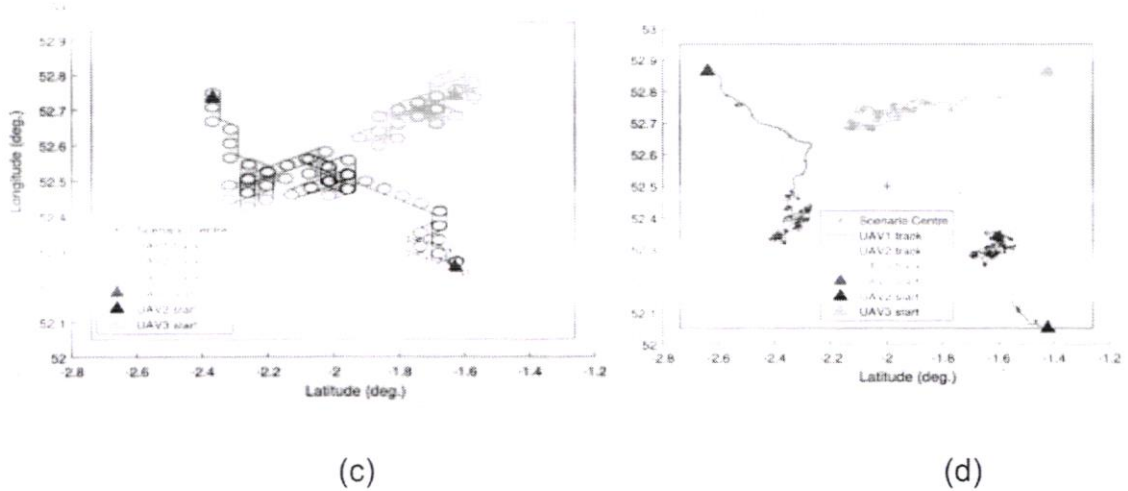


(a)



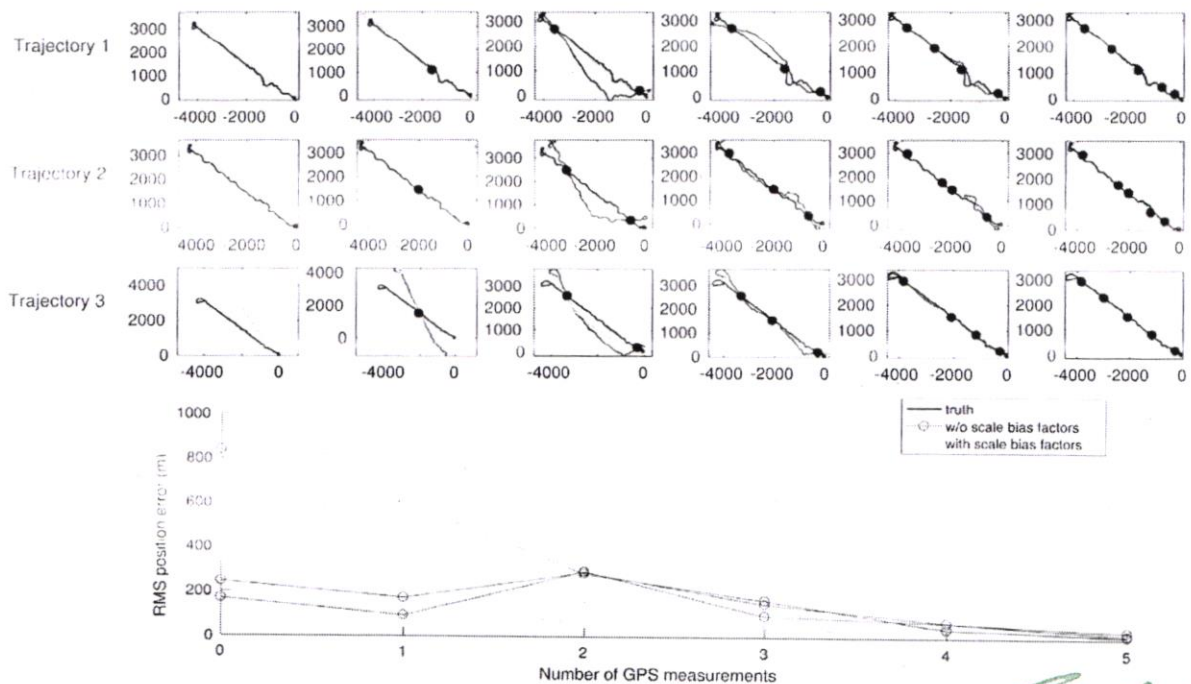
(b)

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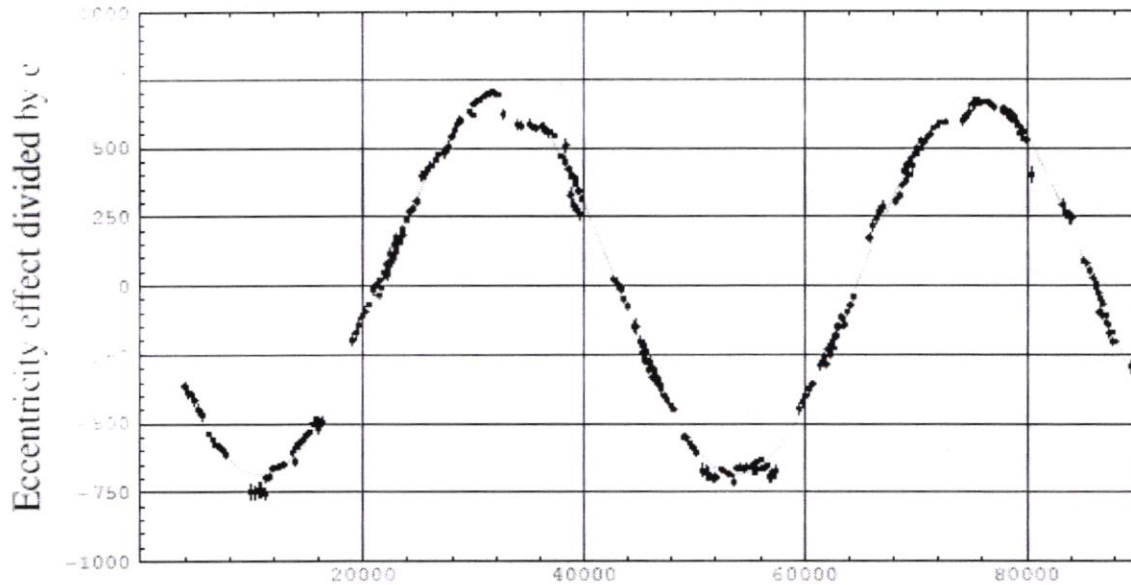


**Fig. 7 UAVs communicating with all header nodes and verifying the performance with X graph for the performance of packets**

Figure 7 (a) shows that the UAV6 is overcrowded due to packet loss and is being removed from the road Figure 7 (b) shows the UAV communicating in a predefined and undefined manner. Figure 7 (c) shows the X graph of packet performance at the required time. In the present system, the Multivehicle cooperative supremacy follows a trajectory generation algorithm, a tracking algorithm and a time-linked control algorithm used. Route control allows each vehicle to meet and follow the assigned route but detects traffic congestion only on a predetermined route. So there is a need to use an algorithm to get an unexpected approach. Therefore, it is proposed that the Optimized Robot Process Automation algorithm be used to obtain a short free crash path in unexpected ways.







**Fig. 8 Comparison of existing and proposed method**

Figure 8 shows a comparative analysis chart of existing route links and proposed links in unexpected directions. Table.1 shows a comparison table of the existing communication path in the specified line and the proposed connections to the unexpected paths at a different number of nodes at the required time.

**Table. 1 Comparison table of existing and proposed method**

Path selection mode	Number of nodes	Required time
Ideal Communication	4	0
	2	0.6
	0	2.8
Non-Ideal Communication-Ideal	4	0
	2	1.4
	0	4.2
Non-Ideal Communication-Non Ideal PF	4	0
	2	3.2
	1	4.0
Dijikloyd	5	1.0
	3	2.2
	1	3.2
Primloyd	5	4.2
	3	1.2
	2	3.0
Robert	5	0
	3	2.2
	1	4.0

## 7. CONCLUSION

In this paper, an effective approach is determined by proposing the Optimized Robot Process Automation method for piloting UAVs and considering short-term free routes found on unexpected roads. Optimized Robot Process Automation method with features Dijkloyd, Primloyd and Robert. Dijkloyd with elements of Dijkstra and Floyd. Primloyd has features of Prims and Floyd. Here the function of calculating the short free collision method is enhanced. It is also well used in UAVS. The future works, it will use the intermittent communication (i.e.) Markov's law to find free ways to conflict, the Markov Decision Process (MDP) generates the idea of resolving multiple threats in the conflict prevention program and a unique feature to create a real conflict avoidance problem.

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## A New Artificial Intelligent Based Deep Learning Model Using IOT For COVID-19 Identification

Dr.Shaik Shakeer Basha<sup>1</sup>, Dr.Syed Khasim<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, Avanthi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telangana, India.

<sup>2</sup>Professor, Department of Computer Science and Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India.

### Abstract:

Since December 2019, the world has been dealing with the COVID-19 epidemic. The importance of a timely and accurate identification of COVID-19 suspected patients in medical treatment cannot be overstated. To combat the COVID-19 outbreak, deep transfer learning-based automated COVID-19 diagnosis on chest X-ray is necessary. Using ensemble deep transfer learning, this work presents a real-time Internet of Things (IoT) system for early identification of suspected COVID-19 patients. COVID-19 suspicious instances can be communicated and diagnosed in real time using the suggested system. InceptionResNetV2, ResNet152V2, VGG16, and DenseNet201 are among the deep learning models included in the proposed IoT framework. Using the deep ensemble model saved on the cloud server, the medical sensors are used to obtain chest X-ray modalities and identify the infection. Over the chest X-ray dataset, the proposed deep ensemble model is compared to six well-known transfer learning models. A comparative investigation demonstrated that the suggested approach can assist radiologists in diagnosing COVID-19 suspicious patients in a fast and effective manner.

**Keywords:** Internet of (ings (IoT), diagnosis of COVID-19, deep transfer learning, medical treatment and Artificial Intelligent.

### I. INTRODUCTION

Internet of things (IoT) devices have become widely employed in a variety of applications in recent years, including smart cities, manufacturing, home automation, and medicine [1]. Sensors are employed to collect data about the physical world in these gadgets. The world's healthcare system is currently overburdened as a result of the COVID-19 epidemic. As of December 19, 2020, there had been more than 21 million confirmed active cases, 55 million recovered cases, and 1.6 million deaths reported in 185 countries. To put an end to the outbreak, coronavirus-infected people must be diagnosed as soon as possible. IoT devices are employed to remotely retrieve data from COVID-19 patients for this purpose. This information is shared with healthcare providers in order to diagnose COVID-19 [2]. These devices not only relieve the stress on healthcare staff, but they also identify unexpected patterns in sensor data. Using IoT-enabled devices, healthcare personnel can deliver better treatment for coronavirus-infected people more quickly. There is a need to build an automatic categorization technique that uses data from IoT devices. Deep learning models have recently been used by a number of researchers to support a variety of healthcare applications [3].

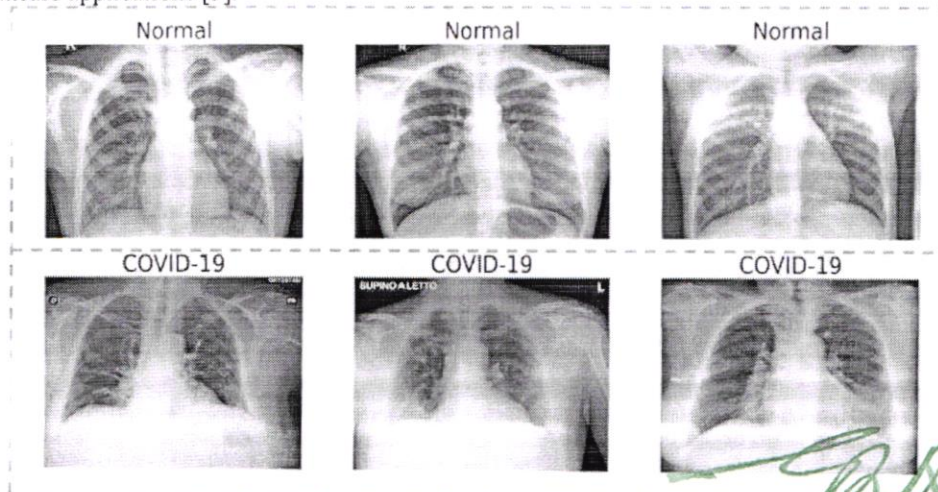


Figure.1 COVID-19 Chest Xray Images [4]



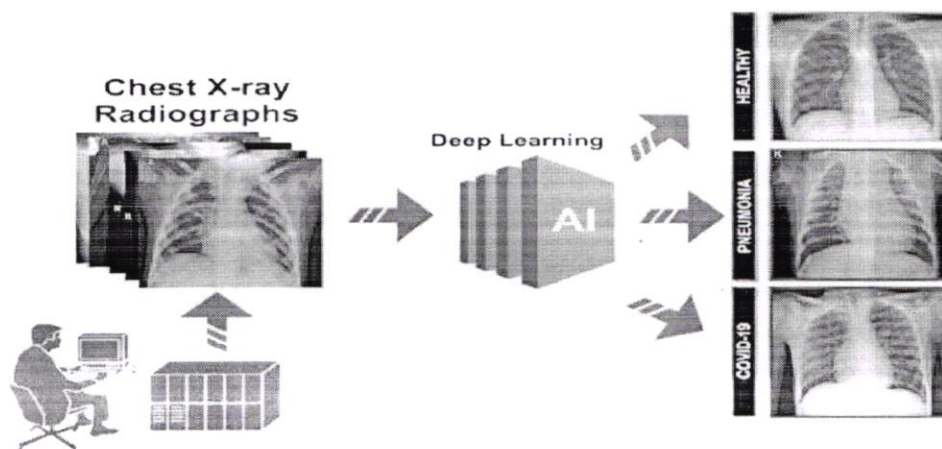


Figure.2 Conventional Block diagram of COVID-19 identification [5]

The chest X-ray modality can be used to classify the person as COVID-19 (+), pneumonia, tuberculosis, or healthy, according to the literature. It is favoured over other imaging modalities because it is more cost-effective and poses a lesser risk of human radiation exposure. The manual chest X-ray modality analysis for the diagnosis of COVID-19 suspicious participants is shown in Figure 1. It is, however, a difficult and time-consuming task. The radiologists looked at the white patches on the chest X-ray, which indicated infection. However, X-ray modalities contain pus and water, making infection detection difficult and time-consuming. The IoT and deep learning-based coronavirus detection framework is shown in Figure 1. The radiologist can use the deep ensemble model to quickly diagnose infected patients.

The remainder of this paper is organized as follows: the next Section 2 presents the most recent related work, while Section 3 describes the proposed approach. In Section 4, the experiments we have performed to evaluate our system are presented and compared with several methods. Finally, we conclude in Section 5.

## II. LITERATURE SURVEY

For early diagnosis of coronavirus-infected individuals, an IoT-based system has been developed. To diagnose coronavirus suspected cases, researchers used a faster region CNN with ResNet101 (FRCR). The FRCR has a 98 percent accuracy rate [4]. For automatic screening of COVID-19 from chest CT images, an attention-based deep 3D multiple instance learning (AD3D-MIL) method was developed [5]. For efficient learning, AD3DMIL used the Bernoulli distribution of labels. An IoT-based ensemble deep learning framework is built in response to the recent success of deep learning models for automated coronavirus diagnosis. The suggested ensemble model will aid radiologists and medical personnel in determining whether a patient has COVID19 (+), pneumonia, tuberculosis, or is healthy. For the automatic diagnosis of COVID-19 suspicious subjects, an IoT and deep ensemble model-based architecture has been developed. InceptionResNetV2, ResNet152V2, VGG16, and DenseNet201 are all ensemble in a deep ensemble model. The medical sensors gather chest X-ray modalities and use an ensemble deep transfer learning model stored on a cloud server to diagnose the infection. For the experiment, a chest X-ray dataset with four classes (COVID-19 (+), pneumonia, tuberculosis, or healthy) was used.

According to a comparative analysis, the suggested approach will assist radiologists in efficiently and swiftly diagnosing COVID-19 suspicious patients. On 460 CT images, AD3D-MIL was trained and tested. For screening coronavirus-infected people using CT scans, a multitask multislice deep learning system (M3 Lung-sys) was created [6]. Using the generative adversarial network, an auxiliary classifier model was created to generate synthetic chest X-ray pictures (GAN). CovidGAN [7] was the name given to the newly created model. COVID-19 was distinguished from other viral pneumonias using CovidGAN. CovidGAN was put to the test using 192 chest X-ray scans. CovidGAN, on the other hand, does not perform cross-validation. Using ultrasound, X-ray, and CT scan, deep learning models were employed to detect COVID-19 suspicious cases [8]. VGG19 was used to create an automated categorization system. To reduce sample bias and improve image quality, the preprocessing technique was applied. Data fusion strategies, on the other hand, can improve classification accuracy. For the classification of COVID-19 suspicious instances, a CNN-based transfer learning architecture was presented [9]. In this suggested framework, the eight pretrained CNN models ResNet18, Inceptionv3, SqueezeNet, MobileNetv2, ResNet101, CheXNet, DenseNet201, and VGG19 were used. (A total of 423 COVID-19, 1485 viral pneumonia, and 1579 normal chest X-



ray images were used to evaluate the framework.) To identify COVID-19 infection from other infections, a 3D convolution neural network (3DCNN) was created [10].

DCNN used a dual-sampling and online attention refining technique. (The infection regions were extracted using this network, and the uneven distribution of pneumonia-infected regions was eliminated.) A total of 2796 CT scan pictures from 2057 patients were used to test DCNN. The accuracy of the affected area, however, is still lacking. To categorise coronavirus-infected people using chest X-ray, a deep learning-based chest radio classification (DL-CRC) system was suggested [11]. To create artificial coronavirus infected X-ray pictures, DL-CRC used a generative adversarial network and data augmentation. Four separate chest X-ray datasets were used to test DL-CRC. The COVID-19 epidemic has been greatly aided by medical IoT devices. Deep learning models based on the Internet of Things have been developed to lessen the labour of medical personnel and doctors. The IoT-based deep learning models that do not address defensive models against adversarial perturbations, on the other hand, are vulnerable to adversarial attacks [12]. To detect COVID-19 suspicious patients, Gianchandani et al. [13] developed an ensemble deep transfer learning model. For COVID-19-infected individuals, Singh et al. [14] developed a deep neural network-based screening strategy. To categorise COVID-19 patients, Singh et al. [15] used highly linked convolutional networks. Although these models produce better results, ensemble modelling can improve them much more.

According to the existing research, present models still suffer from the overfitting problem [16, 17]. Ensemble models, as opposed to individual models, use numerous learning methodologies to produce higher classification performance [18]. When there is more diversity among the deep learning models, the ensembling of deep learning models delivers substantial outcomes. (In the United States, assembling is a meta-approach that combines multiple deep learning models into a single classification model in order to improve prediction (stacking) or reduce bias (boosting) and variation (bagging).)

### III. PROPOSED METHODOLOGY

Figure 3 depicts the IoT-based automated coronavirus diagnosis framework's layer-by-layer architecture. Perception, network, data storage and processing layer, and application layer are the four layers that make up the system. Medical IoT devices are first responsible for gathering various types of scans such as X-ray, CT, and ultrasound at the perception layer. (With the help of the network (transmission) layer, these collected scans are then communicated to the data storage layer.) (The collected scans may be transmitted via telecommunications, the Internet, or other means by the network layer.)

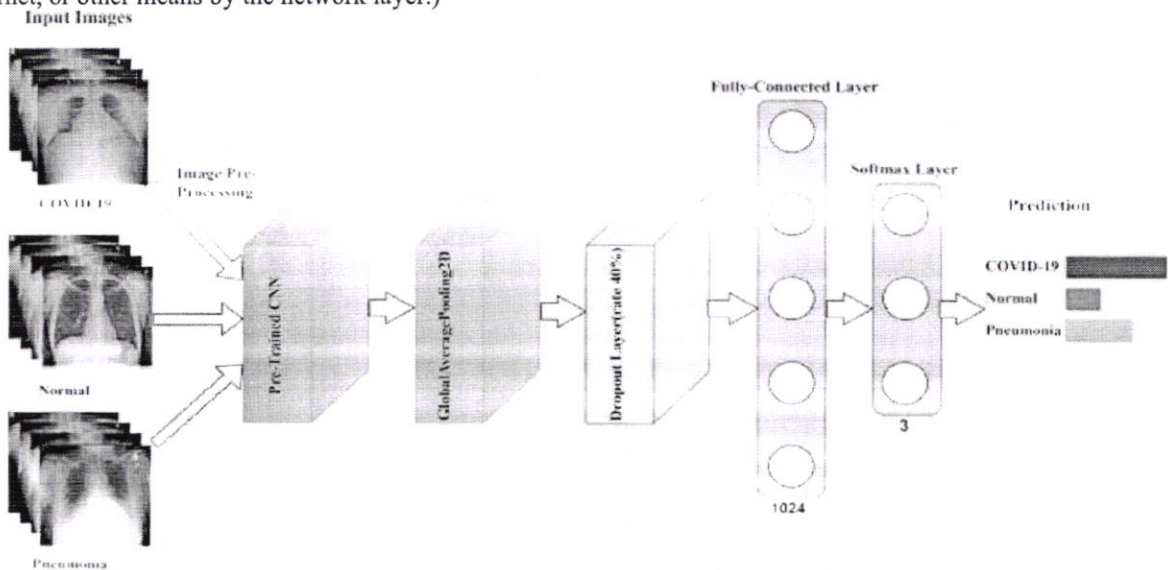
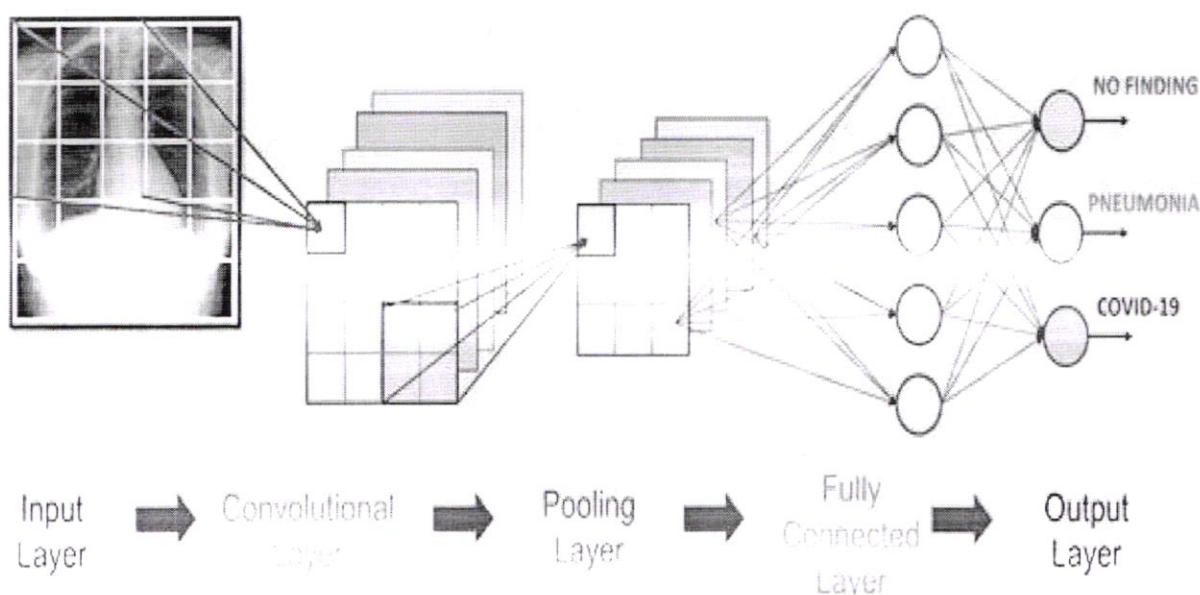


Figure.3 Proposed Architecture model of this work





**Figure.4** Proposed AI based Deep Learning Model

The IoT network's data processing/storage layer next uses deep learning models to categorise the people as infected or healthy, and subsequently stores the results. Finally, at the application layer, clients such as patients, doctors, and medical personnel can use the diagnosis results for further treatment or action. (Figure 3 shows a potential ensemble model for COVID-19 diagnosis.) (e suggested model ensembles ResNet152V2 [9], DenseNet201 [9], VGG16 [19], and InceptionResNetV2 [20], four well-known transfer learning models. Only these models were utilised since they achieved good accuracy and diversity among the deployed deep learning models during testing on the provided dataset.

The ensemble of pretrained models produces more efficient results than individual models, according to research. The ensemble method can be used to extract the best features and enhance classification accuracy. The proposed ensemble model for COVID-19 diagnosis is shown in Figure 3. The initial dense layer is made up of 64 neurons. To extract the features, a fine-tuned transfer learning model with multiple layers is used. The softmax activation function is used to solve the four-class classification issue. Using epoch 100 and batch size 10, the models were created. To avoid overfitting, fully linked layers with 64 neurons with dropouts of 0.3 and 0.2 are employed during the first tuning of characteristics. Regularization is also accomplished by taking into account the concept of early halting.

#### IV. RESULTS AND DISCUSSION

The four-class CXR dataset is used to test the proposed DenseNet model. The suggested ensemble model is compared to well-known deep transfer learning models that are already in use. The experiments are run on a MATLAB 2020b computer with a core i7 3.80 GHz processor, 32 GB RAM, and 15M cache. To solve the problem of overfitting, this study used 20-fold cross-validation. For training purposes, 70% of the complete dataset is considered.

##### 4.1. Database

The information was gathered by combining four separate datasets. (The first set of data comes from hospitals in So Paulo, Brazil.) There are 1262 COVID-19 (+) and 1230 healthy participants among the 2492 CXR scans [21]. Furthermore, two publicly available tuberculosis datasets from Shenzhen, China, and Montgomery County, USA, were obtained from the National Institutes of Health's National Library of Medicine (NIH). The Shenzhen dataset contains 326 healthy patients and 336 tuberculosis (+) patients. There are 80 normal CXR photos and 58 CXR images of tuberculosis (+) patients in Montgomery County, USA. A total of 1663 COVID-19 (+) patients, 401 pneumonia subjects (viral and bacterial pneumonia), 394 tuberculosis patients, and 2039 healthy person pictures were employed in the study. Random rotation, random cropping, and random blurring are also used to supplement data.

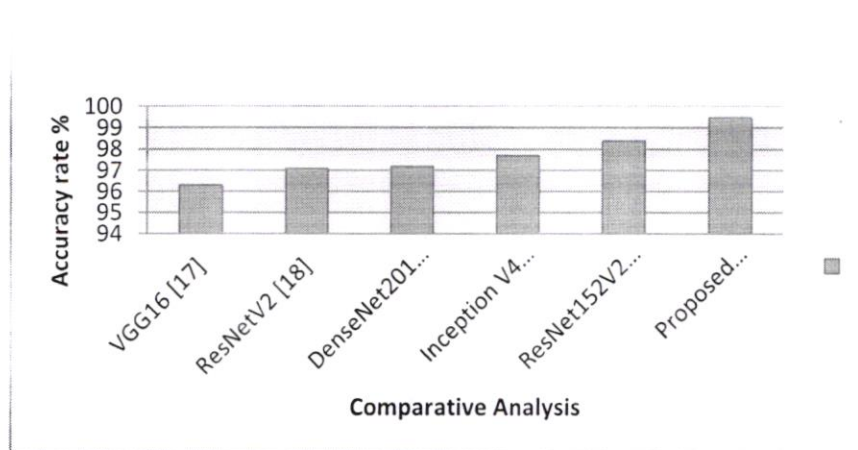
The suggested model's training and validation analysis. It is obvious that the suggested model produces better training and validation outcomes and is unaffected by overfitting problems. The overall accuracy for the COVID-19

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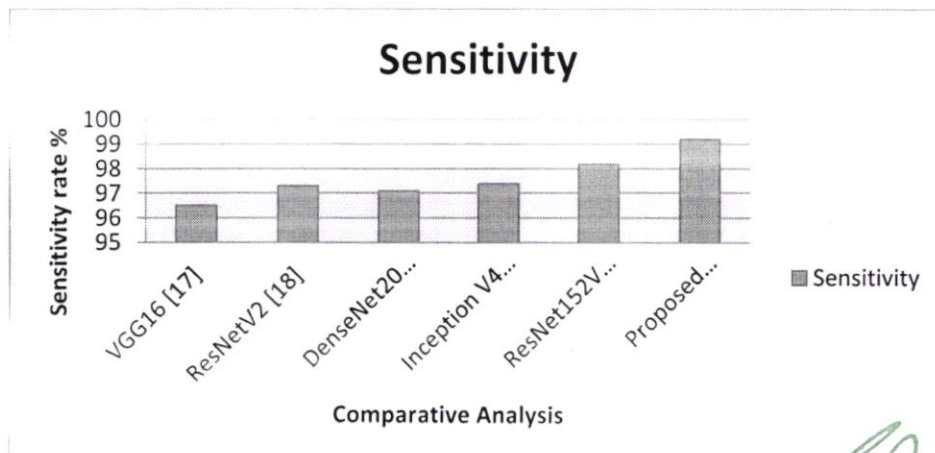
class is 99.6%. The suggested deep ensemble model has a 99.2 percent accuracy for healthy patients. The suggested deep ensemble model has an overall accuracy of 99.4 percent for the pneumonia class. The E tuberculosis class has a 99.1 percent accuracy rate. With an overall accuracy of 99.3 percent, the suggested model achieves outstanding overall categorization. As a result, the overfitting problem has little impact on the suggested model. The results show that the proposed framework outperforms existing deep learning models in terms of performance. The suggested approach outperforms existing models in terms of accuracy, Fmeasure, sensitivity, and specificity, among other metrics.

**Table.1** Comparative analysis of performance evaluation for COVID-19 diagnostic identification using proposed AI-Deep learning model with IOT.

Model	Accuracy	Sensitivity	Specificity	F-score
VGG16	96.3	96.5	95.4	96.6
ResNetV2	97.1	97.3	96.2	97.9
DenseNet201	97.2	97.1	98.7	96.9
Inception V4 network	97.7	97.4	98.5	98.2
ResNet152V2	98.4	98.2	98.7	98.9
Proposed Model	99.5	99.2	99.7	99.4



**Figure.5** Comparative analysis of performance evaluation for COVID-19 diagnostic identification using proposed AI-Deep learning model with IOT for Accuracy.



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Figure.6 Comparative analysis of performance evaluation for COVID-19 diagnostic identification using proposed AI-Deep learning model with IOT for Sensitivity.

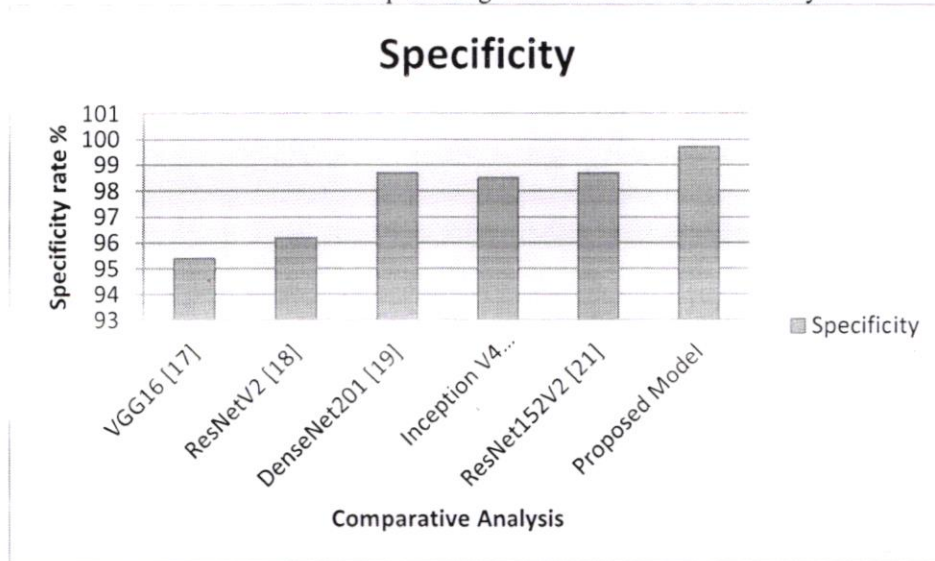


Figure.7 Comparative analysis of performance evaluation for COVID-19 diagnostic identification using proposed AI-Deep learning model with IOT for Sppecificity.

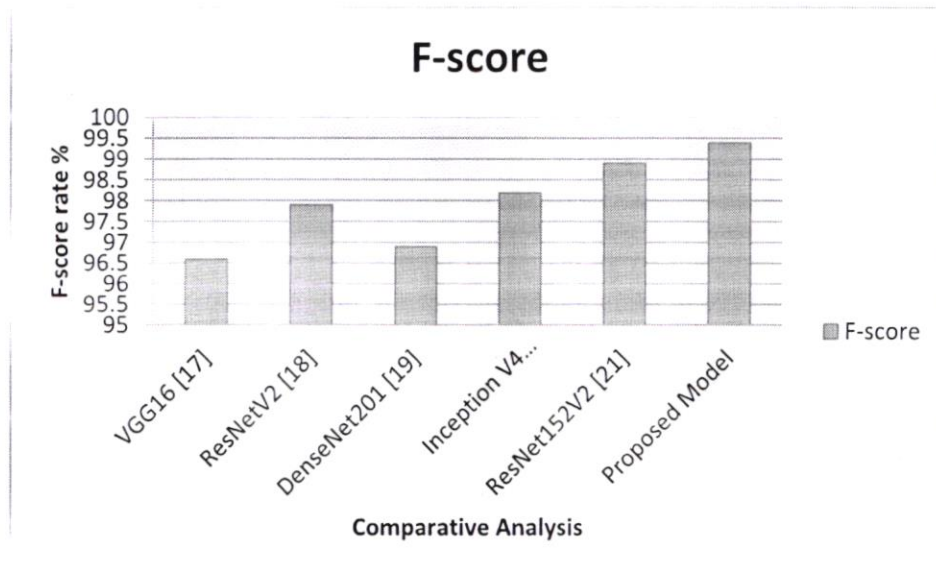


Figure.8 Comparative analysis of performance evaluation for COVID-19 diagnostic identification using proposed AI-Deep learning model with IOT for Sppecificity.

Deep transfer learning models' hyperparameter tuning concerns have yet to be resolved. The results of deep transfer learning models can be improved with effective hyperparameter adjustment. Furthermore, the proposed methodology must be extended to diagnose chest CT and ultrasound pictures. In addition, the proposed approach can be applied to create a multidisease classification model in various disciplines.

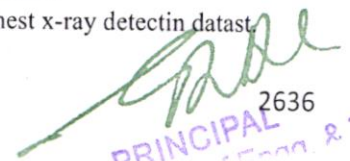
#### V. CONCLUSION

This paper provides real-time communication and diagnosis of suspected COVID-19 patients. Using ensemble deep learning, an IoT-based automated coronavirus detection system was created. ResNet152V2, InceptionResNetV2, VGG16, and DenseNet201 are among the deep learning models that have been combined in the

proposed framework. The suggested model's performance was tested using four-class chest X-ray datasets. A comparative investigation demonstrated that the suggested approach can assist radiologists in diagnosing COVID-19 suspicious patients in a fast and effective manner. The suggested framework outperforms previous models in terms of performance.

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## **Brain tumor identification and classification system using convolutional neural network**

**Dr. Syed Khasim**

Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India

**Dr. Shaik Shakeer Basha**

Avanathi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telangana, India

**Abstract---**The production of extra cells often results in the formation of clusters tissue, which means growth or tumor. Brain tumor has two types: Benign Non-Cancer and Malignant Cancer and Leading bad human condition. Brain tumor has various dimensions as well shapes and comes from different places. It is very important to find the type it grows at its beginning. Separation, acquisition and acquisition of the location of the infected tumor from magnetic resonance imaging (MRI) is primary anxiety but a tedious and time-consuming task done by a radiologist or clinic doctor professionals and their accuracy is based solely on their experience. So use computer technology required. So feeding ahead of performance. A neural network called the Convolution neural network (CNN) is used for measurement the complexity of the tumor in the brain that provides accurate results.

**Keywords---**classification, prediction, convolution neural network, tensor flow, accuracy.

### **Introduction**

Brain Tumor segregation is one of the most important ones as well difficult tasks in the field of medical imaging such as human-assisted manual processing can lead to inaccurate predictions and diagnosis. Moreover, it is hard work when there is a large amount of existing data to be assisted. Brain plants have high variability appearance and there is a similarity between the tumor and the normal tissue and thus the removal of the plant regions from the images becomes do not compromise [1]. The human brain is the basis of the nervous system; it is a the accumulation of white matter. A brain tumor is collected uncontrolled growth of these cells is rarely found in a different part of brain namely Glial cells, neurons,

lymphatic tissue, blood vessels, the pituitary gland and other parts of the brain that lead to cancer. The brain plants are dangerous or harmless [2].

Diagnosis of brain tumor and isolation is one of the most complex tasks and it is boring under handling a restorative image. Brain tumors is divided into two types such as lower grade (grades 1 and 2) and higher grade(3rd and 4th grade) the plant. A tumor in the lower extremities is called benign. Similarly, a high-grade tumor is also called a malignant. Good the tumor is not a cancerous growth. It therefore does not distribute other parts of the brain. However, a malignant tumor is a cancerous growth. So it is spreading quickly with endless boundaries in another body region easily [3].

It leads to immediate death. Brain tumors are not genetic. That's right there is no defective quality that can be passed on to the family members. Brain tumors are usually abnormal. However, brain indicators Plants in adults can vary from person to person as well different types of tumor in the brain. It is important to know about the side results and its treatment. The manifestation of brain tumors depends on the location and size of the plant. Abscesses cause direct damage with attacking brain tissue and bringing brain weight to growth. And have visible side effects when the growing plant increases weight the tissues of your brain. Brain pain is a common manifestation of a brain tumor. By itself it is not possible to diagnose and diagnose the tumor [4][5].

The method of differentiating systems with MRI is a method of detection and identification tumor. In order to provide accurate output the strongest split is required. Identifying a brain tumor is a daunting task at early stage stages of life. But now it has improved by learning about various machines and in-depth learning algorithms. Automatic brain tumor problem identification is very interesting. To detect a brain tumor a patient, patient data such as MRI images of the patient's brain considered. The problem is to see if the tumor exists the patient's mind or not and then divide it into Benign and Malignant. It's too much it is important to identify plants in the early stages of a healthy lifestyle a patient [6].

### **Related Works**

There is plenty of literature on the subject of brain tumors and to improve the accuracy of the acquisition. Separation, adoption, and extraction of infected plant area in magnetic resonance imaging (MR).they are a major concern but a tedious and time-consuming task done by radiologists or medical professionals, and their accuracy depends on them experience only. Brain plants have the effect that they can completely change a human way of life. Cerebral palsy is one of the most dangerous complications the light of the fact that almost all plants come from the brain it is dangerous [7][8].

Progress is still in the clinical stages; however, it is still the case very individual and with different types of tumor in the brain. It is important to know about the side effects and their treatment. The manifestation of brain tumors depends on the location and size of tumor. Abscesses cause direct damage by invading brain tissue and delivering about brain weight gain. Shravan Rao explains that a



preliminary MRI imaging scan was performed by filtering the process by which the sound in the image is removed. Usually with the use of a central or intermediate filter with the size of the default layout feature 3x3 [9].

After the sound is removed, the image is divided into three sections methods, namely - K-means, Fuzzy C-Means and Adaptive K-means integrating algorithms. Feature discharge is performed with a nearby threshold with regional growth and level set contouring. Ms. Seema Pawar The first step in diagnosing a brain tumor is check the symmetric and asymmetric Shape of the brain that will explain abnormality. After this step the next step is based division with two strategies 1) F-Transform (Fuzzy Transform) 2) Morphological performance [10][11].

These two methods are used to design an image on MRI. Now with this help to design the boundaries of the tumor in the brain is also obtained calculate the actual location of the plant. F-transform is used to give the specific information such as reconstruction of missing edges and quiet extraction edges. Qiang proposes a group-based readable division a method that replaces convolution in the element extraction phase with Learnable group convolution, thus reducing the number of conversions network parameters and improve communication between convolution groups. Skip connection and introduces in-depth network monitoring the output phase to integrate the output of the network [12].

K.Sudharani Includes methods such as Histogram, Re-sampling, KNN Algorithm, Distance matrix. First, the Histogram provides the exact number of the specified number of pixels distributed in a particular image. Re-sampling resize the image to 629x839 for the correct geometric representation. Separation and identification of a brain tumor using k-NN based on training k. Manhattan metrics have reapplied calculate the distance of the divider. The algorithm has always been applied using lab view. The algorithm was tested in 48 images. The score for all images is about 95% [13].

Halder is a productive strategy for the area of the tumor in the brain that may dissect the tumor and finding in the brain MRI images is proposed. This strategy removes the tumor using the K method continues with the naming process. Similarly, some pre-processing measures (distinguishing between morphological sites) are used reason for plant recognition. It is analyzed that the test results of the proposed strategy provides a better outcome in relation to different approaches.

### **Convolutional Neural Network – Proposed Model**

In the normal stage of the brain tumor it is formed by using segmentation based on Fuzzy C Means (FCM), where applicable human intervention and constant renewal. Fuzzy logic is not permanent accurate, so the result is perceived based on speculation, so it may not be widely accepted. The removal of the structure and shape element is done by SVM. The SVM algorithm does not fit as much data set as it needs long-term training. Complexity is low. But the calculation time is there the highest accuracy is currently low. It is difficult to understand and interpret final model.

  
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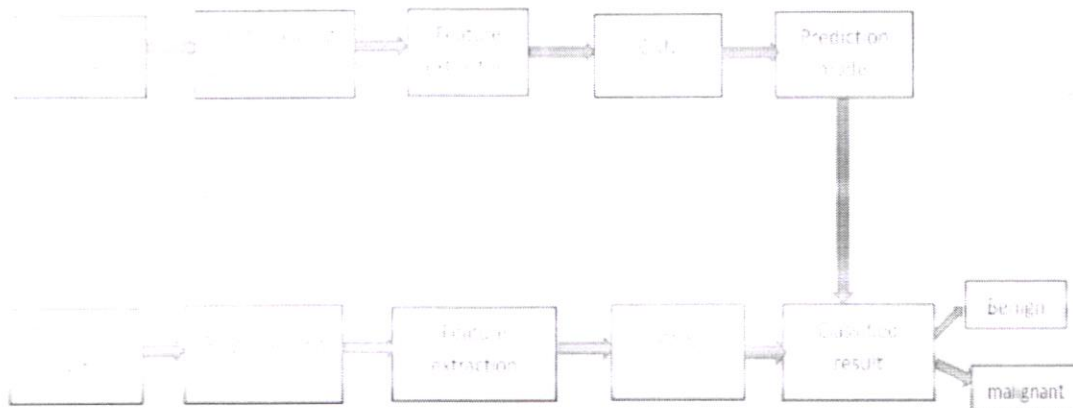


Figure 1. Classification of Brain Tumor Images – Block Diagram

A feed forward neural network called the Convolutional neural network used to divide an MRI image of the brain into a benign or it is dangerous. Following the discovery of an MRI image, raw data needs to be processed in advance to remove noise and remove unwanted data. In the Advanced Processing Phase, the basic steps are to resize the image and use Gaussian linear filter to insert the perfect clear image for convenience image recognition. In the feature removal process, which works a texture operator is used to record image pixels. Here features and features of the images are extracted for convenience brain tumor detection. In a normal neural network, the image cannot scalable.

- Input Layout: This layer contains raw image input, height and depth.
- Flexibility Layer: This layer calculates the output volume computer product dots between all filters and image patch.
- Activation Layout: This layer will use the element wisely function to activate the output of the convolution layer. Others The normal opening functions are RELU:  $\max(0, x)$ , Sigmoid:  $1 / (1 + e^{-x})$ , Tanh, Leaky RELU, etc.
- Pool layer: This layer is periodically applied to convolution neural networks and their main function is to reduce the size of the volume that makes counting faster reduces memory too it also prevents overheating. Two common types of integration layers are great integration and intermediate integration.
- Fully Connected Layer: This layer is a layer of normal neural network takes the input of the previous layer and calculates the class points and results.

But in the neural network of convolution, the image can measure (i.e.) it will take the 3D input volume to the 3D output volume (length, width, length). Convolution Neural Network (CNN) contains an input layer, convolution layer, Rectified Linear Unit (ReLU) layer, integration and full layer connected layer. In the convolution layer, the input image provided is divided into different sub-regions. The smart activation function is Element made on the ReLU layer. Blending layer can be selected. Yet consolidation the layer is widely used to make low-grade samples. It is in the final layer (i.e.) a fully integrated layer used to produce a classroom or label school. The neural convolution network consists of four stages of input and convolution categories. The input layer processes the input image to generate



designed photo clips. The conversion phase processes the design image patches, in which multilayer Convolutional filters, operators and output feature maps. In addition, a fully integrated layer that covers everything features maps. The classification phase estimates the predictive effect on it split the voxel of each image and provide a split map.

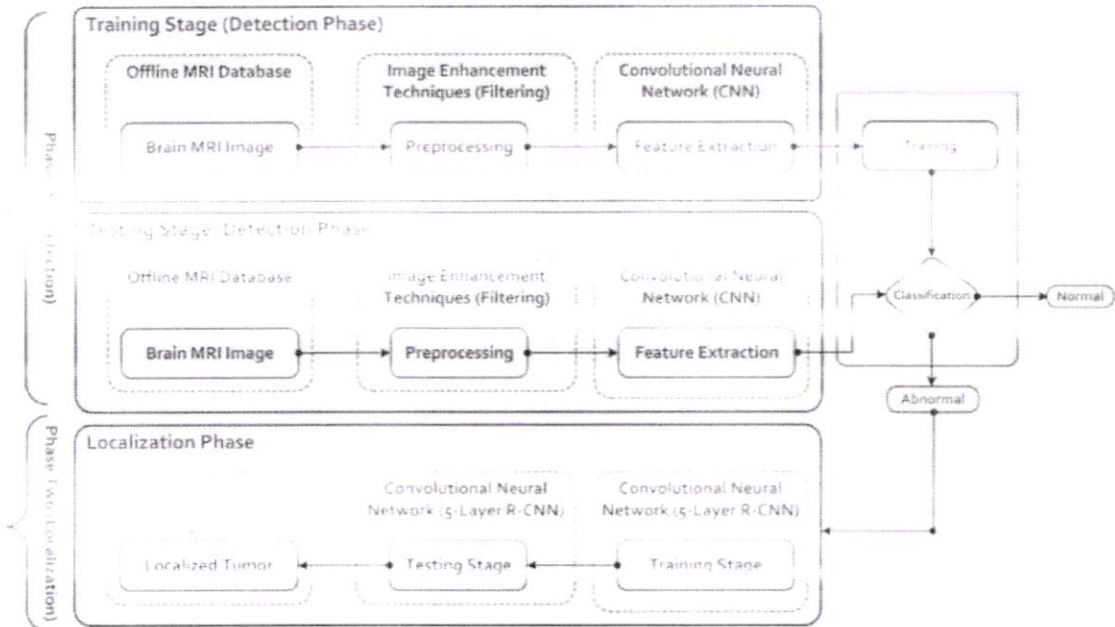


Figure 2. Proposed System Architecture – Identification and Classification

Image Acquisition Toolbox includes a separate interface for use with GigE Vision compliant cameras. This interface is designed for GigE Vision cameras and supports additional Gig specific functionality. Performing image detection in image processing is always the first step in the sequence of work because, without a picture, no processing takes place. The resulting image is complete is not processed and is the result of any hardware used to produce it, which would be very important in some fields to have a consistent foundation since then the operation. One of the final principles of this process is to the input source that operates within the controlled and measured guidelines that the same image, if necessary, can be almost complete produced under the same conditions to make it easier to do bad things find and finish.

**Experimental Setup**

In the process of applying, the Gaussian Filter to image size. The Kernel / Matrix is defined as the one that would be used to remove picture. Sizes are usually odd numbers, i.e. overall results can be computer per cent pixel. And Kernels are equal too so have the same number of rows and columns. Internal values the kernel is compiled by the Gaussian function, which is as follows:

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$$G(x, y) = 1 \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$$

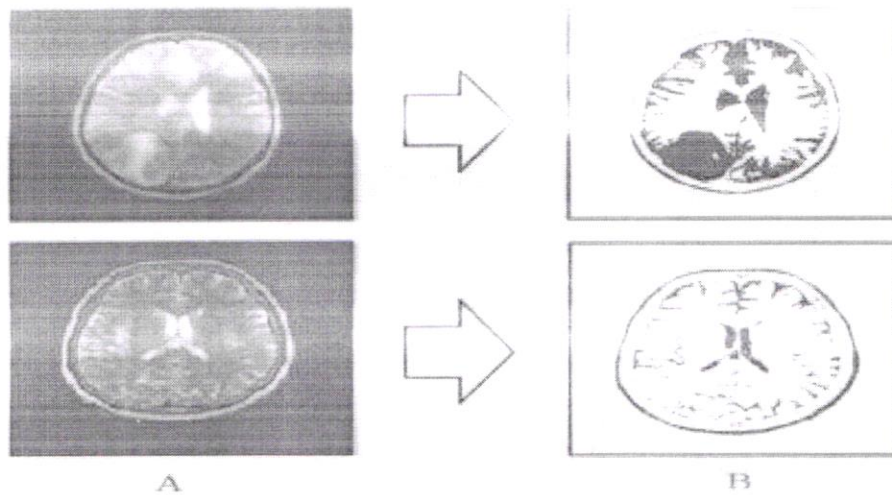


Figure 3. Brain Tumor Image identification

In statistical analysis, texture features are calculated from mathematical distribution of marked energy combinations in positions mentioned in relation to the image. According to the number of solid points (pixels) in each compound, the figures are the same divided into first order, second order and top-level statistics. The Gray Level Co -occurrence Matrix (GLCM) method is a method of extraction second-order mathematical features of the second order.

GLCM is a matrix in which the number of rows and columns are located is equal to the number of gray levels,  $G$ , in the figure 3. Matrix element  $P(i, j | \Delta x, \Delta y)$  the relative frequency at which two pixels are separated pixel range  $(\Delta x, \Delta y)$ , occurs in a given area, one with intensity 'i' and the other has the power of 'j'. Matrix P element  $(i, j | d, \theta)$  contains the second order of the statistical equity of the statistical variables between the gray levels 'i' and 'j' at a certain migration level  $d$  once at a certain angle  $(\theta)$ . Applying a large number of  $G$ -level levels means to store multiple temporary data, i.e. a  $G \times G$  matrix for each component  $(\Delta x, \Delta y)$  or  $(d, \theta)$ . Due to their large size, GLCMs are very good sensitive to size.

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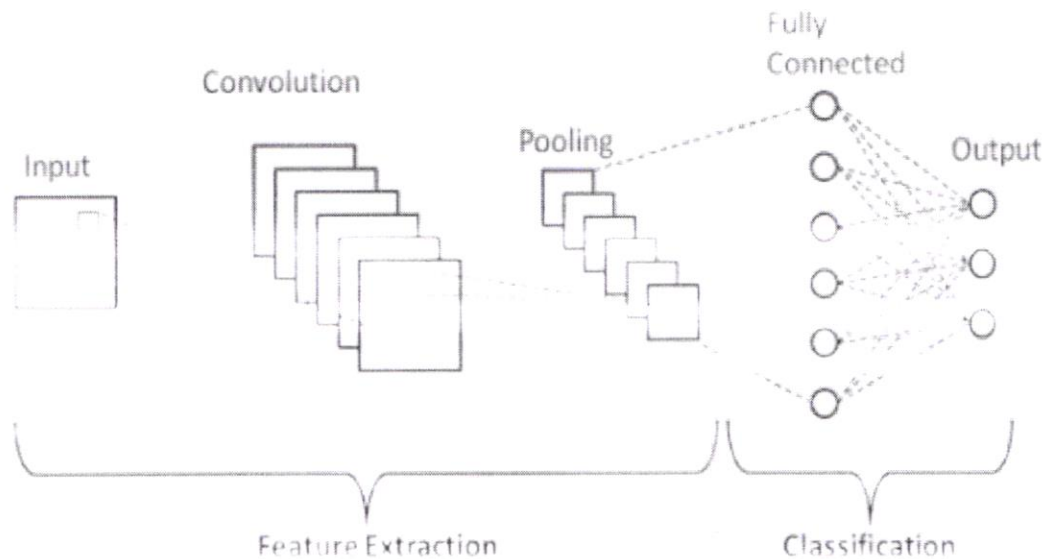


Figure 4. CNN Model

- Convolution Layer - This is the first step in the process of removing key features from the picture. The convolution layer has a few filters that make convolution functionality. The whole image is considered a pixel matrix prices.
- ReLU Layer- ReLU represents a modified line unit. If the map feature released, the next step is to move them to the ReLU layer. RELU do a smart job and set all negative pixels to 0. It introduces linear inconsistencies in the network, and the output is modified feature map.
- Binding layer- Blending is a down-to-earth sampling activity feature map size. The modified feature map is now moving by using the composite layer to produce an integrated feature map. The next step to login the process is called flattening. Flattening is used to convert all features. The result of the same 2-Dimensional elements from the combined feature maps into a single length continuous line vector. The flat matrix is provided as a complete input a connected layer to separate the image.
- Fully Combined Layout (FC) - Fully Combined Layout (FC) consists of weights as well bias and neurons and is used to connect neurons between two different layers. These layers are usually pre-set exit layer and create the last few layers of CNN Architecture.
- Pixels from an image are subjected to a Convolutional layer that perform a convolution function.
- It results in a modified map.
- Combined map is used in ReLU work to produce a modified feature map.
- Image is processed through multiple convolutions and ReLU layers for features.
- Different composite layers with different filters are used for identification certain parts of the image.

- The integrated feature map is flat and eaten to fully integrate layer to get the final output.

### Performance Evaluation

The network is first trained into a database. This data training works with cycling or repetition with a training database many times again outgoing measurement or use bias in the performance-based neurons how close the output is to what is expected. For each repetition, bias changes so that eventually the output is closer to what is expected output. To improve output and upgrade CNN, additional steps required. This includes more than just optimization, data optimization, integration and the use of a modified line unit (ReLU). The overlap refers to the fact that the neural network may be depleted trained in the training database and produce lower segments. To because of this, CNN needs some training to detect the input features of the input. Four examples are described.

1. Apply a Convolutional filter to the first layer
2. Sensitivity of the filter is reduced by optimizing the convolution filter (i.e.) a small sample
3. Signal transmission from one layer to another layer is controlled activation layer
4. Strengthen training time using the adjusted line unit (RELU)
5. Neurons in the continuous layer are connected to all the neurons in them the next layer
6. During training the loss sheet is added at the end to provide feedback neural network

These are data enhancements, stops, group acquaintances, and mergers. Adding data can be used to generate anonymous inputs. MRI images can be cut, zoomed, and rotated. This reduces over-installation. As the neural network will not detect certain patterns within the input A database based on morphological systems is considered insignificant between images. Dropout is the way in which nodes are temporarily formed' reduced' in the neural Convolutional network for production in accuracies within the database. Batch normalization is a method used reducing the balancing power of nodes with high bias. This allows generally in other data sets as these higher weights can be associated with certain precise features within the training set.

Merging is when a photo of the installation is taken down as a sample or adjustment was brought down to train CNN to identify existing features indirectly. For example, edema in T2-FLAIR varies between patients. If CNN is not compiled, may take incorrect information from Database training leading to indirect separation of edema from plant at the time of confirmation.

From the filtered data, the image is scaled using a line function. Considering the diversity of biological patterns, this only provides incorrect measurement of the actual image. Adjustments need to be made self-reflection in linearity within the image. Trigger can be used equivalent to this non-linear within the database. For example, the unit that operates the fixer is called ReLU. The network then



imagined from the feature map to the column to be included in the neural network.

The same 2D converted members are guided and used by the echo data mathematical process. The closed reference power list is calculated using the figure below.

$$Rh = \sum \frac{image(Ah, Bh)}{N}$$

$N = Rh / \text{Max}(Ah, Bh)$  and  $Image_n = Image_n \times Rh$

Apply deep convolution formula and find attenuation energy, the energy balance is calculated by

$$Image(n, R) = Image_n + \sum image(Ah, Bh) + \sum N$$

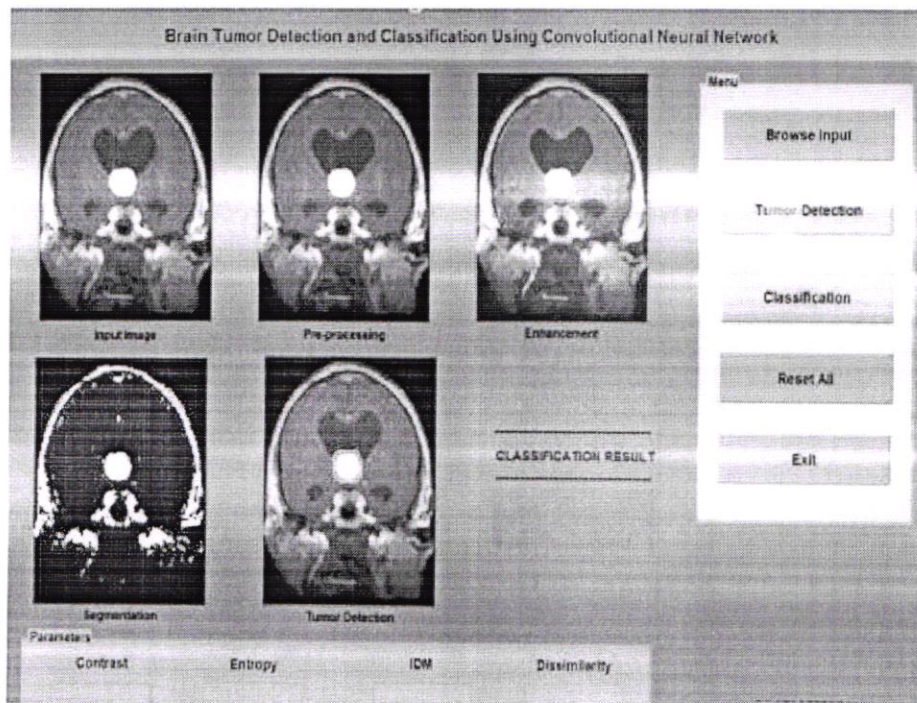
In the above formula image aggregation is used to measure edges, jump section and particles. DCT transformation is used to determine depth and location.

$$DCT_{n, R} = ((1/N)(0.5) \times image(Ah, Bh)) / N - 1$$

Inverse operation

$$IDCT_{n, R} = ((1/N)^{0.5} / image(Ah, Bh))$$

Based on the above formula we modified the Python API code and checked the accuracy using Tensor Flow. The test was performed using a 64bit GNU Intel processor and a GPU Tesla K80. Sea data were selected and Figure 3 shows the water column and part of the stratum. Disruption factor is calculated and echo features are corrected. Typical value for input image size as 1024X1024 and kernel size is 3x3. The same integration effect is tested on the CPU and the table below shows the performance of our algorithm.

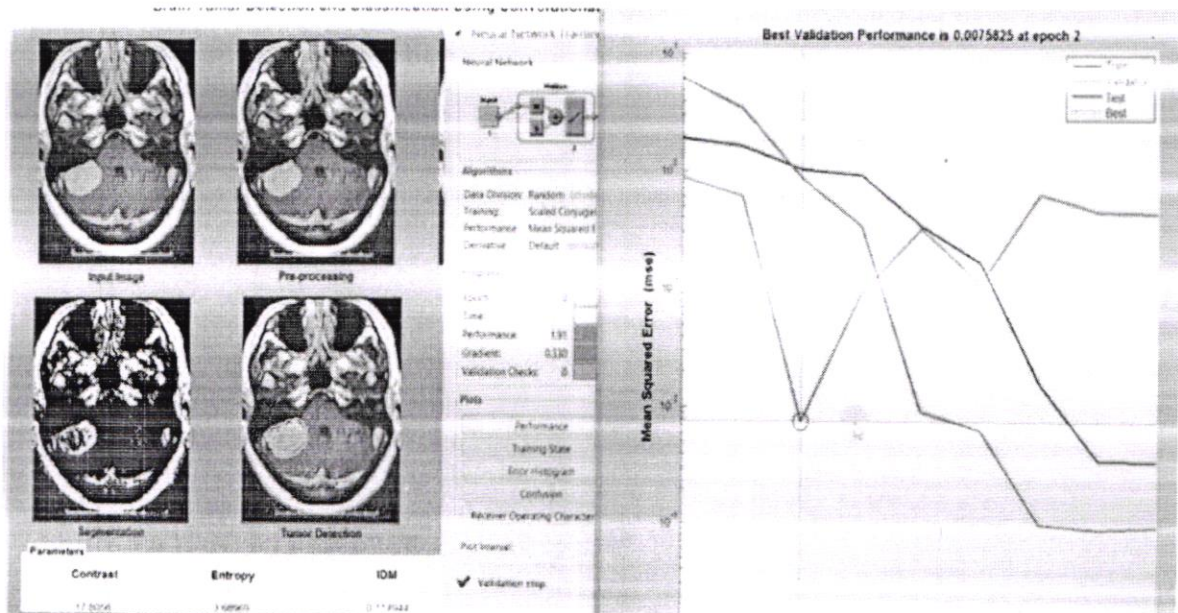


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```

%groups = ismember(label,'MALIGNANT');
%[train,test] = crossvalind('HoldOut',groups);
%cp = classperf(groups);
%svmStruct =
svmtrain(data(train,:),groups(train),'boxconstraint',Inf,'showplot',false,'kernel_func
tion','rbf');
%svmStruct =
svmtrain(data(train,:),groups(train),'showplot',false,'kernel_function','linear');
%classes = svmclassify(svmStruct,data(test,:), 'showplot',false);
%classperf(cp,classes,test);
%Accuracy_Classification = cp.CorrectRate.*100;
%sprintf('Accuracy of classification is: %g%%',Accuracy_Classification)
Crossfun(xtrain,ytrain,xtest,rbf_sigma,boxconstraint)
%Cross Validation
Function yfit = crossfun(xtrain,ytrain,xtest,rbf_sigma,boxconstraint)
svmstruct =
svmtrain(xtrain,ytrain,'Kernel_Function','rbf','boxconstraint',boxconstraint);
yfit = svmclassify(svmStruct,xtest);
c = cvpartition(200,'kfold',10);
minfn = @(z)crossval
crossfun(xtrain,ytrain,xtest,rbf_sigma,boxconstraint)
function svmStruct_Latest =
crossfun(xtrain,ytrain,'Kernel_Function','rbf','...','rbf_sigma',rbf_sigma,'boxconstraint'
,boxconstraint);
yfit = svmclassify(svmStruct,xtest);
c = cvpartition(200,'kfold',10);
minfn = @(z)crossval('mer',cdata.grp,'Predfun',...

```



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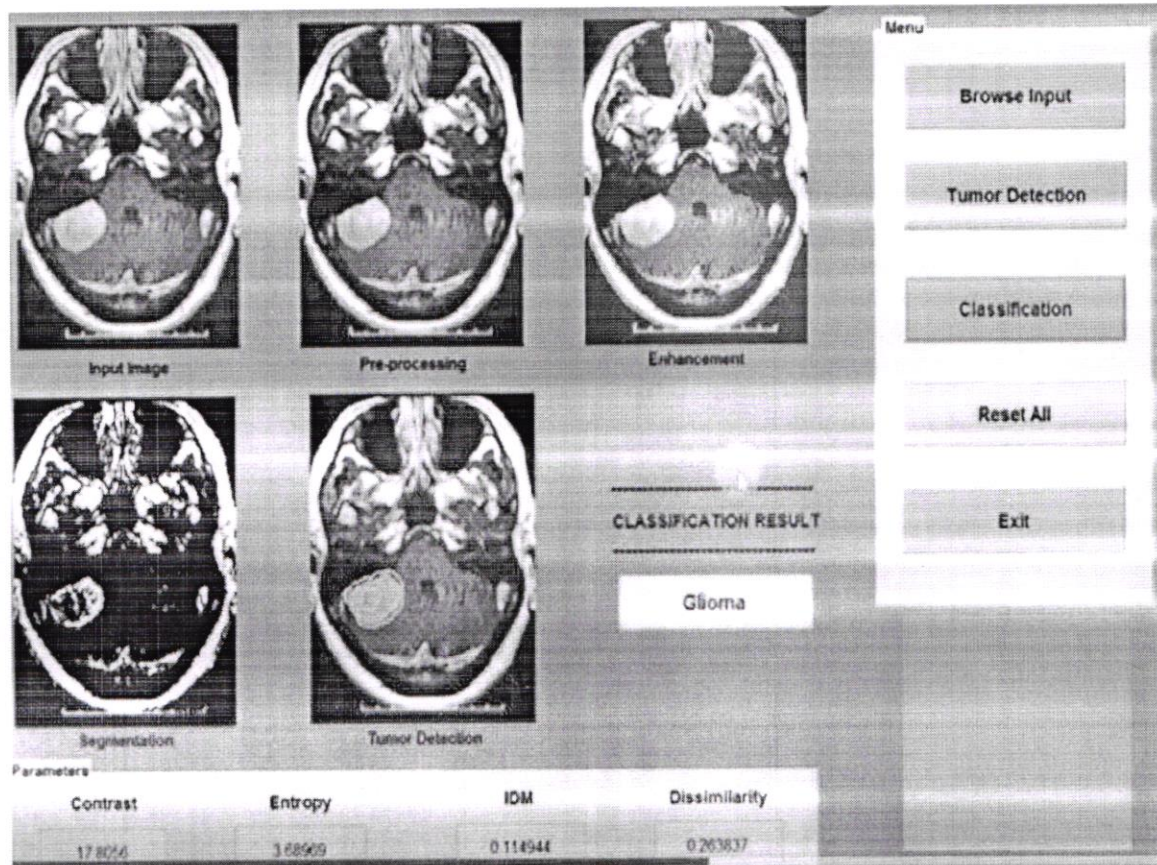


Figure 5. Classification and Prediction Result

## Conclusion

Convolutional neural networks are always a growing area of research in the automatic plant separation. It is important that radiologists have it practical knowledge of Convolutional neural networks to be in a good position to use these tools in future clinical practice. The brain abscesses vary greatly in intensity and shape. Convolutional Neural Networks is good enough to diagnose the brain implants in MRI images. The number of layers of convolution affects level of separation, multiple layers of convolution increase accuracy results, but an additional number of convolution layers will require more time training. Convolutional neural networks represent a growing field of knowledge almost help radiologists provide more accurate care to their patients. All steps for Convolutional neural networks are eliminated pre-processing, segmentation, element subtraction and phasing using various algorithms and got better accuracy. As a future work plan to clearly the brain tumor phase. After finding the type of plant and the patient's condition falls into what category of disease he or she may be in redirected to another page where they can get medical details consult.

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## Smart X-Ray interpreter for predicting epoch of healthcare using machine learning

**Dr. Shaik Shakeer Basha**

Avanathi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telangana, India

**Dr. Syed Khasim**

Dr. Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India

**Abstract---**This paper provides a complete overview of our work in providing a well-designed and accurate X ray scanner accessible to everyone and features applications that include radiology research and sharp X Rays. The use of Artificial intelligence (AI) has been rapidly advancing in medicine, especially in radiology. Artificial intelligence has in addition been a source of amazing development and alarming research in recent years. In addition to the risks and problems of quality assurance related to Artificial intelligence (AI), it offers large open doors to change the way radio sensible management is delivered. In addition, it is possible that AI could become a strong, persistent companion of a radiologist, in addition to being an important tool for preparing radiologist students. This model explores and validates the opportunity to innovate in providing the essential X Ray Scanner.

**Keywords---**X-Ray Interpreter, Epoch values, Machine Learning, Radiologist, Artificial Intelligence.

### Introduction

Machine learning and artificial intelligence (AI) play a major role in today's society where much of the work is done with programming, not physical. We have the opportunity to live in a world full of technological advances. With these innovations, machines can be part of the simple things that need to be done by humans in general. We can also say that our lives have also improved through the use of these improvements. This technology reduces the struggles of people in a few areas such as industry, banks, financial systems, transportation, games, agricultural efficiency, the medical sector etc [1][2].

Artificial intelligence (AI) and machine learning are important in clinical care and surgery because decisions have to be made in seconds to save lives. There is a worldwide shortage of radiologists. Radiology is a specialized clinical practice that is often associated with innovation and relies heavily on machines, therefore; has gone through almost unlimited improvement, unlike other clinical features. According to the World Health Organization (WHO), 2% of the 4 billion people have been admitted to radiologist [3].

Artificial intelligence (AI) can help with that. The standard programming languages used in Artificial intelligence (AI) are R and Python. The Department of Radiology may incorporate the basic skills of regional planning languages soon. Artificial intelligence (AI) has developed rapidly as the unique creative center of radiological science in recent years. Radiology is a medical profession that is often recognized for innovation and relies heavily on machines; therefore, it has undergone consistent development, as opposed to other clinical specialties [4].

At the same time, as it turns out, the field of data renaming has grown significantly during the new millennium. Part of the recent progress we have seen is the development of non-motorized vehicles, online banking computer bots, AI-driven media, automated arms, mobile apps, Siri phone I-assistant, Google Chrome program development, apps capable of detecting building materials, plants, and living animals, learning robots, and AI-driven systems for large business chains [5]. Along with these same lines, AI has been developing rapidly as the most innovative area of radiological science recently. In addition, it is widely used in all areas of the budget, including the clinic area. Moreover, it has become a very common point in the field of radiology, especially among radiology social orders and ongoing historical exploration. In particular, Artificial intelligence (AI) techniques dominate the detection of complex models in photographic knowledge and provide image compliance testing [6].

The title of the ongoing review provided some of the figures for the Artificial intelligence (AI) paper sections one step at a time from 2015 onwards. As mentioned in the diary, there has been no distribution in Artificial intelligence (AI) in radiology in 2015, three every 2016, 17 since 2017, and about 10% of entries were AI-related investigations in 2018. The results confirm that deeper understanding. with CNN it showed high analytical killings in dissecting the liver mass in separate post-CT scans. Experts who participated in the painting agreed that it is possible that half the potential for Artificial intelligence (AI) is beyond human ability in 45 years [7][8].

### **The Working Model Manoeuvre of AI**

A smart X-Ray scanner aims to transmit strong support to patients who do not approach radiologist physicians; will ensure that patients are able to identify the right lost part. The main task for patients is to transmit an x ray image with a smart X-Ray Scanner. The unique thing about this is that it offers the possibility of all diseases. In addition, it provides the right nutrients. It also magnifies all diseases to which part of the image we are looking to resolve in its selection. For

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example, if we feed a large number of lung images with various diseases and show a lot of pictures the PC becomes ready to detect various diseases [9].

The process goes this way, we have to open the app and take a picture of your x-ray and properly that image is transferred to the cloud and later passed through the algorithm. An evolving Artificial intelligence (AI) algorithm can reliably diagnose X-rays of more than a dozen disease classes, and it takes less time than it takes to read this sentence. The algorithm, called the CheXNeXt, is the first to simultaneously differentiate X-rays from countless risk of disease and recurrent conclusions that are studied by a radiologist's specialist study [10]. The algorithm, CheXNeXt, is a 121-layer convolution neural association taught at ChestX-ray14, which is now the most accessible source of chest X-ray data, containing more than 1,00,000 X-shaft images former with 14 diseases.

We expect that soon, software will be able to differentiate and differentiate between different types of chest radiographs. Convolution neural association is a screening and analysis of a type of disease and its prevention, which is captured by cutting the image into a "corrective" system to obtain confinement data. Therefore, scientists have had the option of combining diagnostic and confinement methods into a model of comparative expectation [11].

There is also another ChestX-ray8 database that clearly contains more than 110,000 chest x-beam studies related to up to 14 stages of the disease. MGH scientists have taught an in-depth study tool, called CXR-risk, over 85,000 chest x-beams from 42,000 members at the beginning of the clinic. Each image is integrated with a central part of the data so that the model can understand the concepts or combinations of the chest x-ray image.

  
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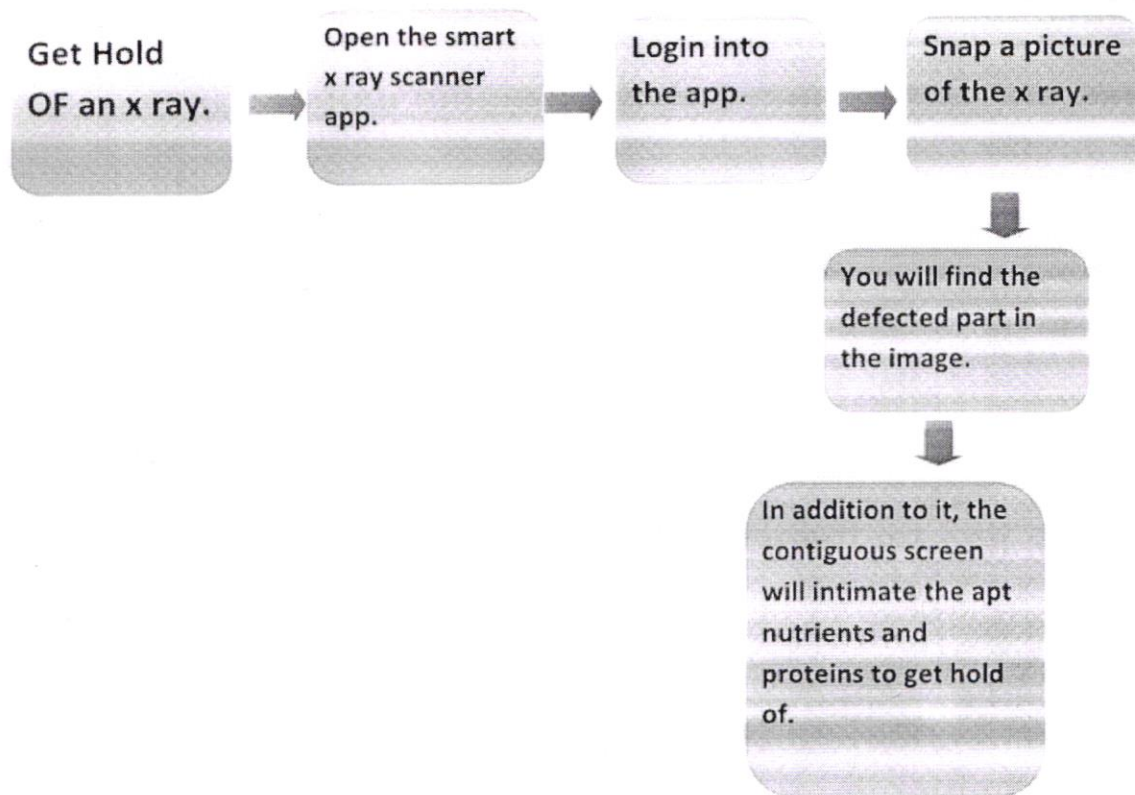


Figure 1. Working of the smarty x-ray scanner

There should be Artificial intelligence (AI) specialists and clinical specialists needed to develop this algorithm. The algorithm is set for in-depth reading. A large emergency clinic around you produces dozens of x-rays every day, everything that needs to be evaluated by a radiologist or various doctors. In addition, it is not wrong for diagnostics to be performed within hours to determine the underlying conditions. In short, translating the X-beam is a very difficult task for radiologists and physicians [12][13].

So it takes a lot of time. It is difficult to speed up because x-ray examination is a systematic process. The biggest difference in this project is time and speed. Radiologists take about four hours to diagnose x-rays. With the help of this technology, the work should be considered in less than 2 minutes. Doctors have a serious memory problem; these improvements make it easier. The client request is as follows:

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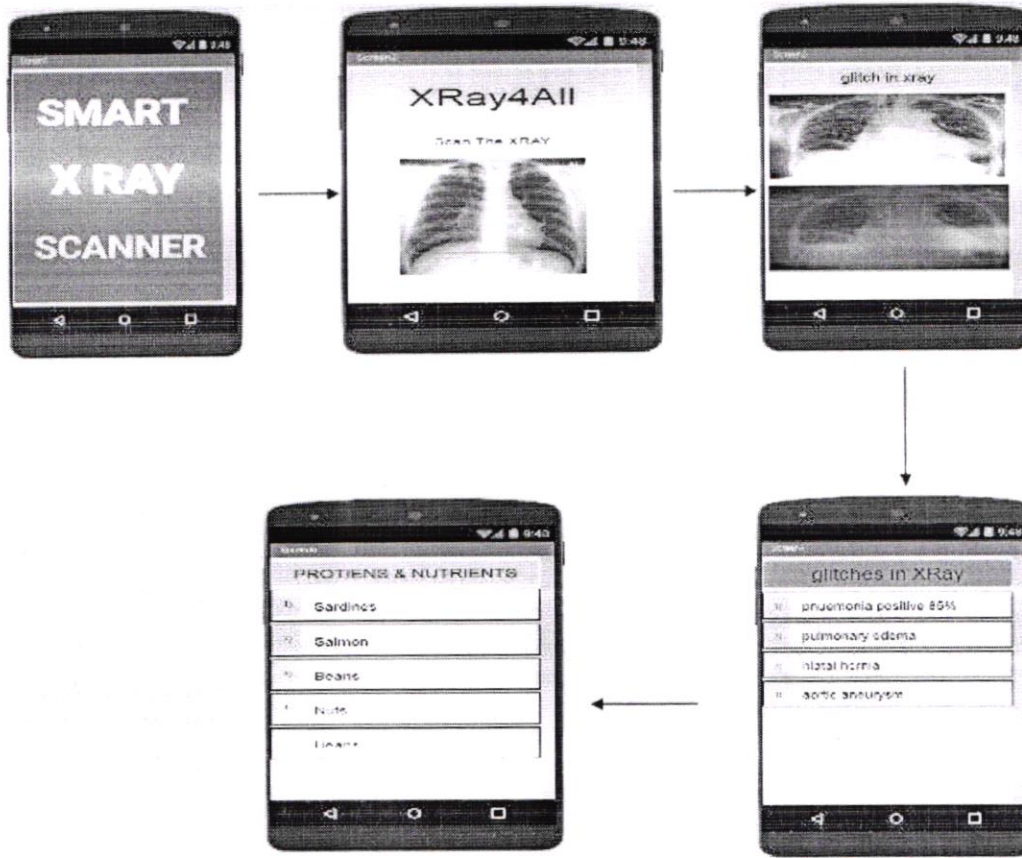
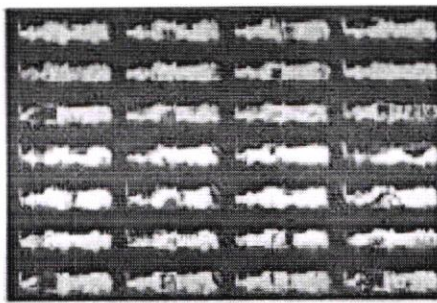


Figure 2. The above images depicts the working of user app.

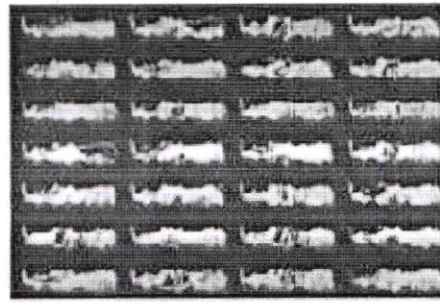
### Manoeuvre of Machine Learning

In old era, a man took a photograph of a man. The main clinical picture was once taken. This may not surprise you today, however, at that time it was a masterpiece because this was a major event in which we could look inside the human body. The obvious evidence of the disease is diminishing and becoming smaller and evaporating towards the independent eye. So, how quickly can we choose to detect these diseases? Let me give you an example: Osteoarthritis is one of those diseases that we can detect at the threshold of damage; one in ten of us can get osteoarthritis knee disease when a torn tendon between two bones comes out on its own, causing a pound of bone to hurt your bone.

*Pradeep*  
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Osteoarthritis in 3 years



No osteoarthritis in 3 years

Figure.3 Dataset of Collected Epoch values

These are MRIs of the knee ligament. The different tones here speak to different parts of the makeup tendon, and we understand that one of these, directs the diagnosis of osteoarthritis however the other collection will not. Moreover, the question is what is the meeting? The difficulty is that our eyes do not see the difference between these circles of patients. Even experts cannot say what is wrong here? However, this also applies to machine learning. A great guide after learning a machine is to set up an experienced non-readable PC.

In this study, we studied and developed a method called Players in Transportation, which trains PC to enjoy the interaction between pixels instead of finding the basis for a single clear pixel within an image. This exact image of the vaccine is used to capture and detect differences in MRI results of the knee joint. It can protect the individual's cause from developing osteoarthritis in three years down the line with an accuracy of 86%. I recall that experts today do not have the opportunity to diagnose osteoarthritis in the first three years. Seeing 3 years means in people's lives.

Now you will be wondering, what PC does we see that we can see? Oops! These photos are made with PC. The red here indicates the percentage of water we know. However, I had no idea what PC was used to diagnose osteoarthritis, later, the disintegration of the fluid. You see on the left a person is completely strong and the water here is always flowing throughout the muscle and on the right, we see a person starting to develop osteoarthritis and here the water is damaged where the muscle meets. As a result of the collection, there is self-injury of that muscle in that region.

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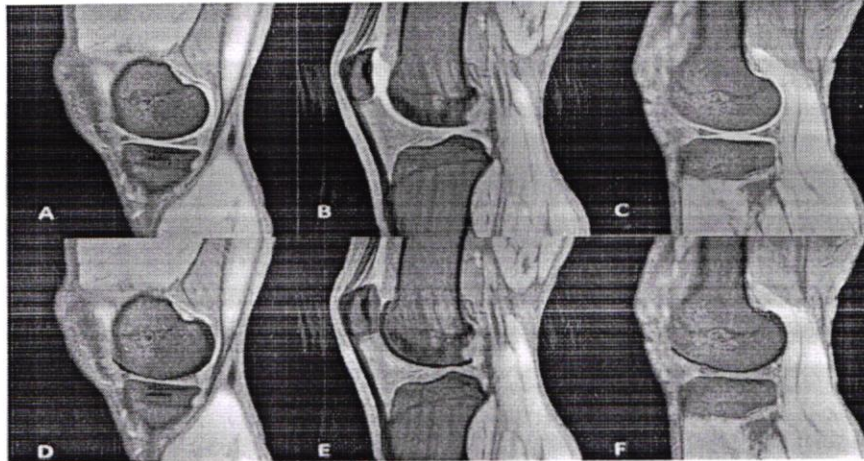


Figure. X-Ray Inputs

Getting sick in the early stages can prevent a person from developing osteoarthritis, three years down with an accuracy of 86%. This is a major event in which we see premature confirmation of disease in the ligament. Finally, we can see the continuity of the eyes on the PC that we are instructed to look at. This is the definition of a PC that can detect the first symptoms of a disease by eye examination.

Similar to arthritis, it is similar to that of osteoporosis and various people have no symptoms until they break a bone. There is no cure for osteoporosis, but real treatment can help to strengthen and strengthen your bones. Despite causing chronic degeneration, osteoporosis causes few patients to lose height. Once osteoporosis affects the vertebrae or vertebrae, it usually promotes a curved or collapsed gift.

There are usually no initial results during periods of bone loss. However, when your bones are paralyzed due to osteoporosis, you may experience signs and symptoms that include: Back pain, caused by a broken or fallen vertebra, loss of height after a certain period of time. Osteoporosis is where the bones are sensitive and bound to break.

If left untreated or at any point left untreated, osteoporosis can progress easily to the point of fracture. Osteoporosis can be reduced by taking early treatment. However, experts could not detect the deviation by looking at the x-beam. They get a chance to see after a 50-60% bone marrow transplant, where the patient can get proper treatment with irreversible stages of coronary heart disease. Therefore, the ability to detect imperfections in the early stages can be detected by rapid x-rays. With the help of these rays, we can detect imperfections in the early stages and receive appropriate treatment for osteoporosis.

### Results and Values

Artificial intelligence (AI) is known as a “game changer” tool in health care in today’s ever-evolving society, there are areas where goods are small and not immediately open to people who need them most. With the help of man-made new ways of thinking, resources and information can be spread and accessed in new



ways. The effort demonstrates one such use case, of an intuitive edge, where Artificial intelligence (AI) expertise can help and educate medical and patient care professionals with thought.

The development of practical wisdom understands the concept in clinical management research, practice, in fact, is not fundamental and there are still many obstacles in your way. Despite the way this great development did not happen without the part of the "fear" within the radiological science field of fear that would arouse the claim that artificial intelligence replaces the requirement of senior, skilled and experienced radiologists.

It is interesting that some radiologists or researchers have given a variety of empowering speeches during the 2020 Radiology Society of North America (RSNA) conference in the US. Almost any radiologist has also pointed out how artificial intelligence develops and enhances radiology which was the explanation for the escalation of conflicts among young medical professionals. The clinical picture based on the wisdom of practice in general practice is not too far behind.

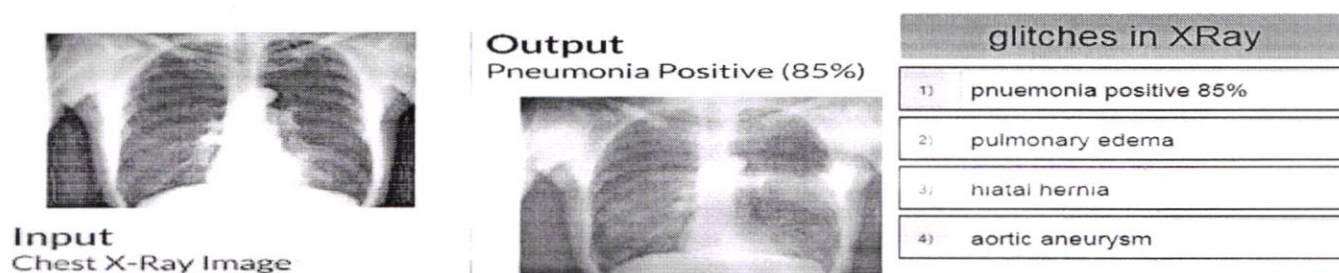


Figure 5. The above images show the input, output and the imperfections in it

## Conclusion

This effort is being made to date and we will make this a gadget to help patients and specialists. As we move forward in this regard, it further requires unlimited thinking over time in the metaphor of readiness, clear knowledge and a useful and exemplary program focused on human ingenuity and practicality in powerful health services, helping authorities deal with and treat any emerging disease. The conclusion begins another period of clinical and medication management. Whether the outcome provided by the customer is appropriate to support its motivation should be managed with effort and daily life and ongoing training. It is difficult to resolve when this invention could create new open spaces over time, yet it is easy to see what functions AI might take on people. AI may take from people. It can be believed that any routine exercise will be performed by a robot. This move to automation has been happening for a long time; however, what is not understood today is that it influences other businesses. It is possible that we will adapt to new changes by planning completely new types of work, as well as using our human potential in a wonderful way.

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# IoT Framework with Support Vector Machine Learning Algorithm for Intelligent Health Monitoring System

Dr.Syed Khasim<sup>1</sup>, Dr.Shaik Shakeer Basha<sup>2</sup>

<sup>1</sup>Professor, Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India.

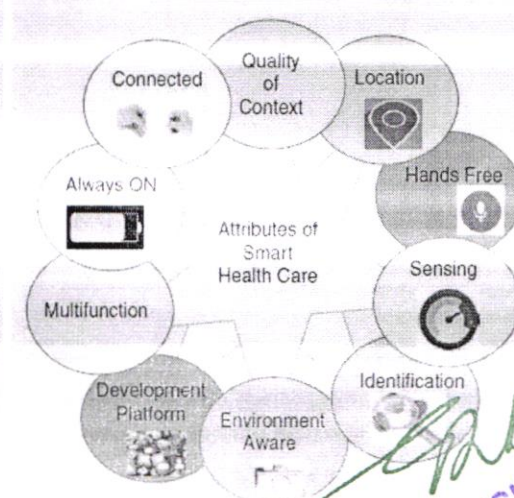
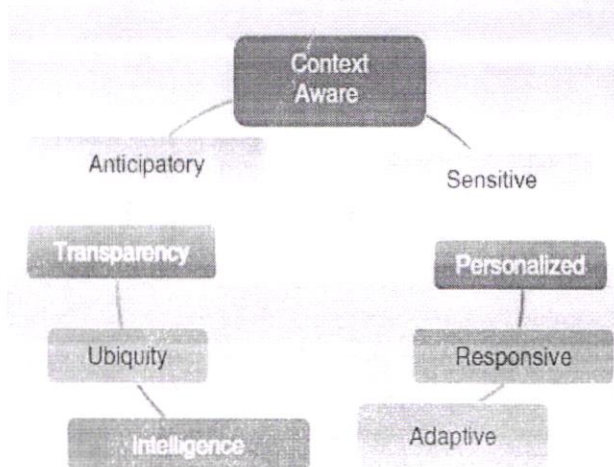
<sup>2</sup>Assistant Professor, Department of Computer Science & Engineering, Avanthi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telengana, India.

**ABSTRACT:** The main purpose of this paper is to look at the patient's health crises every second and to update the subtitle on a server with sophisticated IoT in the same way as caregivers will learn or monitor the current state of patients with no hidden activity. The aim is to determine the highest level of accuracy and speed. Net of Things (IoT) is an advantage in the field of communication, which connects people far and wide through an international medium. The main concern of IoT is to adjust for strong network connectivity on small devices. During this program torture includes a Medicare program primarily based on the work of the police health care system. This process allows patient information to be read to an international server with a view to managing access. In this way, no one will cheat caregivers, no one will hide the patient's health outline and no one is limited in understanding about a particular patient's condition. During this framework, a new system emerges from the axillaries wellbeing viewing (SHM) IoT development for smart and reliable viewing. In particular, the worrying development in the use of the IoT framework and SHM is compared as a data management system in a given IoT environment unit. as the amount of data generated by obtaining a gadget regional unit is stronger and faster than ever, the regional unit of large data setting is equipped with an advanced and large amount of data collected on sensors embedded in structures. Predictability plays an important role for IoT. That sensory data should be analyzed and should be predicted in another context. In the case of past records, the risk of a heart attack should be identified so that the patient can be identified. In the proposed machine learning method with a decision tree and a decrease in performance.

**Keywords:** IoT, Decision Tree, Support Vector Machine, Machine Learning, Prediction

## 1. INTRODUCTION

Ordinary human services are not suitable for forcing everyone to do what everyone wants because of the huge population growth. Without a good foundation and current development, medical management is irrational or unreasonable for everyone. One of the purposes of all good public insurance is to assist clients by advising them on their medical status and keeping them in mind. Good human service enables clients to deal with themselves on critical issues [1]. It gives weight to the rising standards and expertise of the client. Major medical services help to use available resources to their full potential. It helps to keep patients away and to reduce client-centered treatment [2].





**Fig. 1 (a) Characteristics (b) Attributes of smart healthcare**

In addition, it encourages medical professionals to extend their care without the constraints of geology. Concurrent welfare is largely focused on machines that support the quality and power of public insurance through self-care, in addition to remote considerations [3][4]. It has its origins in the era of telemedicine, the regional unit of any client who is educated about their health and the local unit that is given criticism whenever needed. While major medical resources are focused on programs that will operate independently, complementary human resources offer ways to provide clients with ideas about nurses. An important provision, it re-imagines the economy of the best human services advertised by the client. 3: home app, home-news-sure news, and home-specific languages [5].

App-focused structures should ensure reliable transmission between direct and indirect telephone systems, establish a custom community between sensors and consequently the consumer digital PC, and enjoy the information. Focused structures should be flexible to support the material used, the appearance of length, timely transport, and high sensitivity, maintain high efficiency at low power losses, and start a smart process. Semantic-focused structures should be equipped to expand behavioral patterns that support previously ungenetically retrospective data, approach natural language strategies to match user proficiency, and incorporate ubiquitous computer skills [6][7].

## 2. RELATED WORK

In [8] it states that its internet associate degreed applications became an Associate in nursing an integral part of modern human mode. It has been an important tool in each segment. This research of the semiconductor unit up to the birth of the magnificent gizmo, IoT ... IoT ideas were considered years ago but still some time in the early stages of economic preparation. The local unit of the dynamic domestic and mobile industries is seeing growth through IoT. However it is not a local unit for a few articles written throughout the course.

The area unit of technology, history and applications are briefly mentioned in accordance with various statistics. In [9], the findings of the Associated in nursing comprehensive literature survey focusing on bridge health (SHM) health views are presented. The local unit of standard, growing, and growing technology has also been updated as problems for preparing for new SHM operations. SHM programs have clearly provided a valuable value to homeowners under guarded property. The author of the paper [10] will integrate various technologies and communication solutions. Wireless and wireless tracking networks, enhanced communication systems and distributed intelligence of the smart unit area are the most important. Consistently it will only be considered, any serious contribution to the development of the Material Network needs to basically be the result of collaborative activities carried out in various fields of knowledge, such as telecommunications, IP, physics and science. In such a state of affairs, this study is aimed at those who must be compelled to face this advanced subject and contribute to its development [11][12].

In Paper [13], IANA's last IPv4 address house was completely decimated by the Gregorian calendar month 1st, 2019. This poses a significant challenge when adding new features and allowing new services to Infobahn. Many discussions about the IoT area unit have supported the first notion that the home address information system is a major source or is taken without the assumption that IP is the same as the number eight created naturally by nature. Hopefully, the next generation of Internet Protocol, put together as IPv6 brings a solution. IPv6 was designed by the IETF In unit and developed by the same experts from time to time IPv6 Forum since 2000.

To expand the IPv4-type code with a larger address house and a way for new end-to-end retrieval capabilities to complete the structure, and to complete completion of services, several IETF operational meetings work on a wide range of transformation models to work with IPv4 infrastructure and services. include a recurring combination of options that are not strictly designed or measurable in datav4 processing such as IP quality, error services; etc. personnel line for the worst case scenario where IP becomes a portable service that allows network activity for very low number of high-speed detector networks [14], RFID [15], IP within vehicles [16], in any media situation where the network adds value to the visual object. Pv6 is designed to provide secure communication to users and the quality of all devices connected to the user [17]; thus users can be connected permanently [18]. This work provides an overview of our high level of experience in dealing with the challenges in terms of structure, reliability, security and quality of Infobahn Material with IPv6 and therefore on the success of Infobahn of Everything [19].

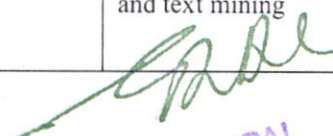
  
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**Table I. Medical relevance of IOT**

Accessing Technology	Development Method	Merits	Demerits	Usage
PAN LAN-IF	Continua Health Alliance	Efficient, Cost effective	Low records Fee evaluate with different community, Short range (10M)	Primarily Prevention.
Remote Home Healthcare	Continua Referece Architecture	Minimize the code of device, consume less time; get improved communication.	Problem of Decision making, Data Which was Interrupted	Chronic diseases people
Body Area Network	Mobile phone based architecture	Timely medical care	Range (2- 5meter)	Care aged, Physically Disable person, High Sugar
Wireless Body Area Network	Windowing and technique of self learning	Geographical large area location monitoring.	Low security, High cost.	Cardiac, Diabetics, Home care old people
M-IOT	Heterogeneous s	Tele treatment services	Easily deployable	Neurology, pulmonary medicine

**Table II. Comparison on machine learning algorithms**

	Methods Used	Remark	Future Work
[1]	Decision Tree Naïve Bayes.	Decision trees afford correct outcomes as evaluate to Naive Bayes.	Clustering, Time series, Association regulations can be used
[2]	Decision Tree Naïve Bayes	It gave the maximum accurate result whether the affected person had the possibility of the coronary heart ailment.	locate the unique type of coronary heart sickness especially
[3]	Naïve Bayes	it is able to also contain distinctive statistics processing strategies, e.g., time collection, clustering and association rules.	Text Mining to mine the giant amount of unstructured records presented in healthcare databases -combine information mining and text mining

  
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[4]	Nine voting Equal Frequency Discretization with Ginny Index Decision Tree	tested decision tree type and vote casting to pick out a stronger, more correct method	larger volumes of data from different medical databases -same can be extended in different horizontal and vertical domains of medical science
[5]	Decision trees, Naïve Bayes & KNN.	Nearest neighbor is very handy and useful for all kind of datasets even for large size datasets.	Increase the speed of algorithm using proximity graphs.
[6]	KNN and ID3	Risk occurrences of heart disease were detected and accuracy level also provided for diverse amount of entities.	numbers of elements could be abridged and accuracy would be increased using some other algorithms
[7]	Generalized Linear Model, SVM, Bagging algorithm,	achieved higher accuracy by using hybrid data mining for heart disease analysis	NA
[8]	SVM Classifier and GA optimization , clustering	K-mean clustering and MAFIA algorithm for HDP system and achieved the accuracy of 89%.	Improved algorithm of clustering which achieve the accuracy more than the present algorithm.

### 3. PROPOSED METHODOLOGY

In fig 2 it states that its internet associate degree applications became an Associate in nursing an integral part of modern human mode. It has been an important tool in each segment. This research of the semiconductor unit up to the birth of the magnificent gizmo, IoT ... IoT ideas were considered years ago but still some time in the early stages of economic preparation. The local unit of the dynamic domestic and mobile industries is seeing growth through IoT.

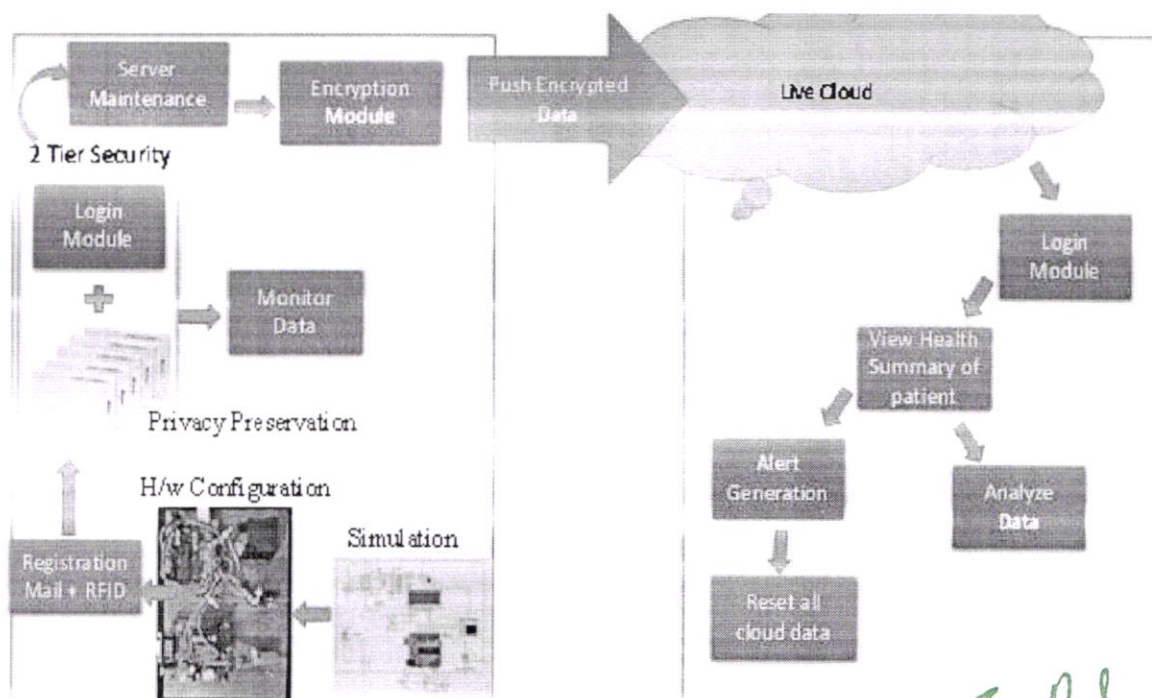


Fig. 2 System Architecture

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**Step-1: Hardware Configuration**

- Connections between IoT Module with ESP8266 with Inbuilt Microcontroller, Heartbeat Sensor, MEMSSensor, DHT11 sensor and USB-to-TTL Module
- Defining heartbeat sensor value DOWN 0 and UP 1
- Check for availability of serial data for RFID
- Keep reading Byte by Byte from the Buffer till the RFID Reader Buffer is empty or till 12 Bytes (the ID size of our Tag) is read
- Read 1 Byte of data and store it in the input[] variable
- Printing RFID tag data
- For DHT11

dht.readHumidity();

dht.readTemperature();

For Heartbeat

Initialization on of timer

If digital read of D0 pin is high Then count+2

If count is between 40 and 80 Then beat status is normal

Otherwise, Beat status is abnormal

Count= 0 and it will reset the timer

For MEMS

If acceleration of z is greater than zero Mems condition is normal Otherwise, there are chances of patient felt down. Print all details on Display devices

**Step-2: Cloud storage generation**

For Registration details

Master details about all the alerts and sensors value

Column Name	Data Type
REGID	varchar(150)
Name	varchar(150)
Mail	varchar(150)
MbNo	varchar(150)
Age	varchar(50)
Weight	varchar(50)
Pin	varchar(150)
Pwd	varchar(150)
Addr	varchar(150)
City	varchar(150)
State	varchar(150)
Country	varchar(150)
Sts	int

Column Name	Data Type
UniqID	bigint
Temperature	varchar(50)
Humidity	varchar(50)
Secs	varchar(50)
Beat	varchar(50)
BeatSts	varchar(50)
MEMS	varchar(50)
RFID	varchar(50)
ActivatedBy	varchar(150)
DT	datetime

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**Step-3: IoT live cloud data inserting system**

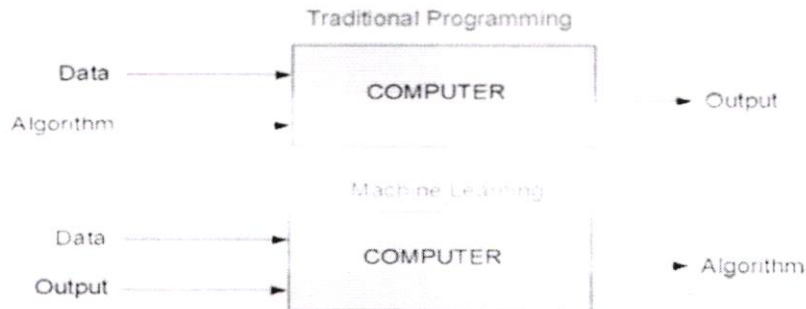
✓ Initialization of Port  
✓ Two Tier Registration for entering insystem  
✓ ForRFID  
If serial port is open  
Serial port will read string. If it is not null  
if it has S, if it has then split with comma Then  
Checks Get RFID Text  
✓ Insertion of details and Check necessary validations  
Inserting details of registration using MD5 Encryption of RFIDtag  
MD5 uses TripleDESCryptoServiceProvider and UTF8Encoding  
Pushing data to server  
In LoginModule  
Two Level security  
Verification of username and password  
If verified then  
Verification of RFID  
Read RFID  
✓ Encrypt using MD5 then match with the stored value  
If verified then insert username password as an encrypted form  
User can monitor data  
Server Maintenance  
Show details  
✓ When Push Button pressed data will be push data on cloud  
Increment ID= fetch existingid+1  
Insert entire data with RFID in encryption from  
If heartbeat=ABNORMAL then Sent mail through SMTP server  
If MEMS status is=felldown then sent mail regarding that through SMTP server

**Step-4: Verifying Details for patient from web services in live cloud**

Identification of username and password  
We cannot decrypt encrypted text of MD5. So again encrypt inserted values and match with the existing.  
View Live Health Summary using datasource  
Reset server data

**Step: 5 Machine Learning**

Machine learning is a strategy to allow computers to be automatically detected and predicted to achieve complex tasks whose processes cannot simply be explained by humans.



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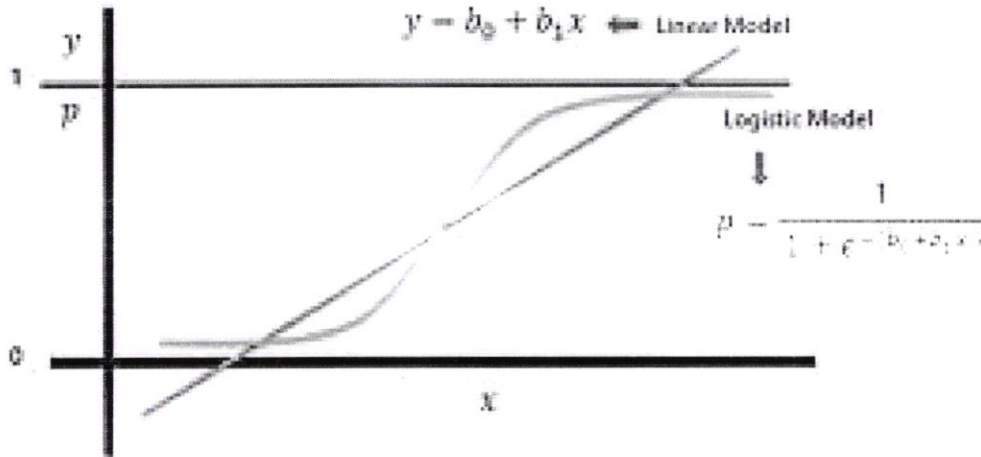


Fig. 3 Logistic Regression

The retrospective rule may be a step-by-step method of comparing databases when it contains a single variant or a series of independent elements that complete the final results of a companion diploma. The result is measured by a split variance.

**Steps**

Importing LiveDataset

Factorvariables

Partition data in 3phase

Train 70%, test30%

Train 80%, test20%

Train 90%, test10%

Process for everyattributes

Binomial logistic regression for training dataset Confusion matrix for trainingdata

Calculating miss classification error for training data andaccuracy

Confusion matrix for test data and calculating error andaccuracy

Process for significantattributes

age + alcohol + obesity + beat+temp

Again do the same process for significantvalues

Predicted Class		
Predicted Class	C1	C2
C1	True Positives	False Negatives
C2	False Positives	True Negatives

**4. PROPOSED ROC CURVE**

The recipient feature (ROC) feature can be the most appreciated accommodation to compare the overall performance of the organizer. The structure of the mythical creature is foretold in simple steps of analysis — clarity and sensitivity. Specification may be a full function of the negative 0. Five negative, and sensitivity may be a positive performance of 0.5 positive. Most devices know the models that grow into positive points and predictable labels.

Positive Sensitivity =  $\frac{\text{TruePositive}}{\text{TruePositive} + \text{FalseNegative}}$

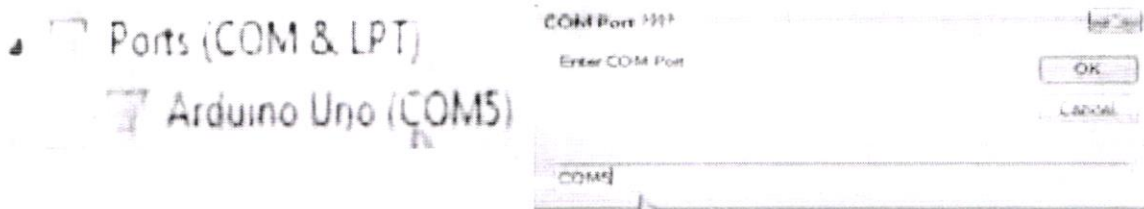
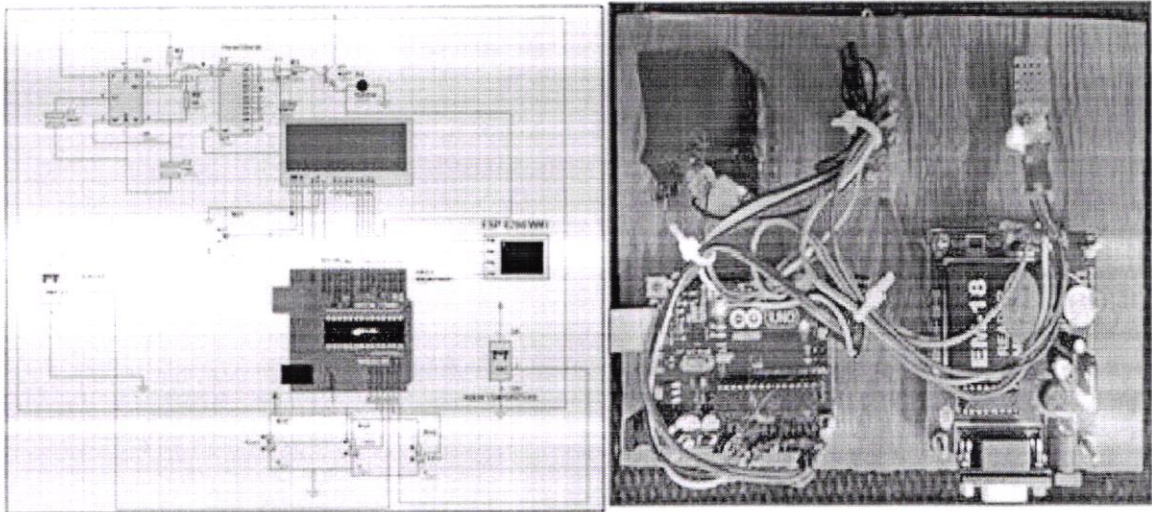
Specificity =  $\frac{\text{TrueNegative}}{\text{TrueNegative} + \text{FalsePositive}}$

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### Decision Tree

- o Import data
- o Factorize the data
- o Create data partition based whole as an training phase
- o Recursive Partitioning and Regression Tree for data
- o Predict the values and create confusion matrix based on tree.
- o User input for all attributes for testing
- o Based on user input predict the possibilities of having heartdisease

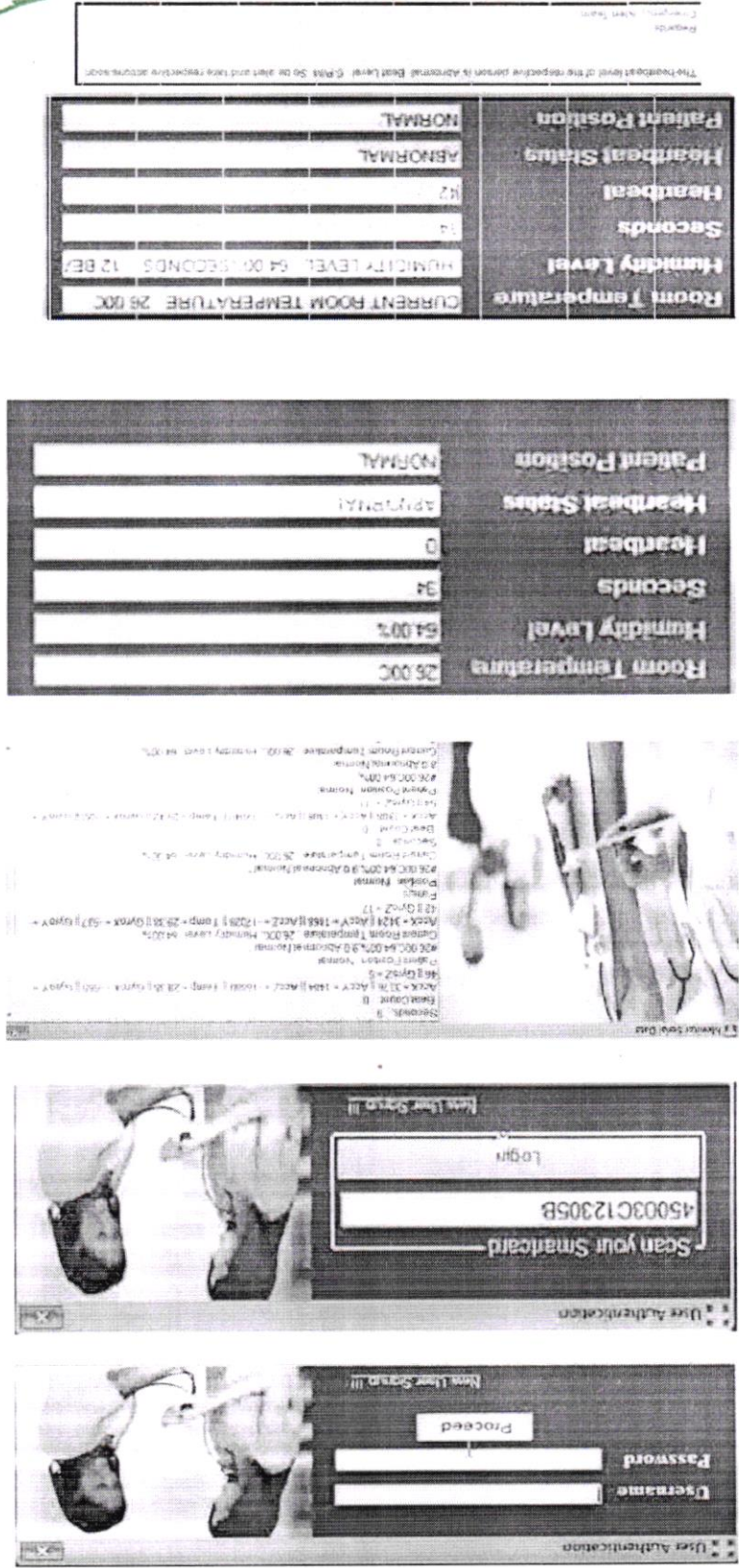


New User Registration	
RFID Number	5300E502790C
Name	GOFI
E-Mail-ID	sweta.dave15@gmail.com
Mobile Number	9099394005
Patient Age	25
Patient Weight	52
Patient Height	157
Alcohol	N
Family History	SMRUTI(SURAT)
Username	sweta
Password	*****
Address	BHAVNAGAR
City	BHAVNAGAR
State	GUJARAT
Country	INDIA
<input type="button" value="Submit"/> <input type="button" value="Clear"/>	

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Fig. 4 Deep Simulation values





Unique ID	Temp. & Humidity	Seconds	Heartbeat	Status	Position
124	26.00C, 63.00%	41	24	NORMAL	NORMAL
123	26.00C, 63.00%	41	24	NORMAL	NORMAL
122	26.00C, 63.00%	42	22	NORMAL	NORMAL
121	26.00C, 63.00%	44	20	NORMAL	NORMAL
120	26.00C, 63.00%	44	18	NORMAL	NORMAL
119	26.00C, 63.00%	51	12	NORMAL	NORMAL
117	26.00C, 64.00%	58	0	ABNORMAL	NORMAL
116	26.00C, 64.00%	0	0	ABNORMAL	NORMAL

ID	beat	hum	temp	obesity	alcohol
Min. : 1.0	Min. : 1.00	Min. : 38.00	Min. : 30.98	Min. : 14.70	Min. : 0.00
1st Qu.: 116.2	1st Qu.: 24.00	1st Qu.: 38.00	1st Qu.: 33.28	1st Qu.: 22.98	1st Qu.: 0.51
Median : 231.5	Median : 34.00	Median : 40.00	Median : 34.34	Median : 25.80	Median : 7.51
Mean : 231.5	Mean : 38.33	Mean : 41.66	Mean : 34.74	Mean : 26.04	Mean : 17.04
3rd Qu.: 346.8	3rd Qu.: 48.00	3rd Qu.: 44.00	3rd Qu.: 35.79	3rd Qu.: 28.50	3rd Qu.: 23.89
Max. : 462.0	Max. : 118.00	Max. : 69.00	Max. : 45.33	Max. : 46.58	Max. : 147.19

age	status
Min. : 15.00	0: 402
1st Qu.: 31.00	1: 160
Median : 45.00	
Mean : 42.82	
3rd Qu.: 55.00	
Max. : 64.00	

Fig. 5 Summary of Dataset

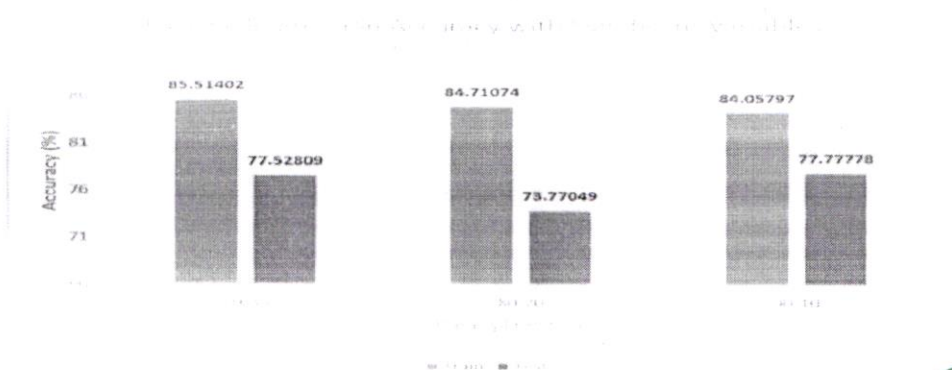
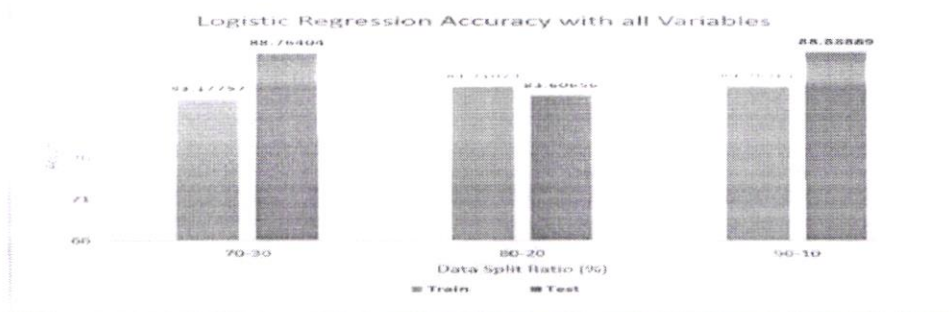


Fig. 6. Logistic Regression Accuracy (a) All variables (b) Significant variables

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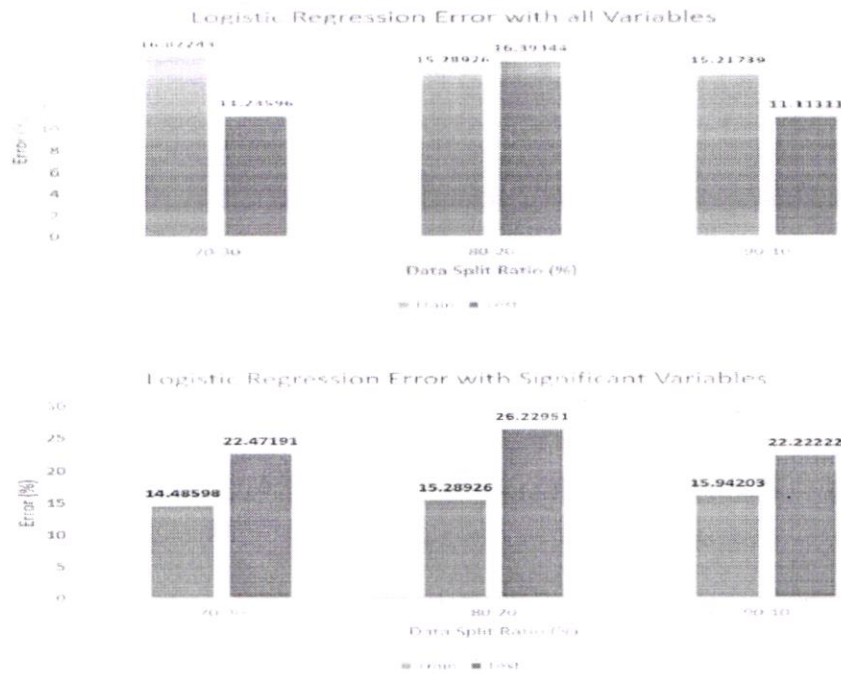


Fig. 7 Logistic Regression Error Rate for (c) All variables (d) significant variables

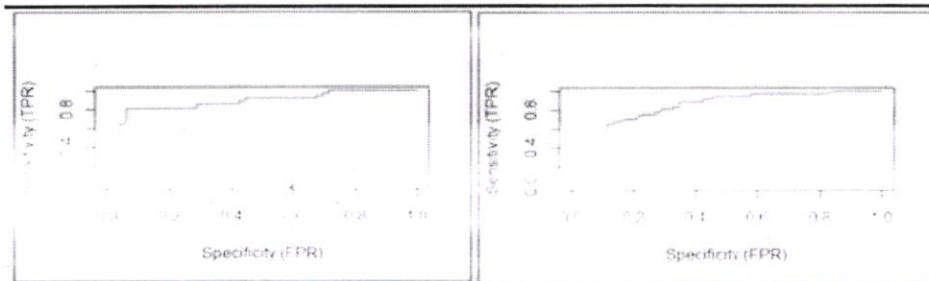


Fig.8 AUC for All variable and significant variable

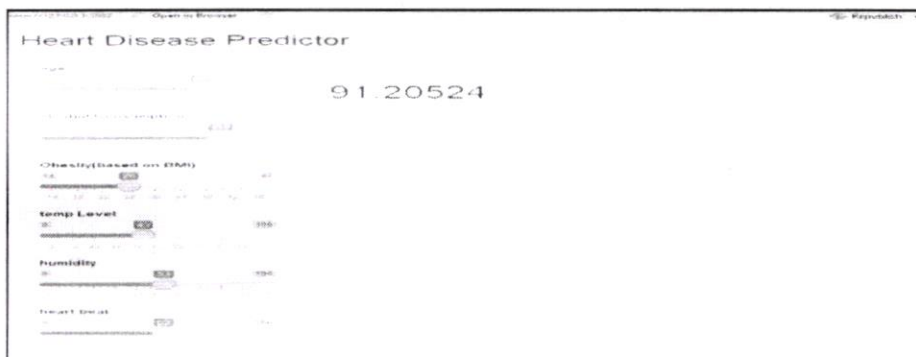


Fig.9. Prediction of heart disease based on user input



S.No	Algorithm Used	Accuracy (%)
1	Decision Tree	76
2	Association Rule	55
3	K-NN	58
4	Artificial Neural Network	85
5	SVM	86
6	Naïve Bayes	69
7	Proposed Approach	91

## 5 CONCLUSION

In order to provide a framework for the use of SHM, this machine aims to introduce a modern technology survey to the IoT paradigm. It is evident that the choice of wireless technology, which tackles the use of SHM systems based entirely on IoT, is astonishing. As the IoT era becomes more and more fashionable, a number of technologies are being developed to meet all the needs of the IoT community. A number of SHM IoT communication responses have been proposed in recent years to attach an online tool that can hear and collect useful facts. Data were analyzed based on age, duration, obesity, month, heart rate, temperature and humidity using R and the use of linear regression and tree decision analysis accuracy. In the future we can add additional parameters and add a non-parameter model to better predict and we can use KNN or any other machine learning method.

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Gunthapally (M), Abdulapurmet (Md), R.R. Dist





# Digital Anonymity Detection In Software Characterized Systems Using Onion Routing

**Dr. Shaik Shakeer Basha** Assistant Professor, Avanthi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telangana, India.

**Dr. Syed Khasim** Professor, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India.

## Abstract:

Anonymous digital tools have received extensive consideration in controlling the traffic of the opposing system, and have taken up a significant portion of online open source content. Onion Routing (Tor) is considered to be the most comprehensive process for transmitting movement information and providing digital privacy. Tor operates by digging the work with continuous transmission, which makes such a movement appear to have started from the end of the release in the form of a speed hour grid, unlike the first client. However, Tor has faced a number of obstacles in successfully completing its mission, for example, improper issuance and limited limitations. This paper outlines an anonymous digital strategy for looking at Software Characterized Systems (SCS); called SCSOR, which makes onion-directed holes over various secret societies. SCSOR Engineering empowers any cloud dwellers to participate in confidential acquisitions through Software Characterized Systems (SCS). Our proposed engineers are using the limited bandwidth and heart availability of business cloud systems to maximize the profitability of digital obscurity.

**Keywords:** Digital Anonymity, Tor Systems, Onion Routing, Software-as-a-Services, Prediction.

## 1. INTRODUCTION

Nowadays, with the rapid development of data renaming and communication structures, security and privacy have become a major concern for individuals and organizations. Two governments and private enterprises can monitor and track almost everyone who uses the Internet. Continuing in online life, our right to security is being attacked by various types of distractions. However, it is not just our defense that is revealed, that everything we say, wherever we go, and everyone we know, is targeted. Our safety is greatly questioned [1].

It is noteworthy how both governments and businesses can use our online exercise data collected in a way that will improve online drug control and predict customer behavior. Therefore, there is a new design application that helps online clients achieve greater security assurance through anonymous reading and documentation. Outstanding among the most popular online access tools known as The Onion Routing (TOR), where client movement is blocked by continuous transmission (coordinators), makes such work seem to start from the end. manual removal in the direction of onion. Instead of



exposing the first client [2]. Tor transfers are often assisted by volunteers all over the world, which is helpful in giving legal approval to related movements. Also, its reliance on volunteers also leads to counter-killing. Most Tor referrals only provide ISP links for consumer reviews with limited data transfer and extended integration inefficiency. Also, Tor hubs are freely distributed by Tor registry servers. This transparency makes Tor less resistant to oversight: Any government with a blue pencil without delay can find IP addresses for all Tor transfers and squander them. In this way, the online privacy benefit is still in its infancy of a powerful digital encryption program.

In the last few years, Software Characterized Systems (SCS), global surveillance has grown widely accepted in

the professional community and the systems management industry as it enriches the rich system management system. SCS promotes administrative work within the area of a single control system and completed scale programs (i.e., worldwide shipping) [3] covering a wide range of areas [4] (i.e., we can spread over authorized and authoritative boundaries).

Basically, SCS - in view of the onion direction, we suggest in this paper, does not need to change the basic Tor assembly. Instead, it proposes a SCS-based strategy to build a Tor-like hole in displaying well-disposed and simple control settings to achieve blurring. Clearly, this raises its own special difficulties and security concerns. These difficulties include how end clients pay (or provide withholding) access to transfers while protecting encryption, and how clients can access transfers without the inability to withstand divisive attacks.

In this paper, we propose to submit the onion management process to SCS to take advantage of larger limits, a stronger network, and a feature-level economy on business server farms. This paper shows SCS-in view onion Routing (SCSOR), which produces onion-guided holes over many secret societies and with multiple SCS, separating trust while creating green pencils that meet the high cost of guarantee. We discuss new safety measures and tools needed in such a community-based provider of healthcare.

## 2. RELATED WORKS

With the rapid and progressive development of data innovation, individuals and organizations are reaping huge profits. Sadly, all of that comes at a tremendous cost in terms of protection and security. With that in mind, Privacy and confidentiality are two different ideas. Both are a dynamic base as we explore and seek continuously, legally or not, and it is important to know why they are an integral part of our social freedom - why they are not just for the benefit of the individual, but rather the foundation for a free society [5].

We discuss security when we try to continue to comment in person, no matter how it affects the community. For example, if someone barricades the entrance to the men's room, it should not indicate that he is committing a crime or intending to control the legislature in the men's room. It is actually because one needs to be silent about this movement [6]. Then again, privacy gives individuals the opportunity to see what you do, though not always what you do. An image could be a point you should whistle to the supervisor or another SCSOR to discredit your organization without compromising your



professionalism or social status in that institution, which is often the reason for having strong resource protection laws. free publishing. The client in this case can send information privately to the web using the anonymous Tor system. This can also be called an anonymous counseling book, similar to the basic dietary procedure in our governing laws [7].

As a rule, clients prefer to keep their online identity covered for reasons that they are concerned about political or financial payments, bets, or other risks to their lives. For example, human rights activists fight against oppressive governments; informers report wrongdoing that organizations and governments need to prevent; caregivers wish their children a safe education; victims of domestic violence need to make another life without the perpetrators following them [8].

The level of systems used to ensure security is firmly identified by the combination of encryption and anonymity development. By far the most obscure strategies rely on affirming the true personality through a combination of complex strategies to follow the source and goal of the communication channel. Security risks and uncertainties can be created, under certain circumstances, due to the non-emergence of appropriate new inventions. Occasionally, these accidents can happen unexpectedly. Editing bugs are one of those images; if they are not disclosed and in some way or another all the data including client personality and information. Another scenario is erroneously set up online benefits that do not use proper encryption while partnering with customers. Customer and character information can also be compromised by the various processes offered by ISPs, which are currently deliberately focused on increasing transfer speed. Poorly trained clients can injure themselves by constantly giving their character and information without knowing the brand [9].

### **A. Onion Router Operation**

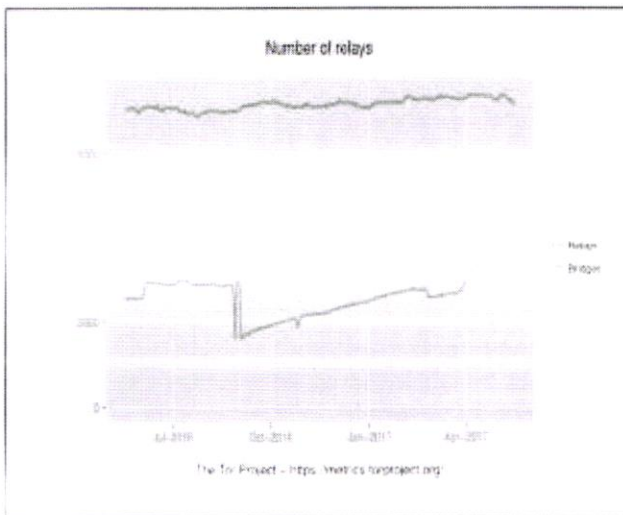
As shown by the Tor venture site [10], Tor arrangement uses a number of dedicated servers, which gives everyone the opportunity to access the Internet privately and securely. Tor, organizations find continuous visible verses instead of making a connection with the goal. Using Tor helps to maintain the identity of the customer anonymously by avoiding being traced or wearing a blue pen.

Tor is a non-profit business that includes 30 designers spread across more than 12 countries. Tor extends push to get free, simple tools, and simple tools under everyone's control. Provides an incomprehensible temporary courier installed in Tor Browser [11]. Tor introduces planning against job evaluation, a common form of online surveillance. Using motion detection connects the sender of the message to its recipient, who can reveal who they are chatting with in an open system.

Source and policy data make it easy to track client action and interests, whether the relationship is resolved or not [12].

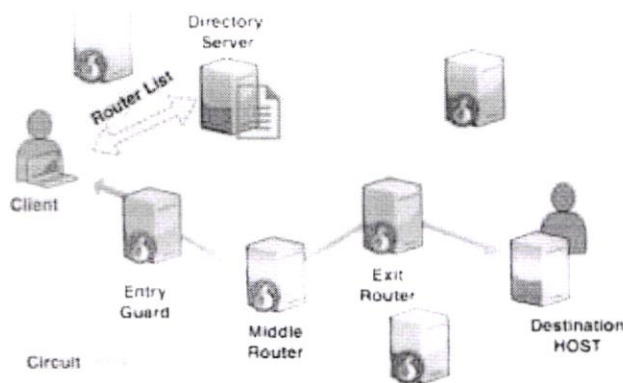
As shown by [13], Tor is an anonymous overlay program that includes thousands of volunteer transfers "Fig. 1" that provide shipping services used by a large number of clients. To affirm their personality, customers disregard their messages in many of the situations that they had previously directed through the multi-transfer cycle. Each release removes one layer of message before sending it to the next bump transfer or goal server set by the customer. In this way, the customer and the server are not connected: no single hub on the communication channel can link the messages sent by

the customer to those received by the server.



**Fig. 1.** Tor Relays and Bridges

Tor gives a anonymity layer for TCP by developing a three-jump way (as a matter of course), or circuit "Fig. 2", through the system of Tor switches. This circuit is layered scrambled like an onion directing [14].

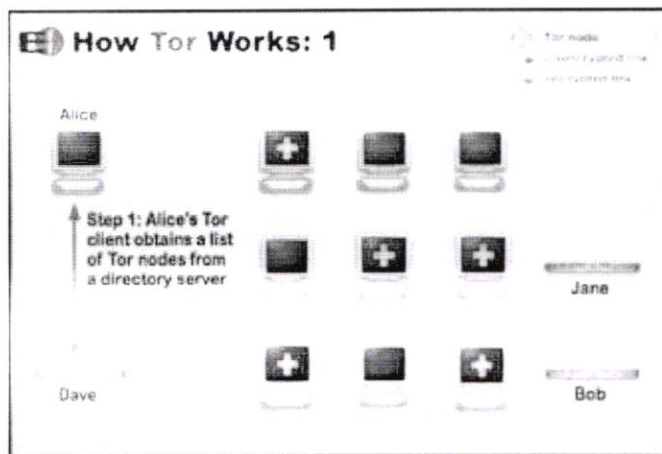


**Fig. 2.** Network Architecture of Tor Systems

Tor clients have a choice of courses in an overlay layer and implement a transparent approach through system enlargement by selecting three transfers from each open list, including category, center and manual exit breaks. Once the path is built, the customer makes a circulation stream by revealing the exit route to align with the required external internet objectives. Each transmission line is transmitted over a single onion control unit formed using the Transmission Control Protocol (TCP).

The application framework rules are based on this basic TCP integration that ensures the transfer of unstable quality information to the user, called cells, between transfers. Due to the use of bounce by-jump TCP in the system layer, Tor does not allow transfers to drop or rearrange cells in the application layer. Distribution is repeated over circuits, which are repeated over organizations [15]. Only the corridor switch can directly view the creator of a particular need with the Tor system.





**Fig. 3. Working Process - 1**

Alternatively, a vacation break can simply check your pay and decide the final goal. It does not apply to Tor change alone to anticipate the personalities of both the founder and the goal scorers [16]. One of the masses targeting Tor users is journalists, who need to pass more safely through informers and protesters. Non-governmental organizations (NGOs) use the Tor so that their professionals can communicate with their local domain while they are abroad. This allows them to have an anonymous relationship without informing everyone around them that they are working with that association. Tor allows for the reduction of the risk of both basic and complex tests by dissolving client exchanges over a few online servers with the goal that no single point can connect the client to its goal.

An idea is like using a twisted, hard way to make tracks that turn away from someone who is flirting with you. Instead of taking a quick course from the source to the goal, the bulk information in the Tor system takes the wrong path in a few transfers, see Fig. 3, which hides

client tracks so that no eyewitnesses can find out where the information came from. or where he goes. The product of the client or customer is increasingly shaping the cycle of coded organizations; see Fig. 4, using a system transfer, to create a private system via Tor.

The circuit is made with one jump at a time, and each transmission along the way determines which hand transmitted the information and which information it conveys. There is no specific issue that knows how to stream information. The sending client sets the encryption key for each circuit breaker to ensure that each jump cannot track these entities as they pass [17]. The deviation from the measurable profile attack, as far as its decision of the negligently selected three hubs is called "class guards".

  
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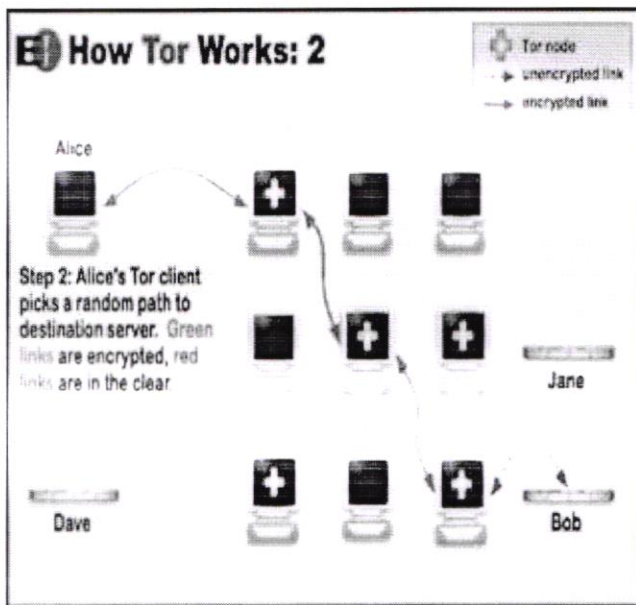


Fig. 4. Working Process - 2

At the center, the customer orders that the Tor be transferred because of its entry connect the data transfer and selectively selects the hand-off, which is likely to determine the maximum transfer capacity. In order to determine the break hub, the customer is responsible for how much of the transfer budget decides not to fill as vacancies as goal servers detect break breaks as the PC communicates with them. In the event of any misconduct identified by the goal, it will acknowledge that the break hinge is capable. Next, when selecting a break hub, the customer selects randomly (and by predicting high power transmission) among the transferors who are willing to fill as a break hub for the specific goal the customer is trying to communicate with and to manage certain communications [18].

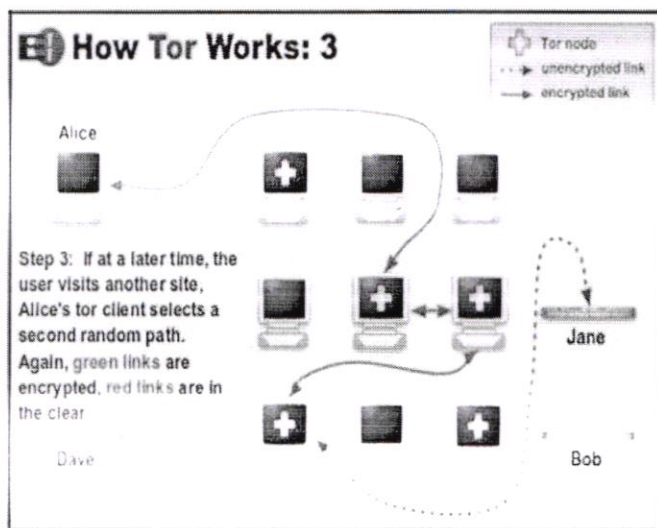


Fig. 5. Working Process - 3

### 3. SOFTWARE CHARACTERIZED SYSTEMS

SCS is a global concept of PC programming that was originally introduced as a way to deal with permissions to manage managers to design and manage profits by demonstrating low-level system

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management, see Fig. 6. SCS aims to overcome a number of confinement related to system culture, which does not meet the need for a state-of-the-art system to manage dynamic systems, for example, server farms. It separates the part of the governing body that determines where the movement is going (control plane), which appears to be directly organized, from the part of the basic framework that sends the work to the selected target (information plane) that will be cut to apply. and management systems.

The OpenFlow conference transforms into a standard operating system for SCS and displays a document agreement that allows the control aircraft to communicate with the sending aircraft. There are various agreements near OpenFlow that are accessible or made for SCS. One of the main objectives of SCS is to allow heads and system technicians to respond quickly to verifying job requirements using an integrated controller. SCS incorporates multiple SCSORs of system development that are designed to make the framework more flexible and configured to support a virtual server with a server farm base on the edge.

A few key elements of the framework promote the need for a flexible, responsive strategy to direct the movement of movement within the framework or the Internet. One of the key components is the ongoing enthusiasm in all Server Virtualization situations. In a general sense, server recognition includes server resources, including the number and character of individual portable servers, ProcessSCSOR, and operating systems, from server clients.

This scale balances hardware resources and makes it possible to split a single machine into separate, independent servers. Due to a machine crash, this shutdown and redirect server immediately starts with one device and then moves to the next with stack switching or dynamic switching. Server virtualization has become an important part of managing "massive" applications and deploying distributed computer systems. However, Server Virtualization creates different problems with the standard system design such as setting up Virtual LANs (VLANs).

System administrators should ensure that the VLAN Responsible Vision Machine is set in the same switch as the virtual server using the virtual machine. Since the virtual machine is portable, it is important to reset the VLAN each time a virtual server is deployed. Once all is said and done, the head of the system must be able to manage, install, dump, and modify assets and profiles dynamically, coordinating server virtualization flexibility. This process is difficult to perform with a standard system switch, where the reason for controlling each switch is related to the reason for the switch. Virtual in-service virtual servers address another effect of server visibility. Spreads the difference basically from a custom client server display. Usually, there is a lot of work between virtual servers, for purposes such as protecting site-friendly images and calling security forces, for example, control. This server-to-server stream changes in location and power over time, requesting a more flexible approach to managing system assets.

An additional issue that creates an urgent response to supply system assets is the growing use of mobile phone operators, for example, cell phones, tablets, and journals to acquire large business assets. The system administrator must have the ability to respond quickly to asset changes, Quality of Service (QoS), and security requirements. The system administrator should customize every vendor's gadgets specifically, and modify the performance and security parameters for each session, in each



application area. Installing a virtual machine (VM) in an expandable organization program can take hours or days for the framework manager to handle the required configuration.

This condition was identified during a computerized central processing process. In the middle of the server season, applications, frameworks, and resources are integrated directly and directly into one vendor. These parts were limited and closed, which made the development boring. OS transmits APIs that allow external providers to build applications, resulting in faster development and performance. Likewise, business planning gadgets with excellent graphics and selected control planes and equipment, integrated with the change layout. The SCS design and standard OpenFlow standard have open engineering costs where control power is extracted from the system gadget and set to intelligent control servers. This structure provides a strong foundation for being busy with operating systems and management and in addition empowers the system to be addressed as a logical unit.

Figure 6 shows the consistent structure of the SCS, in which the central flight plane combines capabilities, including systemic immunization, steering, and safety testing. This aircraft forms the SCS Control Plane, and contains at least one SCS control. In Control Plane, the SCS Controller is responsible for introducing the controls of the transmissions to the Data Plane. After the controller has determined whether the connection is approved by the system system, it allows each channel to bypass the system, calculates the path to be taken by the system, and assigns a stream to all switches accordingly. The use of mind-boggling power-packed switches on the controls actually counter the distribution tables change which verses can be filled by the controller.

#### 4. SOFTWARE CHARACTERIZES SYSTEMS BASED TOR SYSTEM

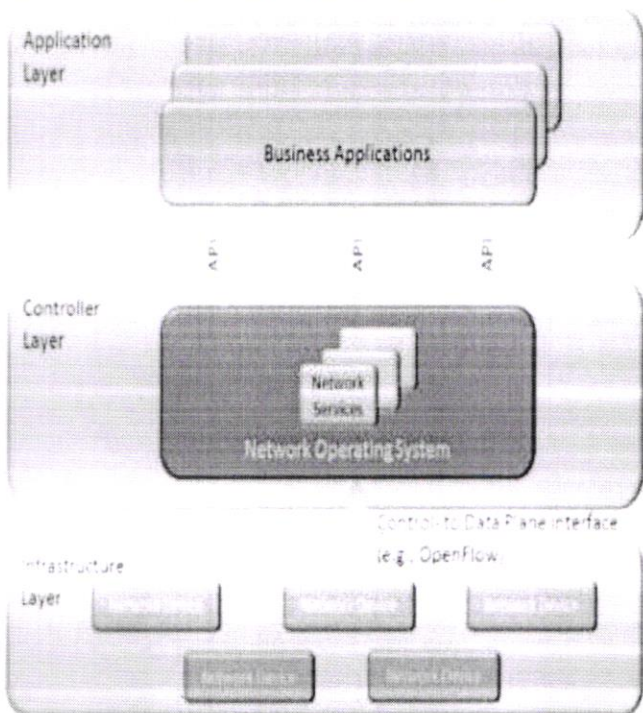


Fig. 6. Logical Operations of SCS using Onion Routing

As specify in segment II-A, Tor transfers are facilitated by volunteers, who frequently offer associations with poor idleness and unimportant data transmission limit. Then again, SCS deals with a considerably bigger number of top notch, high-transfer speed controllers and switches. We

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introduce SCS-in view of onion Routing (SCSOR), which

manufactures onion-directed passages over different anonymity specialist co-ops and through numerous SCSs, isolating trust while influencing blue pencils to encounter substantial guarantee to cost. We talk about here the new secrecy arrangements and components required for such a supplier based biological system and present our primer plan of SCSOR.

On a very basic level, SCSOR does not need to change the fundamental Tor convention. Rather, it proposes a way to set up Tor-like burrowing in a more market-accommodating and simple administrated setting of secrecy administration and SCSs. This raises its own specialized difficulties and security matters. These difficulties incorporate how end-clients pay for (or be unreservedly offered) access to transfers while saving anonymity, and how customers can find transfers without being helpless against parceling assaults.

SCSOR isolates the part of working anonymizing transfers (by alleged secrecy specialist co-ops, or ASPs, which incorporate SCSOR-Controller and SCSOR-Switch) from the real SCS Providers (SCSPs) that deal with the framework. These ASPs lease VMs, run anonymizing controller and transfers in these VMs, and acknowledge cryptographic installments (tokens) from clients in return for handing-off their activity. These tokens have the cryptographic property that it is difficult to connect the buy of a token with the recovery of the token, which keeping ASPs from figuring out which client reclaimed a specific token. ASPs could likewise acknowledge tokens issued by different ASPs. Two stages outline SCSOR's utilization of tokens.

To begin with, customers engaged with the way toward getting tokens and taking in the arrangement of transfers in the organization. Second, customers frame an onion-steered circuit by recovering their preferred tokens at the transfers, which will be utilized as a circuit for unknown correspondence. Given the stages' distinctive security concerns, SCSOR is made of two separate transfer organizes theoretically: The first is the bootstrapping system grants clients to protect secrecy when beginning to utilize SCSOR.

A client can use this system to guarantee IP security while getting tokens, procuring index server data, and beginning an underlying circuit. At first bootstrapping system does not expect tokens to utilize its transfers, in light of the fact that a client does not have tokens. Be that as it may, it must be utilized to get to SCSOR catalog and token servers, and not the more extensive Internet, to counteract manhandle. The second system

is the information connect with High-transmission capacity, low-dormancy arrange through where clients can namelessly get to the Internet. To add another hand-off to a circuit, the customer exhibits a substantial token to the hand-off, which allows the client transitory access (regularly metered by devoured data transmission). The client rehashes this procedure different circumstances to assemble the full circuit.

As noted in section II-A, Tor transfers are made by volunteers, who often provide a combination of inactivity and non-essential data transfer limits. Then again, the SCS deals with a very large number of top notch, high transfer speed controls and switches.



We introduce SCS-in view ofion Routing (SCSOR), which makes onion passages over the co-op of various anonymous specialists and with multiple SCS, separates trust while influencing green pencils to meet the high cost guarantee. Here we talk about the new arrangements and secrets needed for such a provider-based biological system and present our first SCSOR program.

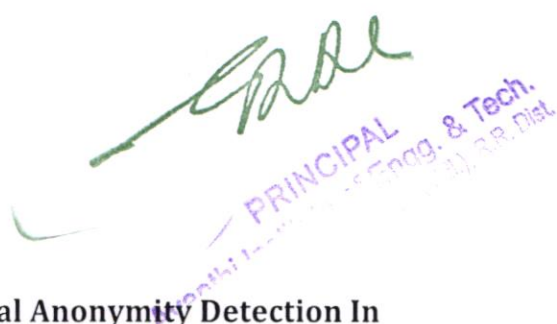
At the basic level, SCSOR does not need to change the basic Tor assembly. Instead, it suggests how to set up a Tor-like hole in a market-friendly and easy-to-manage privacy management system with SCS. This raises its special difficulties and safety issues. These difficulties include how end-of-end clients pay (or withhold resilience) access to transfers while maintaining anonymity, and how clients can receive referrals without having to help themselves in dealing with parcel attacks.

SCSOR distinguishes part of anonymous transmission (in collaboration with secret professionals, or ASPs, including SCSOR-Controller and SCSOR-Switch) to actual SCS providers (SCSPs) that work with the framework. These ASPs lease VMs, use anonymous controls and transfer to these VMs, and accept cryptographic installments (tokens) from customers as compensation for providing their services. These tokens have cryptographic properties that make it difficult to link token purchases with token acquisition, which keeps ASPs from finding out which client has returned a particular token. ASPs can also accept tokens issued by different ASPs. Two sections outline the use of SCOR tokens.

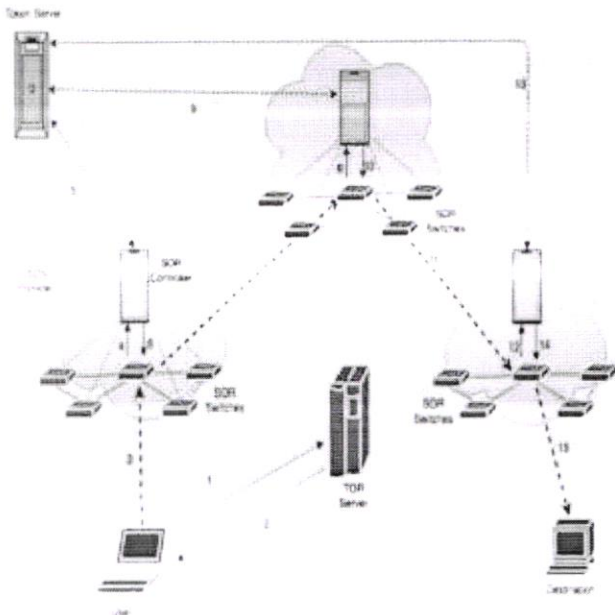
First of all, customers are involved in the process of acquiring tokens and taking over the organization's cash transfer system. Second, customers install an onion-based circuit by returning their favorite tokens to the transfer, which will be used as an anonymous communication circuit. Considering the different security concerns of the categories, SCSOR is made up of two different forward-looking solutions: The first is a bootstrapping system that provides clients with privacy protection when they first use SCSOR.

The client can use this system to ensure IP security while receiving tokens, receiving index server data, and starting

a basic circuit. Initially the bootstrapping system does not require tokens to use their transfers, because the client does not have tokens. However, it should be used to access the SCSOR catalog and token servers, not the wider internet, to combat manhandle. The second system is information linked to High-transmission capacity, low-dormancy planning where clients can access the Internet without a name. To add another release to the circuit, the customer shows more tokens on the release, allowing the client temporary access (usually measured by the transfer of hot data). The client revives this process in different contexts to cover the entire region.







**Fig. 7. SCSOR Process and Implementation Diagram**

Figure 7 represents the SCSOR database, where the client sets the circuit with a transmission supervised by SCSOR controllers and switches, comprising the crossing SCS used by various providers. As in Tor, client information will be bumped into an onion attached near the circuit, to keep the client anonymous from the transmission it is using, SCS skipping it, and other system interfaces that it can resist.

## 5. SYSTEM DESIGN

This section sets out points of interest for the proposed SCOR program. First, we examine the process by which clients contact ASP catalog servers to determine SCSOR transfers. Next, we analyze the properties of SCSOR tokens and their distribution methods. Finally, we check the verification and components of receiving SCOR transfer tokens.

### A. Restoring the SCOR catalog

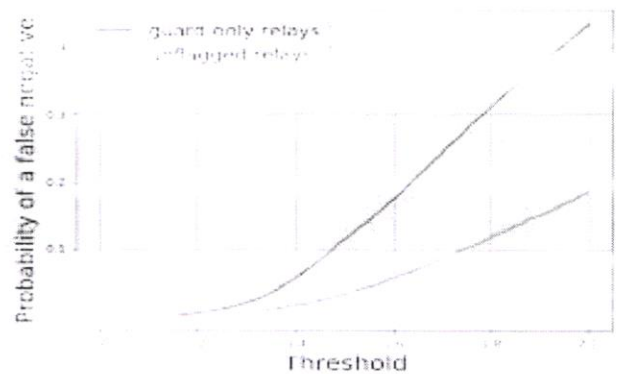
Before a client can build a SCSOR circuit over the transmission of various ASPs, the client must receive a possible transfer from the ASPs' catalogs (Tor) (Fig. 7 - Steps 1 and 2). Catalogs managed to follow the SCSOR Hubs accessible ASP provided. Any client can access the entire Tor catalog at any time due to the fact that the Tor references are open. This makes the hubs in these indexes less effective against blocker-based IP address configuration.

In the event that the client receives a SCSOR reference, it will not receive the entire list of accessible harps, but only a fragment of accessible harbors. Sadly, this program poses a new threat. Consider the status of a retrieval registration server. With SCSOR indexes recently retrieving a small portion of the integrated hub list, the return catalog server can focus on each client (or, in particular, the client's online address) and send that client something simple and easy to distinguish handwriting. -accommodation.

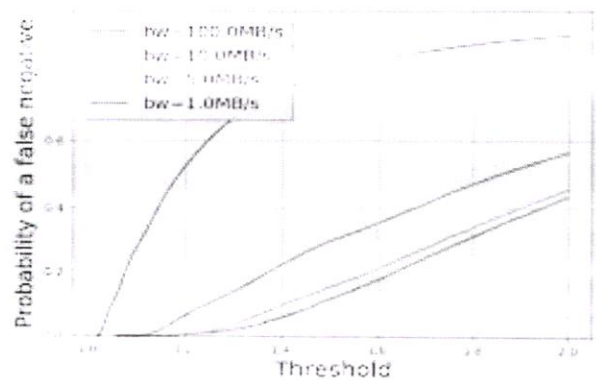
The proposed response to avoid this SCSOR attack sharing, the acquisition of registration within SCSOR faithfully takes place through a SCSOR circuit that sets the real client character by anonymous access. Initially, if a client does not have a SCSOR circuit configured in the information system, the client can use the supposed bootstrapping system to create an anonymous circuit and restore the registration list. Using bootstrapping get, Any client can contact the register and request a transfer of bootstrapping without giving a token. The client adds a bootstrap hub provided in the circuit and then links to another catalog with this hub. This process is updated until the client has fully built his bootstrapping circuit. The client through these lines is increasingly producing its circuit. Once the cycle is complete, the client can purchase tokens or return the catalog to process the information.

### B. SCSOR Token strategy

SCSOR tokens provide the client with the means to access a predetermined timeframe and exchange rate. It can be killed with Chaum's blind system [10]. The client sends an invalid blind nonce to the token server to purchase or usually to receive the token. The token server responds with an invalid nonce symbol while not determining its identity. While retrieving the token, the client proceeds to a non-marked nonce in the token server, which after confirming the token and the way the nonce has never been used, allows the token and, in the meantime, adds the nonce to the rundown of used nonce. Since each blind token can automatically generate the

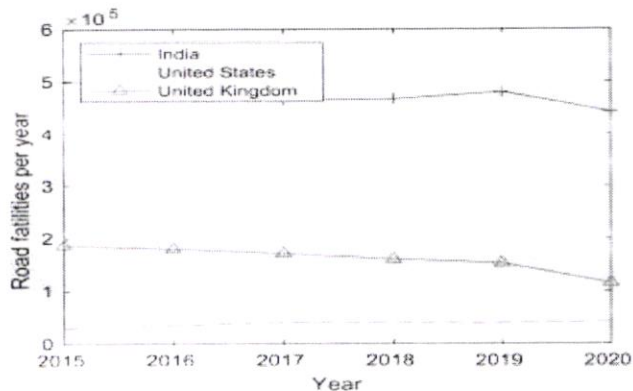


official mark of one nonce, and the token server holds the list of used nonces, it is ensured that the token must be used once. Thus, the client is assured that the security is protected because it is computer-assisted for the token server to be accompanied by a disagreement when the customer receives a token with a marked token given during token retrieval. Previous recommendations such as XPay [9] and Par [20] provide more confusing programs than those required by SCSOR. XPay holds small payments, within Par, awaiting independent national bank, none of which applies to SCSOR. All Bitcoin exchanges, respectively, are logged and excluded from Bitcoin editing, making Bitcoin unsuitable for use as a token. In any case, Bitcoin can be used as a currency to buy tokens, just like any other currency the token server decides to accept. Then, as we speak, one of the biggest surprises is the distribution of SCSOR tokens while keeping the blurring. Working in ecash is based on the use of anonymous channels. It uses any token server principles it thinks are important, tokens may be distributed to customers. However, most token servers will authenticate the client in some way before issuing the token token. For example, ASPs may need to secure client relationships with the organization they are



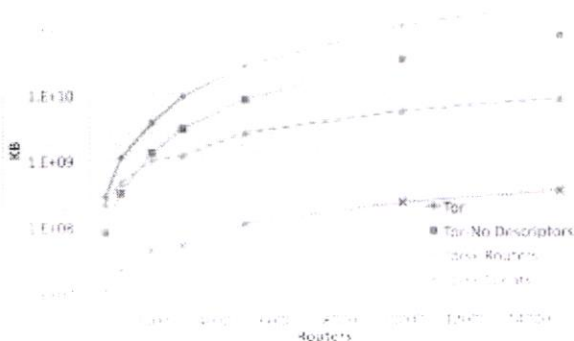


looking to give them free access to. Alternatively, they may need to ensure that the client transfers the installment. Regardless, if the domain address used during token purchases is the same IP that will be used when accessing SCSOR, ASP may retrieve the client's name when the token is recovered. We can accommodate this attack by ensuring that every token server entry is done through SCOR. If the client does not approach the SCOR transfer within the planning information from now on; e.g., working with SCSOR other than blue, he can access ASPs through the bootstrapping system.



### C. Relays Verification

Before the client begins a relationship with the SCSOR transfer, the client must present the SCSOR token to which it is issued (Fig. 7 Steps 4 8 and 12). The instant transfer immediately affects the token server, which issued the token to check its validity (Fig. 7 Steps 5, 9 and 13). Once the token is verified, access is allowed to the client on that transfer in accordance with the terms set by the ASP, at the closing rate.



eventually suspended, we think these attacks can be monitored.

## 6. CONCLUSION

In this paper, we propose to investigate, opportunities to use a branded system (SCS) to organize anonymous regulatory frameworks. Such tools have drawn considerable support in supporting hiring structures against monitoring and evaluation work. Onion Routing (Tor) is considered the most common form of non-employment and to provide digital privacy. However, Tor faced an obstacle, for example, a lack of execution, and insufficient limit to achieving its goal. Additionally, Tor movement is not easy to make a square, screen or blue pencil, as Tor transfer is turned on. This paper introduces SCS-in view of Onion Routing (SCSOR), which creates onion-driven holes over co-ops of various secret experts. SCSOR Engineering empowers any cloud citizens to take an interest in private profit through Software-Defined Networking (SDN). Before a client conducts a SCSOR circuit over the transfer of various professional organizations (ASPs), the client must receive a possible transfer from the ASPs' catalogs (Tor). Such catalogs are bound to follow the accessible SCSOR Hubs of ASP provided. To be able to use SCSOR harps, the client needs to receive a SCSOR Tokens donation to access the harp with pre-defined length and exchange rate. Immediate transfer immediately affects the token server via SCS control to authorize the token. Tor SOR transmissions, unlike

Tor, are available in two officially open circuits: an active ASP, and an SCS server (SCSP) with authorized access to the virtual machine (and hypervisor of the virtual machine). SCSOR Engineering hopes to use the growing limit and robust availability of business cloud systems.

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## **Iot Enabled Health Monitoring Using WBAN Sensors In Non-Invasive Remote Environment**

**Dr. Syed Khasim<sup>1</sup>, Dr. Shaik Shakeer Basha<sup>2</sup>**

<sup>1</sup>Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India.

<sup>2</sup>Department of Computer Science & Engineering, Avanthi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telengana, India.

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### **Abstract**

The WBAN (Wireless Body Area Network) (inside and outside of the human body 1-2meters) is used to develop intelligent health care systems that predict unusual conditions Pre-Hand by sending alerts to caregivers / users who monitor information according to a doctor's prescription by prescribing prescribed medications, with non-invasive sensors (SP02, ECG, Heart-Rate, Temperature and Gluco meter) connected to Arduino. Data from the sensor is digitized and transmitted to a physician using Zigbee data analyst using the Raspberry Pias laptop computer and adapts to health conditions (using regular / unusual switches). Using Bluetooth sensor data is sent simultaneously from sender to user and received via built-in Bluetooth. Module on cell phones and is displayed in the APP. Procedures include hearing data, transferring it to a doctor and receiving data in the APP to which the doctor and patient are connected. Hardware modules focus on size, cost and non-abrasive non-invasive wearable. Python and Embedded C are pre-requisites for the Raspberry Pi system and Arduino boards.

### **Keywords**

IoT, WBAN Sensors, Arduino UNO, Non-Invasive Remote Environment, Prediction.



## 1. Introduction

Health is a very important factor and exercise and good health make us more susceptible to infections, which helps us to live healthier lives. The development of various technologies has greatly contributed to the growth of health-related Smart Technologies [1] to overcome the modern challenges of visiting a doctor for regular checkups. BAN (Body Area Network) is a special purpose network that is used internally and externally (1-2m) in the human body helping to provide real-time updates by transmitting information to the recipient [2].

WBAN (Wireless Body Area Network) Architecture is divided into three categories such as Intra-BAN, Inter-BAN and bridging Inter and beyond BAN communication. Intra-BAN connects body sensors to a personal network; Inter-BAN connects servers and multiple access points. Outside of the BAN closes the gap by transferring information available on the website and doctors can access it, without previous records in files. In remote monitoring time-saving and early diagnosis is made [3]. With the Android APP (popular mobile OS) user who sends data via Bluetooth, Physician interacts using the Raspberry Pi receiver as an APP interaction and the patient can be notified of any abnormalities or health conditions [4].

A study at Prevention Control recommends exercising or doing aerobic activities to maintain a healthy lifestyle. Figure 1 shows the HealthCare division where you include a real-time Mobile / PC monitor and wearable includes sensors as part of bloodless data collection. The ultimate goal of building a portable, painless and effective device for measuring Glucose is a matter of concern today.

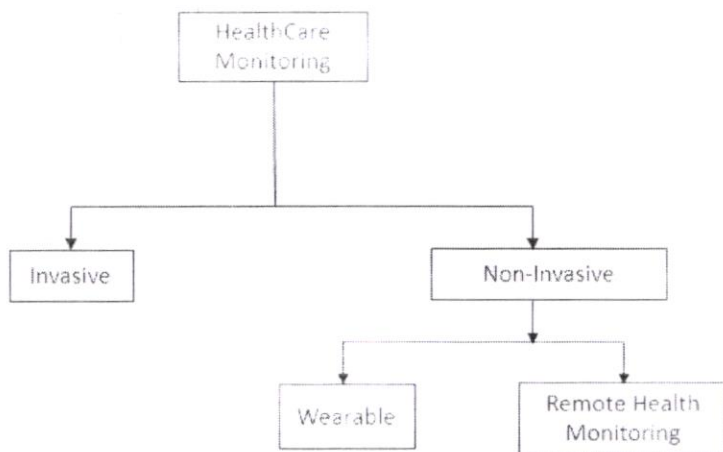


Fig.1 Classification of HealthCare Monitoring Systems

A summary of various techniques using sensors, computer technology and intelligent information processing is used in BSN which is part of WSN. Non-invasive (i.e.) nerves are used without blood precision and reusable. Rarely recognized at advanced levels for information transfer and business monitoring [5][6]. The sensors communicate and send information in real time and in an emergency - emergency help is needed for health care managers. Models can be analyzed using FFT conversions and drawn with drawings. Wi-Fi, IoT is used as the central node for long-distance communication [7, 8]. Monitoring suffers from intensive care by collecting signals from the node.

NRF24L01 + connects between Arduino boards and displays signals in Lab VIEW. Upon receipt of the data, the user may receive approval. With the use of the HTTP protocol a physician can also view data on his or her computer, each patient having his or her own data pipeline, with a unique id [9]. Focuses on low power consumption, long battery life, power harvester (RF) are used to charge the battery during standby but protection against overload is required [10].

The non-invasive glucose level uses a Near Infra-Red vision system where the selected NIR light absorbs glucose and fat than other body fluids. It is based on the PPG method that determines the amount of sugar in the blood by the intensity of light passing through the skin by getting a reduced light passing through the finger [11][12]. Diabetic blood sugar levels are converted to voltage and signal condition is created to remove noise and improve signal quality. At 940nm the intensity of the IR wavelength is present and glucose absorption is high [13]. Living cells and body fluids shine at a wavelength 700-1100nm. The NIR helps absorb glucose without body fluids, reducing interference [14]. The tissue viewing window is used to determine blood sugar levels. The glucose molecule  $C_6H_{12}O_6$  has bonds of C-O, O-H and C = O. Other infra-red methods Raman Spectroscopy, Photo-Acoustic Spectroscopy, Polarization and Light Scattering include less common techniques [15].

### 3. Methodologies

#### 3.1 Invasive Methods in Hospitals

The existing invasive methods in hospitals to measure health limits are difficult to use and make them larger while others require analog values. Electrodes with gel pads (12 lead) use ECG waveforms and the doctor performs analyzes on measurement and rhythm. Adhesive tracts are attached to the body area of the limbs or chest and the other part has cords to connect to the monitor.

To measure oxygenated blood or periphery capillary oxygenated saturated blood adhesive is placed near the patient's nose and the amount of respiration and oxygen can be measured. For example Nasal Alar was approved as a nose ring worn by patients. Heartbeat no machine used.



Place your index and middle fingers in your coronal artery near the neck and count the number of beats for 10 seconds and multiply by 6 to get your heart rate / heart rate up. Temperature measurement is performed with an invasive digital thermometer as it needs to be placed in the mouth or armpit to measure body temperature or temperature and is measured in a centigrade of Fahrenheit. The arithmetic formula is calculated by  $(^{\circ}\text{C} \times 5/9) + 32 = 32^{\circ}\text{F}$ . Metal may ige. Normally measuring glucose or blood sugar levels takes extra time to inject into a vein and take a few liters of blood and then report on post-parent blood sugar levels and fasting which may take 1 day to provide updated reports.

### 3.2 Non – Invasive Methods for Monitoring Healthcare

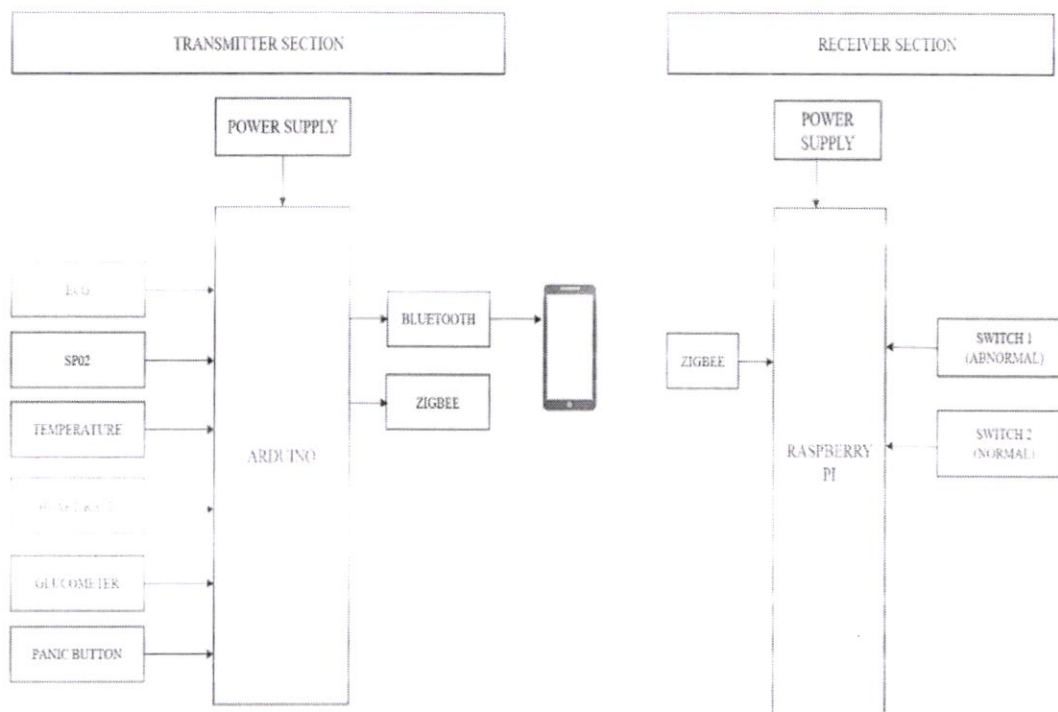
Sensors are also called detectors as a tool that measures the measuring attribute and converts it to a signal read by an observer. Different types of sensors are classified as active (require external power supply such as Photovoltaic cell) and passive (no need for power supply such as radiometer). Sensors should show accuracy, repetition, low cost and should be within measurable limits. With PPG technology, between the Infra-Red LED Transmitter and the Photodiode receiver finger is placed and the receiver absorbs bright light, both operating at 5v. Selection of sensors is very important and should be kept away from moisture, otherwise even a small error can cause an error.

The ECG uses the PPG Technique and is measured by BPM and varies between 60-100. A clip containing IR LED and Photodiode with control. circuit based on LM358. Transmission or light sensor can be used when in the first part the light source and the detector are placed facing each other while at the end they are placed close together. The other ECG includes a 8232 module but has an invasive pad so it is avoided. Heart palpitations are two types of rapid heartbeat that occur when the heart fails, Palpitations. Bradycardia called neutral pacemaker occurs when oxygen-rich blood is transfused into the body. The SP02 sensor provides the level of periphery capillary oxygen saturated in the blood. Concentration and Absorption have a direct relationship. Oxygen in the blood depends on the state of health. the respiratory rate of oxygen.

For example if a person has 98% of SP02 each RBC each has about 98% oxygen-rich blood and 2% oxygen-free blood. For insufficient oxygen is less than 85% and for the average adult 95%. Temperature consists of a sensory element enclosed in a plastic or metal housing and the sensor indicates a change in natural temperatures. In the normal human body it is 98.4°F and fever status > 98.4°F. Hib body temperature is controlled by thermoregulation which helps to maintain a normal body temperature.

The LM75 is also designed to work only with Raspberry on the transmitter but we use Arduino on the transmitter so to use it we need ADC and Raspberry which makes it bulky. Heart rate / Heartbeat is used as a plug and plays with audio cancellation and has 3 PINs (Input, Output and ground). The value shown to the receiver is measured in terms of

electricity and using linear regression analysis the mathematical equation can be used to convert the current into electrical energy and by the absorption and wavelength we can set the graph which means if glucose is high energy. It is usually measured in mg / dl. It is also helpful as the fingers are chosen as a test area that makes them easy to access.



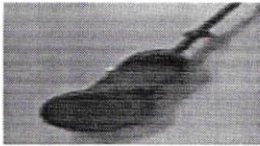



**Fig.2 Transmitter and Receiver Section**

The sections in Figure 2 of the analog are converted to digital signals ADC built-in data is transmitted via Bluetooth (<10 mts and 8 nodes per network) and Zigbee (75-100 mts with a limit of 255 nodes per network) simultaneously. In Phase 2 the physician analyzes and monitors the patient using the Raspberry Pi as a laptop (OS - 1GB RAM) and in rare / Normal cases sent via APP so that patients can see their results and take appropriate safety measures.

In an emergency, the alarm button that when pressed GPS location on the phone is sent to the doctor via APP to be sent to the patient's ambulance is taken in time. As monitoring and distance to the imaginary Wi-Fi or IoT can be used for long distance transmission. The app can be built using the Android studio and sold through Google Play. When the Android OS upgrade is updated to have new features and feasibility. It is an open source that allows you to build and test and has a drag and drop theme that makes it easy to integrate into the cloud with APP Engine. Due to the easy aging and small size these modules are selected. Arduino is used when a recurring action is required and converts the ADC signal into electricity. Open source also has GPIO PINs that use a minimum power of 40mA.

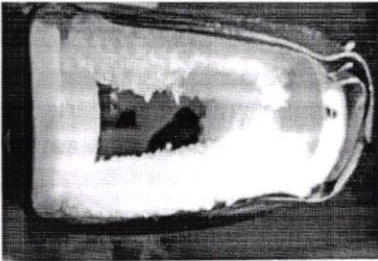


**Table 1. Comparison Table of Existing and other Non-Invasive sensor Technologies**

<b>Invasive Methods Disadvantages</b>	<b>Sensors (Non-Invasive) Figures</b>	<b>Sensor features and advantages</b>
<p>Holter ECG Monitor AD8232 Invasive gel pads with patches with single lead may slip if sweat is formed and patches with electrodes need refrigeration CG machines need to be carried along to check the waveforms.</p>	<p>ECG (clip usually paired with LM385 control circuit).</p> 	<p>Compact Size, 5v, -40°C Operating Temperature, DIP Package..3v, LM385 has a temperature of 0-70°C.</p>
<p>Per fused index if lowered is monitored using disposable nose adhesives but alternatively a stethoscope is needed if sufferer has cold.</p>	<p>SPO2 (XANEOXYM3444)</p> 	<p>5v, inbuilt amplification and circuit for noise elimination. Sensors such as clips for adults and wrap sensor for infants are used.</p>
<p>Thermometer, Thermocouple, RTD and Thermistor 1. Non-Linear 2. Limited stability 3. Sensitive 4. Self-heating</p>	<p>Temperature(LM35)</p> 	<p>60uA, No extra calibration, Tolerates -55 to 150°C, Temperature is calibrated in Fahrenheit or Celsius coating prevents heating.</p>
<p>Self-analysis wrist Pulse and beats can be found in 15 seconds.</p>	<p>Heart-Rate (XD -58C)</p> 	<p>1. 5v,4mA,inbuilt amplification circuit 2. Noise suppression circuit 3. Readily available sensor</p>

The Raspberry Pi Model 3B + is a small-sized computer used for high-performance 1GB data storage OS for SD card, 1.4GHz clock and 0-50°C temperature and CSI port for connecting and A VGA doctor can call patients on video for regular check-ups in the future. Each patient has his or her unique ID stored on a website that eliminates the need for instructions.

**Table 2. Optical/Non-Optical Non-Invasive Glucometers Technology**

Invasive Methodologies and its Disadvantages	Sensor (Non-Invasive) Features and its Advantages	Disadvantages of the Other Optical Technologies
<p>Accu-check meter or disposable syringes like micro needle techniques painful, Causes anemia and pricking damages skin. Longer time for analysis.</p> <p>Blood samples have to be measured either intermittently or continuous period.</p> <p>Minimally Invasive Implantable sensors like laser induced micro pores, Sonophoresis, Reverse Iontophoresis</p>	<p>Optical Methodology – NIR Spectroscopy (940nm)</p> <p>NIR based glucometer operating at 5v, with faster and painless detection.</p> <ol style="list-style-type: none"> <li>1. PPG technique uses Near Infra-Red penetrating more than 95% than other optical technologies without affecting pigmentation and has greater sensitivity and offers accuracy.</li> <li>2. Signal conditioning circuit is used to eliminate noise and errors caused by slight movements.</li> <li>3. Direct proportionality can be obtained, as voltage increases glucose concentration also increases.</li> </ol> 	<p>on-Invasive Optical Technologies</p> <ol style="list-style-type: none"> <li>a. <b>Olarimetry</b> Eye's retina is used as a measurement site but direct light when focused may cause eye irritation, infections and sensitive to changes with a lag time of 30 minutes.</li> <li>b. <b>Aman Spectroscopy</b> Needs longer stabilization time, spectrum deviates owing to unstable laser wavelength and velocity, low SNR.</li> <li>c. <b>Reverse Iontophoresis</b> Minimally invasive, inconsistent, causing irritation and skin ruptures (tattoo-like device) and may slip off easily due to moisture.</li> <li>d. <b>OCT (Optical Coherence Tomography)</b> Sensitive to motion and temperature changes, tissue in homogeneity.</li> <li>e. <b>Illumination/Fluorescence technology</b> Short lifespan, permits pH to change and auto fluorescence, toxicity increases when foreign</li> </ol>

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		material enters biological media. <b>f.</b> NIR Goes into only a few micrometers, strong water absorption, reflects more because of poor penetration. Non-Optical Techniques <b>g.</b> Bioimpedance and Metabolic Heat Confirmation Techniques Longer calibration times, sensitive to motion, sweat and temperature and are bulkier.
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In the v

Sensors are used by general caregivers and physicians so that you can hear from a distance. Modern technology sensors make rapid and easy advances in data transfer easily. Table 1 of the comparison shows the comparison of existing sensory technology with non-insane ones. Table 2 shows glucomers using a variety of methods. Sites most targeted for fingers due to congestion of thin hair and nerves and clips.

#### 4. Conclusion

The aim is to monitor glucose levels using NIR Spectroscopy which is a non-invasive method to measure blood sugar levels. NIR spectroscopy is effective and accurate compared to other technologies. The Assembly probe is covered with closed tape to block outdoor light; the cost ratio is relatively low compared to today's invasive equipment on the market. It is advantageous compared to traditional methods such as the absence of metals, self-help and a friendly environment without the disposal of waste and the slightest error compensation for accuracy. Compatible sensors such as the accelerometer sensor, blood pressure and BMI sensor can be added if precision can be reached making it more functional and dressed as you wish. Helping yourself with the panic button reduces wasted time to find space and ambulances are organized using GSM.

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## Web Cross-site Inference Attack Detection and Avoidance using Defense Convolution Neural Network in Sensory Networks

Dr.Shaik Shakeer Basha<sup>a</sup>, Dr.Syed Khasim<sup>b</sup>

<sup>a</sup> Assistant Professor, Department of Computer Science and Engineering, Avanathi Institute of Engineering & Technology, Gunthapalli, Hyderabad, Telangana, India.

<sup>b</sup> Professor, Department of Computer Science and Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, India.

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**Abstract:** The accelerometer and gyroscope motion sensor-based pass-web page detects attacks that may endanger the security of many mobile web clients, and measure the level of efficiency. Attack as a standard multi-stage problem also creates an imaginary framework that trains the phase within the training phase and predicts a new consumer input into the attack phase. To make the attack more robust and realistic, to design unique strategies and address quality data and conditions that require data classification and to conduct experiments to evaluate the impact of the use of invasive data protection techniques to reduce the accuracy of assumed attacks. The results show that researchers, smart phone companies, and app developers are paying close attention to cross-site-based motion sensor attacks, and begin designing and implementing powerful defense strategies.

**Keywords:** Web cross-site, Inference Attack, Defense Method, Convolution Neural Network, Sensors

### 1. Introduction

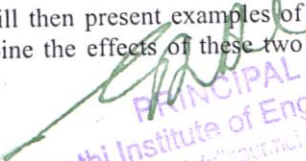
Network security The security provided by the network to unauthorized access and risk. It is the responsibility of the network administrator to take steps to prevent the production of their network from potential security threats. The most common and simple method of protection a network device by providing us with a unique name and associated password. Smart phones have been heavily targeted for computer crashes and their sensor has created new threats for attackers to compromise user protection and privacy.

The moving sensors will be used as separate channels for attackers to detect sensitive customer keyboard tapes on smart phones. Such a suspected attack may be due to the fact that the sensor records are constantly associated with user tap behaviour and keyboard layout. Some researchers have found that the task of simultaneously differentiating between many sounds becomes increasingly difficult when it involves listening to human speech apps on smart phones, but their dangerous, focused, and complex models are one of our kind.

While the attack on the ideas posted can be done by using malicious native applications, they can be further exploited with the help of malicious WebPages to anticipate the damage to mobile Web customers [1] who engage with WebPages on both mobile browsers or Web View [2][3] native applications. For each iOS and Android application, JavaScript code in standard WebPages can scan to capture device movement events and gain access to motion sensor statistics. These motion sensor statistics acquire access no longer require a person to explicitly grant any permission, install any software program, or perform any configuration. It can even be done from one site to another in the latest versions of other mobile web browsers.

Accelerometer and gyroscope motion sensor based on site intrusion that may endanger the security of many mobile web users, and limit their performance. Accelerometers and gyroscopes are optional sensors for acceleration and rotation information on drones, cell phones, cars, airplanes, and IoT mobile devices. However, both accelerometers and gyroscopes tend to have errors, including noise and erosion, respectively, which require designers to use new methods to achieve complete accuracy [3].

One of these methods involves the integration of nerves. This article will examine the accelerometer and gyroscope independently to determine how these sound and drift errors occur. It will then present examples of each type of sensor and demonstrate how to use Fusion sensor techniques to combine the effects of these two sensors and minimize the impact of these errors.

  
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## 2.Related Works

The first category is based on hardware simulations, such as keys and integrated keys. Individuals are guaranteed on these access control systems only if and when the key blade is the same as the key lock or the correct number sequence of integrated locks is dialed. Due to the apparent limitations of equipment integration systems, they are insufficient to meet the requirements to ensure control of access to critical infrastructure. On the other hand, and it is very difficult to constantly change the internal structure of such similar mechanisms to improve security [4][5].

Another validation component of access control systems is electronic verification that includes barcode, magnetic line, biometrics and more. Compared to similar mechanical authentication, electronic verification like RFID-based smart card offers greater comfort and greater flexibility for both controllers and users of access control systems. However, it still has the same problem of losing the key as the verification is based solely on the coded ID data on the card. Anyone with a card will be given access and system security may be at risk [6][7].

To improve the security of access control systems, various biometric verification methods have been introduced to identify authorized personnel. Although these biometric authentication methods such as fingerprints, iris and voice recognition can provide personal identification, they have high infrastructure costs and access rights cannot be transferred between trusted users [8]. This function aims to enable web-based passers-by traffic to target attacks that may endanger the security of many of our Web clients, and measure the efficiency with which they can operate [9]. Specifically, add flexible data to traditional authentication information using sensors such as the accelerometer, gyroscope and more. In summary, the contributions for this project are as follows:

The design and implement a dynamic authentication framework with sensory information for the access control systems.

- The proposed framework with two Digital Object case studies and theoretically prove and that dynamic authentication significantly increases the key space for proximity authentication systems with the integration of low-cost sensors.
- The implementation and built a running prototype of the proposed dynamic authentication framework on the Intel Wireless Identification and Sensing Platform (WISP). Based on the running prototype, extensively evaluated design in terms of system accuracy and usability in the real-world settings.

## 3. Design of Web Cross-site Inference Attacks – Input case

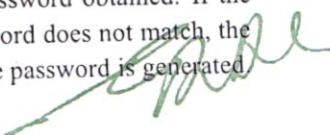
In this section, first provide a summary of the input concepts, and then present its technical details on classifying sensory data, training data testing, well-analyzed data analysis, and feature selection and model selection.

### A. Frame work

This attack as a common problem dividing multiple classes, and creates a framework that guides the learning mechanism of the supervised machine to train the class divider in the training phase to predict new user input attacks in the data section of the data section of the sensor data movement of individual key keys. The training data test section calculates the quality points specified by each key press character and selects the movement data for good quality keys in the training database. The fine-grained data filter section selects user-specific frequency bands with varying lengths of noise reduction in motion sensor data. The output feature mathematically detects both the time domain and the frequency domain from the filtered motion sensor data. Part of the model training trains the machine learning phase from the extracted features. The prediction section uses a professional section to predict new user-captured characters.

### B. Classification of Moving Sensor Data

The accelerometer sensor operates based on 3 methods: Pre-Data Processing, Vector Feature Extraction and F-Vectors Coupling. From the received values the password is generated and stored on the server by the server and then sent back to the user you want to access. User is trying to sign in using a password obtained. If the password is the same as on the website the user is allowed to access the site. If the password does not match, the user is denied access. This provides a flexible authentication method. Each time a flexible password is generated. The following figure 1. shows a diagram of a system structure.

  
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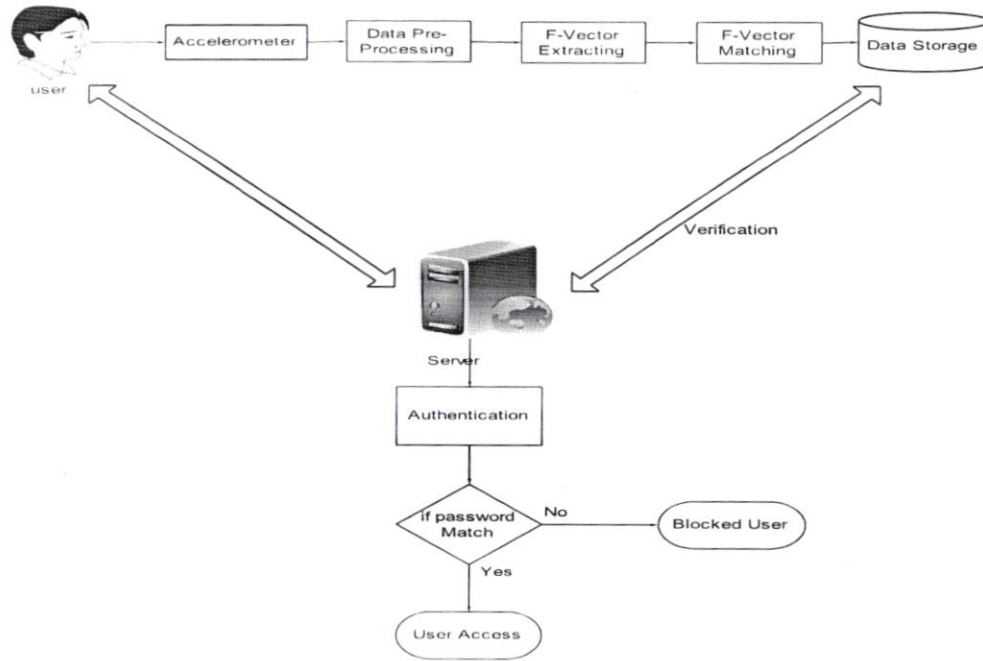


Figure.1 Web Cross-site Architecture

Existing validation of existing electronic proximity of access control systems is largely based on the exchange of coded identification information stored on the access card. The security and integrity of those fixed and idle authentication methods suffers from problems such as loss of access card and unauthorized duplication. This work, it proposes to use sensory information obtained from non-rechargeable wireless sensors on access cards to improve the security and durability of existing electronic proximity authentication systems.

**4. Process and Implementation**

The main concept of the system design is where the access card connected to the wireless charging sensor enters the communication range of the access control client; the access card returns its sensory data to standard diagnostic information and transfers it (electronic key) to the access control client. The information obtained by the access control client is then transferred to the network server for verification. If both sensor and identifier data match the valid record on the authentication site, the network server then uses the actuator and gives the card holder access to the system. In this way, even an authentic access card holds unauthorized employees or has been duplicated illegally, as long as the unauthorized cardholder does not know how to generate appropriate sensory data, he or she cannot access the system. In addition, effectively remove system risk time between access / theft access card and card closure after user report.

With the addition of flexible sensor data from internal sensors, which is able to significantly increase the security key space P and the level of security of existing electronic verification systems. A variety of sensors including an accelerometer, gyroscope and more can be used in the system. Demonstrate the basic concept and effect of improved security design of the system to control advanced access to sensory data, and use both a three-axis accelerometer and gyroscope as examples in the following sections. In particular, use sensor data generated around the accelerometer and gyroscope to introduce a reference design for an advanced authentication system for sensory data. With a prototyping system and real-world testing, show-oriented design is a possible and effective method of standardized verification framework.

**A. Vision Detection**

Powerful authentication with sensory information design. In this section, elaborate on detailed algorithms for sensing cognitive circulation. By comparing sample data of the accelerometer. Find that the accelerometer output shows complex behavior. This is because the gyroscope measures angular velocity and tends to produce momentum during a single basic rotation, which can be treated as a special accelerometer release case. So in this

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section, use the accelerometer sensor data to show all the rotating visual algorithms and discuss how to deal with gyroscope sensor data. One complete flexible verification process consists of a basic rotation sequence. To accurately detect individual basic rotation from raw accelerometer data, perform the following three tasks on the network server.

### B. Data Processing

The first step in visualizing the rotation is the pre-processing of the data. The main goals are to separate and sift the basic rotation of each individual into a series of green accelerometer data. To separate one basic rotation, you first need to identify the interval between two consecutive cycles. During such a break, the accelerometer three-axis reading of the accelerometer will remain stable and unchanged for a short period of time. To better visualize such configurations and distinguish different basic rotations, and use the slide window method. In this way, the accelerometer reading for the first two seconds is placed in the bathtub in the slippery window.

All data in the window that slides and then loads the first polynomial function. If the polynomial coefficient of the first order is below the limit (1 used), consider that the accelerometer remains stationary within the time frame of this window. Following this suspension detection in the current window, the window will slide the action in its seconds, and the duration of the new data is connected to the end of the sliding window while the duration of the first  $t_s$  of sensory data is discarded. By default, set  $t_w = 1s$  and  $t_s = 0.3s$  in system usage. In this way, accurate classification of the basic cycle is achieved in a single complete verification.

To visualize the step ahead of data processing, a single 4-step verification confirmation that has slowed down the use of the model. Shaded circles represent sliding windows in three reliefs. The accelerometer acceleration is stable during the stand between different basic rotations. After pointing a break between basic rotations, use a small square measure to match the immature reading of each basic rotation from the accelerometer.

### C. Feature Vector Background

After separating the basic rotation for one verification, compare it with the standard feature vectors. Since the time-based data category feature has a simpler model and lower calculation, select this method to get around the focus. First, the element vectors (F-Vectors) of each basic rotation are released based on their relevant functions created in the previous section. Specifically, extract initial and end sensory data, high and low sensory readings and the corresponding timing of these events during a single rotation of a three-axis accelerometer. The feature vector is large enough to be used in the verification protocol. In this way, the feature vector will be used to authorize the key or directly generate the key, and thus requires a high entropy from the attacker's point of view, i.e. to include a large amount of uncertainty. Argue that tremor is a necessary movement to create entropy: it creates a variety of sensory learning, because it is one of the most common human movement patterns that includes the highest frequency components. Slow movement will not produce much entropy.

### D. F-Vectors Matching

After removing the feature vectors, then try to match the output element with the standard feature vectors on the website to see the special basic rotation. Vectors of the standard  $n$ -given element can be mathematically calculated and generated automatically as the acceleration components in the three axis represent trigonometric interactions and acceleration gravity. If we take rotation as an example, after the accelerometer rotates clockwise  $\pi$  degrees, the acceleration axis of  $A_x$  and  $A_y$  during such rotations can be calculated as  $A_x = G\cos\theta$  and  $A_y = G\sin\theta$  ( $\theta \in [\alpha, \alpha + \pi]$ ). Therefore, it is easy for users to reset their keys without access to access cards. To compare the output F-vectors with the basic rotation with the normal ones on the website, use the Euclidean range to measure the proximity of these two vectors. Figure 2 shows the Circulation Awareness phase.

  
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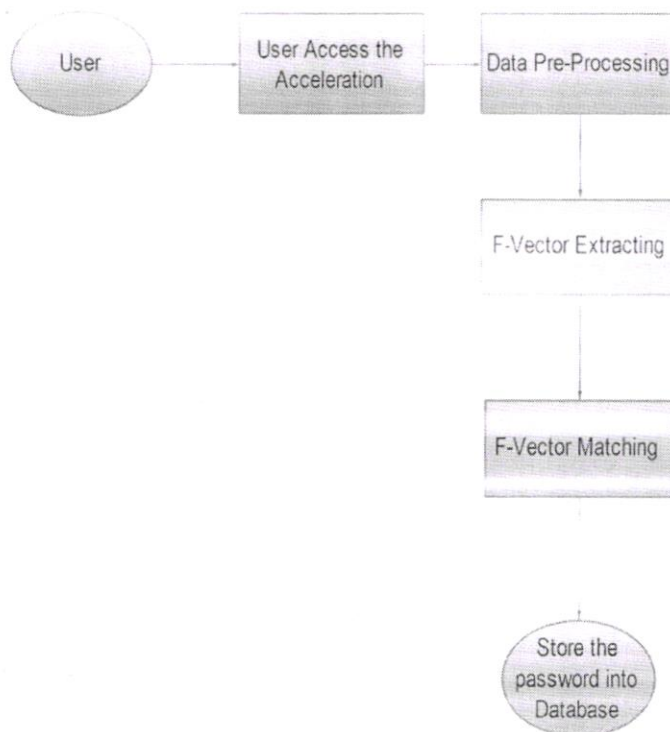


Figure.2 Rotation Value calculation

E. Server Verification

The server can verify the authenticity of the registration details and retrieve it with a key. The server also compares the received key source. Then the server verifies both the password, the password is the same or not. H Service Login User enters the browser and registers on the server and emails the server with a password and the user receives an email and sends it to the server .then the server verifies both passwords, if the password is correct open to view all details, otherwise site inside .. The following figure.3 shows the accessibility module.

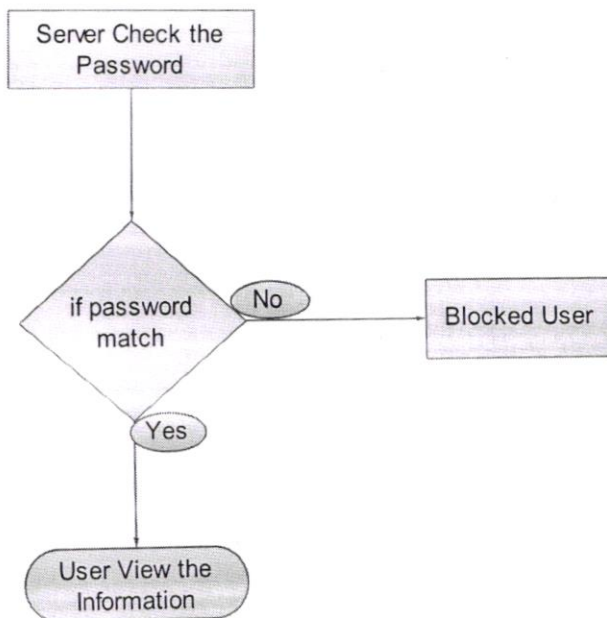


Figure..3 Service Accessing

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The below figure 4 shows that the result of convolution neural network based on each attacks and compared with existing methods.

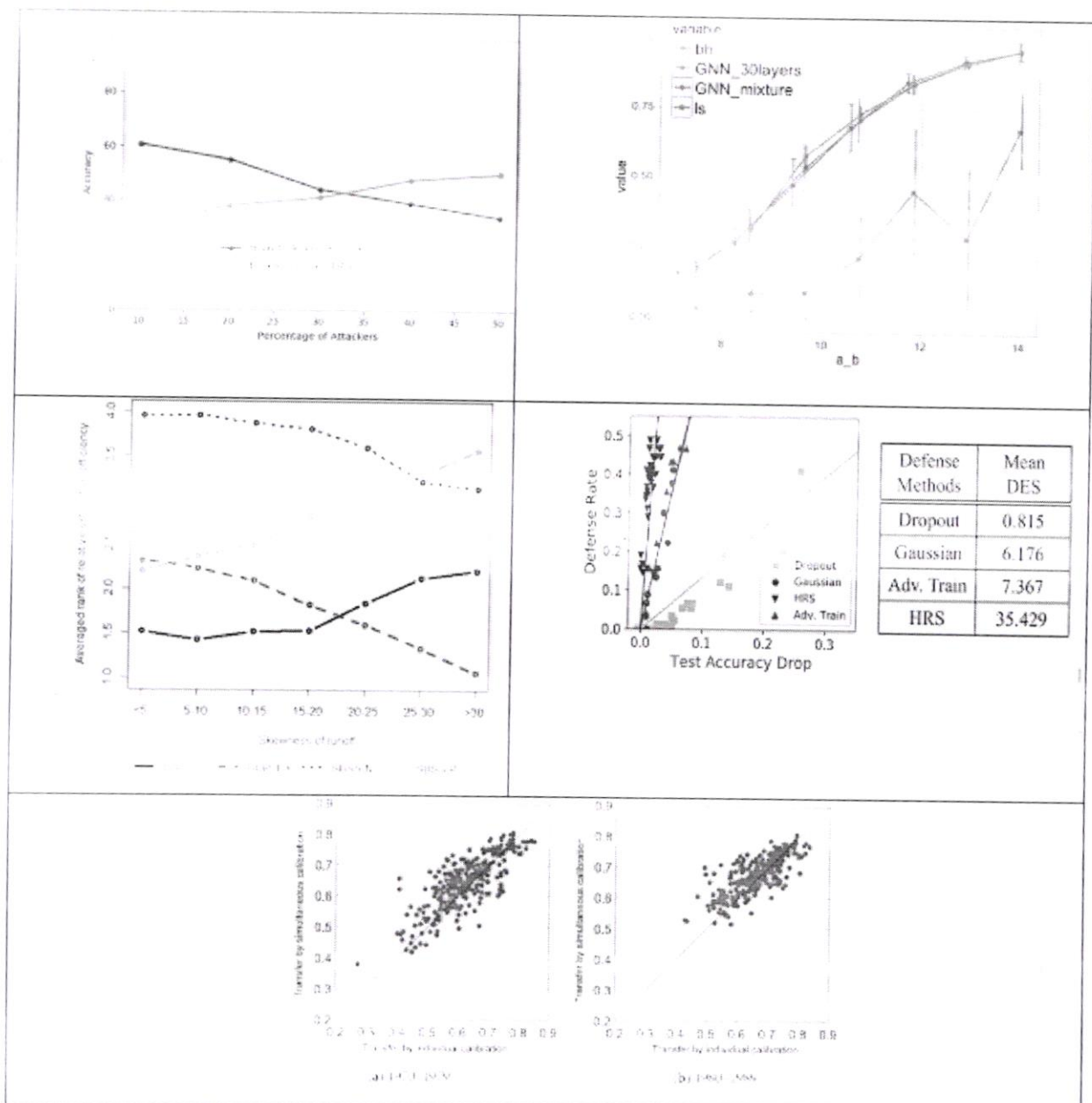


Figure.4 Result of Inference attack and defense values comparison with existing methods

### 5. Conclusion

Variable authentication sensor information for access control systems. Different from existing authentication systems in access control systems, based largely on fixed information on cards, the flexible authentication method includes sensory information from internal sensors and standard standalone ID information. Two model studies are proposed for flexible validation. Theoretically it analyzes their highly expanded key space, which significantly increases the dry key space in existing authentication methods. To test the design performance, create a prototype system and verify the test authentication method. Increasing the popularity of electronic-based authentication systems in access control systems requires a high level of security and universal presence. They believe that authentication accompanied by flexible sensory information can effectively improve the level of security of access control systems and will take a significant step towards achieving electronic authentication in the future.

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# Analyzing the Performance of Marketing Life Cycle Process Using Software Architecture Model

<sup>1</sup>Dr.Shaik.Shakeer Basha, <sup>2</sup>S.Mahalakshmi, <sup>3</sup>Amin Tuni Gure, <sup>4</sup>Durga Prasad Sharma, <sup>5</sup>Dr.Syed Khasim , <sup>6</sup>P N Jeipratha

<sup>1</sup>*Asst.Professor, Computer Science & Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal, Telangana, PIN-501512.*

<sup>2</sup>*Assistant Professor, Department of Information Science and Engineering, BMS Institute of Technology and Management, Avallahalli, Bangalore, Karnataka 560064.*

<sup>3</sup>*AMIT Arba Minch University, Ethiopia.*

<sup>4</sup>*AMUIT MOEFDRE under UNDP and MAISM- RTU, India.*

<sup>5</sup>*Professor, Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316*

<sup>6</sup>*Assistant Professor, Department of Computer Science and Engineering, St.Joseph's College of Engineering, OMR Chennai 600119*

## **Abstract:**

*The findings of our research of software framework metrics are presented in this paper. This analysis includes a short selection of the finest and most widely utilized application development metrics regarding Software Architecture programs and measurements. In a nutshell, the measures performed to strengthen the matrix-based assessment & design of the software platform differ from machine to machine. We developed a technique utilizing commercially available and normal sizes to prove our point. For 3 computer systems of varied sizes, we generated matrix values utilizing the same standardized matrices. Products parameters, Marketing predictive analytics, inheriting, mobility services, diversity, recycling, and complication evaluations were all studied with the help of Software Design matrices toolkits. With a really essential observation and control, it determines the classification of groups. The findings will aid quality engineers in determining the appropriate metrics for their enterprise applications and estimating the dimension that have evolved through time utilizing the Commercial Life Cycle approach.*

**Key terms:** *Software Architecture Procedure, Marketing life cycle, Metrics, Reusability, Performance Estimation.*

## **1. INTRODUCTION**

A metric is indeed a measurement of such a system's effectiveness and capabilities in application development. A metric is a parameter used to estimate the very next location that originates a packet in routing protocol. The metric is being used immediately by algorithms at points and also as an element at other times. The scale in computing is made up of elements. The metrics has an impact on anything that uses the meter as a spatially measuring unit. Metrics are therefore insufficient for determining information about a developing application. To obtain information regarding software performance improvement, multiple factors must



be combined. To calculate the dimension of a particular software programmer, multiple software programs can also be employed. [1]

The information from of the harvesting system manufacturing process is recorded weekly & uploaded further into report repository. Information from the repository is being used to report generation. Regular information gathering actions can be planned by the hosts admin [2]. Modifications to program monitor artefacts, as well as sustainability plan for matrices outputs, really aren't available right away. They could only be submitted when data collection has been completed. The very last information harvest activity time is displayed upon on search result whenever a record is prepared. Report can be defined and stored mostly on Project Matrix homepage by individuals with "project-edit" access [3,4]. You can monitor performance all across domains or in specific projects inside the area for the system level remediation summary. Those organizations in the region which use alleviation as their configuration management are eligible for alleviation report [5]. Complex systems that aid in the evaluation of many properties of computer product or process are frequently described in the software metrics research. There is a lot of debate more about usefulness of simulations and what people expect from them. Although certain theories are conceptually debatable, the accompanying dimension should not have been overlooked [6].

The process of gathering such measures contributes to a positive organization of a system development as well as a deeper understanding of what we're seeing (to an amount if they restrict themselves to relevant measurement by some bogus criterion). This notion exemplifies the value and use of process standards, like that of the Software Development Foundation's capability management framework that encourages organizations to analyze & report on internal operations, although in a measure-by-measure manner [7].

## 2. METRICS MEASUREMENT

- Measurements: The phrase "measurements" is commonly used to refer to a series of measurements conducted on a given subject or procedure. Computer programming methodologies were groups of words that are utilized as distinguishing characteristics:
  - Software engineering goods, such as ideas, system software, and system testing,
  - Software engineering activities, such as research, planning, and programming operations, and
  - Software engineering individuals, such as a reviewer's skill or a developer's efficiency.
    - When it is used properly, it can be used to assess software engineering:
    - Commercial strength or weakness, as well as success or disaster for a business, method, or person
    - Goods Identify and measure enhancements to their goods, procedures and persons, deficiency or development;
    - Valuable and useful management, adopt executive decisions,
    - Identify and categories current trends.
    - Quantification Develop indefinite yet realistic estimations, such as a single reviewer's efficacy or a single creator's performance.

The System Architecture and program design matrices uses the following metric as just a criterion: System Architecture Software Development Components, such as prototypes, system software, and unit test, Software Design Software Development Procedures, such as analyzation, architecture, and computer programming functional areas, as well as Software



Architecture Software Construction Persons, such as the reviewer's capacity or the creator's economic output [8].

The technique of staying in physical interaction is known as localization: Information based policies place metadata in its proper context. Techniques to System Design Locate data in relation to items. Localization is entity-based in System Architecture Technology. This translates to: Item an entity's functionality, but at the very minimum, our matrices recognition and collecting activity (possibly the bigger attempt) must recognize the "entity" as the fundamental unit of program. localization among functionality and entities is not really a correlation in object-oriented systems. A method, for instance, can be assigned to numerous objects, as well as an entity can be assigned to different purposes [9].

The packing (or binding) of a set of things involves business model assessment: Recordings & episodes were decreased instances of Marketplace statistical analysis. Sub-programs (e.g., principles, procedures, subprocesses, and phrases) constitute crypto encryption's intermediary subsystems. Marketplace analytics of entities (e.g. class & associated instances) enables languages syntactically in computer languages. Business model assessment is conceptually accepted but still not realistically validated in the others [10,11].

Operations that encode data has two major effects: Designers have to enhance our understanding about both the structure & assessment of characters networks. The basic element of the units is therefore no more a sub-program, but its an entity, and we will need to enhance the understanding about structure and rating of language technologies. Hide (or hide) information is the same as hiding (or hidden) information. The basic concept is that we simply display the data required to achieve our approach explained. From regulated visibility to ultimate disappearance, the quantity of knowledge is partly covered [12]. Business model research and information concealment are not quite the same thing. For example, an item could be round yet it is still fully visible. In order to measure entity aggregate and informational intrusion, it is necessary to hide data. Inheritance is the process of gaining characteristics through one or more of these items.

Product Many Software Development technologies simply allow for one inheritance, which means that an entity may acquire properties from some other item explicitly [13]. Objects Multi inheriting is supported by some Software Development language, which means an entity can acquire characteristics via 2 or more other entities directly. Character qualities which can be passed on and the concept of heredity differ by languages. Measurement within software development are dependent on inheritance, for example, Amount of kids (numbers of direct specializations) and parents (number of immediate normalizations),. (Classes layer during series hl) Heterogeneous nesting layer. Extraction is a technique for concentrating on the most essential (or required) aspects of a concept or item [14].

The principle of relativity is now at the heart of the Software program. We neglect more and more specifics as we move to a greater level of uncertainty, i.e., we present a broad overview of an idea or issue. We present additional information, i.e., a sharper viewpoint of an area or object, as we proceed to a lesser level of complexity. Operational, information, procedural, & entity capturing are examples of distinct sorts with representations. Researchers consider items as high-level units in entity abstractions (i.e., as black boxes). A meta-class is a type of classes, with sub-classes as prototypes.



Consumer meta categories are natively supported by certain Software Design computer languages. As just a consequence, meta-classes could be considered as class after subclass, in which we provide system conditions to a meta-class and need them to generate a class, as just an instance. The term "meta class" refers to a collection of instances. A customizable category is one in which most or all of the members could be customized. Applying a parametric object only with relevant parameters allows you to construct new (directly useable) class. Parameterized class includes promotional modules & generic objects within electronic File.

A few have highlighted a distinction among meta-classes & parameterized objects, claiming that Meta classes have (typically) runtime behavior while parametric objects do not.

### 3. MARKETING LIFE SKILL

The life span of advertising Applications & event that occurred every class, Application identity or parameterization subclasses for every program, & Ratio of non-parameterized classes over parameterized subclasses are all characteristics connected to a category connection. Merging in programming is linked to managing, where current measures are being used to evaluate external quality assurance aspects including failure, impact assessment, and modification catastrophic effects. Recommended, including one that summarizes the coupling's distinctive characteristics.

This research proposes linguistic coding embedded within identifier & remarks syntactic and semantic data obtained from programming language as novel combination approaches for marketing activities. To contrast the new processes to the proposed project couplings stages, a test case on accessible software applications has been done. The case study demonstrates how conceptually combining catches additional devices of mixing typically caught via current binding techniques, allowing it to be utilized to supplement existing measures.

#### *Marketing Life cycle Complexity Metrics*

- Hierarchy difficulty.
- Computational complexity.
- Cyclomatic difficulty (or conditioned difficulty).
- Kolmogorov complexity( term used to describe the degree of difficulty in solving a problem).
- Object complication that isn't hierarchical.
- Hierarchical entity complication
- non-hierarchical process complication

Cyclomatic Complication	Risk Complication
1-09	a simple program, without risk
10-20	very complex, medium risk
21-51	high risk
51+	Un stable, very high risk

Table 1. Standard Values of Cyclomatic Complexity

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#### 4. SOFTWARE ARCHITECTURE PROGRAMMING

The connection between both the child and its parent is explained by merging the subclasses. The child has a relationship with its parent; however, the parents do not have a relationship with the kids. Whenever two components are temporarily merged under one module, this is known as temporal blending.

##### *Coupling among objects (CAO)*

- 1) *Combining = combining class i with class j, using j modules or example attributes (including conventional combinations)*
- 2) *The CAO for each class is no of additions to the number of other classes*
- 3) *High combination between classes means the modules are interdependent.*
- 4) *Free classes can be used again and again easily and also expanded as needed.*
- 5) *Excessive merging reduces comprehension and complication is getting bigger.*
- 6) *Excessive integration keeps maintainability very complex as the modifications in one class can affect the other classes of the application.*
- 7) *Merging can be less, but few combination is required for a operational software. Coupling between objects (CBO)*

##### Cooping vs. Cohen

Combining and coordinating are two terms that often occur. They integrate together regarding the quality of the module. When talking regarding the interdependencies among different modules, how does integration describe the corresponding functions in a module? Low connectivity indicates that the module is doing a lot of unrelated things and therefore causing problems as the module gets bigger.

Profits: Whether all the pairing was flexible and tight, communication & attribute production, transport, interpretation and overall commenting expense all reduce performance of the system. It help you perform better in few ways.

Measurement in complication are found throughout the sdlc, including specifications, evaluation, architecture, and plan implementation. This is typically an unfavorable aspect of programming since it makes it more difficult to read and comprehend, and thus hard to change; it is thought that it's one of the causes of variation. The difficulty of gauging complication comes in the consumers internet discussion of smart architecture. If there are any acceptable "intricacy" item components? Cos of the possibility of recurrence, clutter, or contaminating, the "number of pieces" is restricted.

The term "number of various pieces" is confusing & necessitates a variety of data sources. The difficulty of all of the crafting products obtained in a software development project can be easily measured using code. Nevertheless, despite extensive research, little conclusion can be drawn about which coding best depicts intricacy. It's tough to discern which coding is much more sophisticated when two programmes are written in a variety languages. Throughout the lack of such a conclusion, numerous methods for determining the system's complexities are already available. What is the optimal metric by each scenario, according to studies? Are all these measures more accurate than even the most typical system software metrics, like coding columns? We explore the relationship among varying sizes and intricacy



measures using the immense amount of free software accessible. We would concentrate with one computer language, C, which would be the "traditional" in software engineering and among the most prominent computer languages, in time to prevent playing oc in various qualities and aspects.

## 5. CONCLUSION

Determine the quality attributes an instructor wishes to define, of above data could be utilized to decide when and where to employ everyone of above measures. Ascertain that the parts are accurately defined, and also that the technology users use could evaluate quality requirements and signals, as well as expand the developmental range and operational capabilities. According to survey results, most organizations are on the correct track when it comes to using measures within software development projects. The following steps are advised for measuring the "best practices" list of metrics in all undertakings for organizations which do not represent "industry standards" and would like to improve existing matrices competencies. Emphasize upon on parameters that really are "simple to implement" for development and system engineers, as well as provide great insight about software development project operations. We've gone through the six factors in depth, which are among the most well-known and commonly used. They're linked to different phases of development. Beginning with the user needs, we can utilize principal component analysis to gauge performance during the requirement specification. The matrices suites can be employed at the expert level development stage: we therefore have process by process notion regarding integration and coordination, which have been the structure's primary qualities. Inheritance, polymorphisms, parallel processing, intricacy, hidden factors, connectivity, interaction, and recycling are some of the business strategies previously proposed to evaluate unique features. Throughout this article, a matrices programmed based mostly on organizational mission will aid communication, measurement, and, eventually, achievement of such objectives. Individuals strive to accomplish whatever they consider to be significant. Measures which are well and have clear objectives enable a company gather the data it requires to enhance its software applications, procedures, & activities while focusing on the most crucial. A realistic and methodical approach to choosing, creating, and applying computer measures would be beneficial. The variety of methods and their difficulty determine how much energy and time was necessary to create and manage the class.

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# Deep Convolutional Neural Networks For Analyzing Electromagnetic Waves Using Maxwell Equation Model

Dr.Shaik Shakeer Basha<sup>1</sup>, Dr Diana Moses<sup>2</sup>, G.Saravanan<sup>3</sup>,Dr.Sumaya Sanober<sup>4</sup>,  
Dr.Syed Khasim<sup>5</sup>, Dr. S. Selvakanmani<sup>6</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, Avanathi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>2</sup>Associate Professor and Head, Department of Computer Science and Engineering, St Peter's Engineering College, R R District, 500100.

<sup>3</sup>Assistant professor (Sl.G), Department of EEE, KPR Institute of Engineering and Technology, Coimbatore-641407.

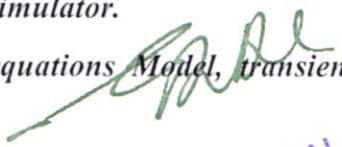
<sup>4</sup>Lecturer, Department of Computer Science, Prince Saatam Bin Abdul Aziz University, Saudi Arabia, Wadi Aldwassir, 1191.

<sup>5</sup>Professor, Department of Computer Science and Engineering, Dr. Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316.

<sup>6</sup>Associate Professor, Department of Computer Science and Engineering, Velammal Institute of Technology, Velammal Gardens, Panchetti, Chennai – 601204.

**ABSTRACT:** A Deep Convolutional Neural Network (DCNN) based model for predicting the advancement of temporal field esteems in transient electrostatics is proposed in this paper. In our model, the Recurrent Neural Network (RNN) fills in as the focal part, which learns portrayals of the succession of its info information in long haul spatial-temporal connections. Simulations of plane wave scattering from dispersed using finite difference time domain, perfect electric conducting objects, we build an encoder-recurrent-decoder architecture educated on the data. The trained network is shown to simulate a transient electrostatics issue with a simulation time that is more than 17 times faster than conventional finite difference time domain solvers, as shown in this paper. It contains a supervised machine learning model for estimated electromagnetic fields in a cavity with an arbitrary distribution of electrical spatial permittivity. Our model is quite predictive and more than 10 times faster than simulations with similar finite differential frequencies, which indicates that, for example, optical reverse design techniques may be employed in the future. Optical devices need the use of fast and precise simulations, which are thus essential. This article proposes a deep learning method to speed up a simulator's performance in solving Maxwell frequency-domain equations. Since our model forecasts 2D slit array transmission by wavelength under certain conditions, it is pretty accurate and delivers results 160,000 times faster than those achieved by the simulator.

**Keywords:** Deep Convolutional Neural Networks, Maxwell equations Model, transient electrostatics,

  
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## 1. INTRODUCTION

The equations established by Maxwell to give an integral and symmetrical theory about electromagnetic waves in the electromagnetic spectrum were the foundation of his prediction [1]. The law of Faraday controls the third and fourth on the induction of electricity and magnetism (which also contains the law of Lenz), and the fourth is the rule of Ampère, which has been reworded in asymmetric wording, to add another source of magnetism: changing electrical fields. To comprehend the process of electromagnetic wave propagation, Maxwell's displacement current must grasp the symmetry established between electric and magnetic fields. This symmetry explains how magnetic fields change and vice versa in the electrical fields[2].

Heinrich Hertz was the first person in the laboratory to observe and verify these theoretical predictions[3]. Electric field lines have positive charges at the start and negative controls at the end. For this reason, an electric field is defined as the force delivered to the test load per unit of load, with force proportional to the electrical constant  $\epsilon_0$  (also known as the permittivity of free space). We may deduce a particular version of Coulomb's electricity law, Gauss's electricity law, from Maxwell's first equation[4].

There are currently no recognized magnetic monopolies. The magnetic force is commensurate with the magnetic constant  $\mu_0$  (also called empty-spatial permeability), which is a constant of nature. This second equation of Maxwell is called the law of magnetism of Gauss since it regulates the behavior of magnets. An electromotive force (emf) is generated by a changing magnetic field leading to electrical field production. The emf moves in the opposite direction when the shift takes place [5]. This Artificial Neural Network (ANN) is a deep neural network with many layers between input and output layers (DNN). The neural networks exist in various forms and sizes but always include the same fundamental components: neurons, synapses, weights, partialities, and functions. These components are similar to the human brain and may be taught in the same manner as any other program. If a dog's picture is provided, a DNN which has been trained to recognize dog races will go over it and evaluate how probable a particular dog is. The user may review the results and choose the probabilities shown by the network (for example, those above a certain threshold); after that, the network will give the suggested label. Every mathematical change is considered a layer, with advanced DNN having many layers, the name "deep" networks[6].

DNNs can represent complex nonlinear relations. The Deep Neural Networks (DNN) architecture builds composition models that describe the item as a layered primitive composition. The extra layers make it possible to compile features from low levels, which enable complex data with fewer units than an external network with the same performance to be represented[7]. For example, deep neural networks show that sparse polynomial multivariates are exponentially easier to estimate with DNNs than with external networks. Deep architectures consist of several distinct variants of a few basic methods. Different architectures have succeeded in several domains. In certain instances, the performance of various designs cannot be compared unless they have been evaluated in the same data sets.

## 2. RELATED WORKS

In combination with an adaptive nonconformal non-structured netting, a node-based Discontinuous Galerkin (DG) Pseudospectral Time-Domain (PSTD) approach for large-scale Maxwell equations in three dimensions is given. This technique, in particular, combines an improved DG algorithm with a method for PSTD, in which the PSTD algorithm provides



spectral accuracy, and the DG algorithm acts as a stable coupling in the DG algorithm for several domains with unstructured hexahedra [8].

The main objective of this project is to identify the external force and current density of the radiated wavefield from the wave field boundary measures[9]. The problems are difficult to resolve because they are poorly positioned and have complicated model systems. It is demonstrated that they are unique and stable for both reverse sources. A unified theory of increasing stability is built on either continuous or discrete multi-frequency data, depending on the situation. There are two methods to evaluate the stability of the source functions: by looking at data discrepancies of the Lipschitz type and the high-frequency tail of the source functions. As the top frequency limit increases, the lower frequency limit decreases and therefore becomes unimportant[10,11].

Many academics have taken an interest in the concept of variable order differential operators since they may gain more complexity than other kinds of differential operators, for example, anomalous diffusion. Although in the actual world are these differential operators, mathematics can only be handled numerically[12]. Several interesting mathematical models we were able to model, plasma and dielectrics are deriving from electromagnetic waves, as well as several other interested mathematical models, using new variable both analytically and numerals which could be used order differential operators and which have a connection with all the integrated transforms. Wave propagation in two separate layers may be described using the differential operators studied because the differential operators are contained crossover and non-singular features. Operators with single kernels with differential variable order, this is not feasible. By utilizing the Laplace transform and linking it to the models under investigation of the exact solution we get the new differential operator[13].

Deep convolutionary neural networks (CNNs) have achieved breakthrough performance in a wide range of pattern identification applications, such as image categorization. However, because there is no clear knowledge as to when and why a deeper model works, it is generally a lot of trial and error to create high-quality, deep models[14]. A visual analysis method for better understanding, diagnosis and the improvement of deep convolutionary neural networks is presented in this article. Since the late 1980s, neural networks (CNNs) have been utilized to enhance visual task performance. The growth of processing power and the availability of huge quantities of labeled data, coupled with algorithm enhancements, helped advance neural networks and led them to a new neural network, which has rapidly progressed since the early 2000s[15].

### 3. PROPOSED METHODOLOGY

Figure 1 shows a simplified depiction of the architecture of the network. An encoder, an LST, and a decoder all form part of the convolutions and consume information in films and other media formats (simulations of subsets). When the network is supplied to the input, the first frame of the input takes the coevolutionary and compresses the input signal's spatial domain using multilayer convolution operations. The encoder provides the DCNN with the characteristics recovered by the encoder from the first frame of the video.

Then the DCNN of the hidden state is a preset number of times for remediously updated, which results in the temporal field evolution compared to a stack of representations. Finally, the stack of updates has the decoder, which it utilizes to construct that specific input signal for complete future Electro-Magnetic (EM) field frames.



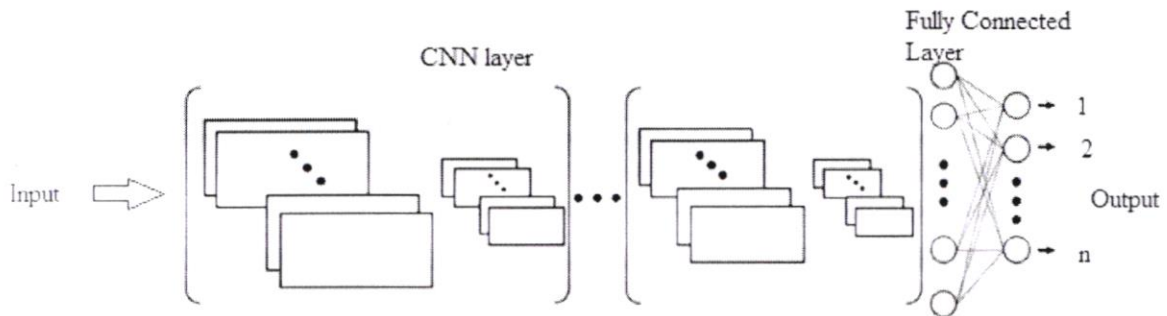


Figure 1. The architecture of Neural Network

In specifically, our model calculates predicted electromagnetic field solutions for a particular scenario detailed in full here. Consider, for example, a d-dimensional cavity that fully reflects an L-length that includes an electromagnetic source in the middle. The cavity comprises a material with an arbitrary spatial distribution of dielectric permittivity owing to the material presence ( $x$ ). Many advances have been made in electromagnetic applications, such as forward/inverse dispersion, input direction estimations, radar, and remote sensing, image processing, and stochastic design. This document presents the findings of a simulation study for transient electrodynamic physics utilizing physics-informed DCNN. The network design has two components: a coevolutionary encoder (DNN) and a coevolutionary decoder. A convolutionary LSTM-DCNN, here implemented as a convolutionary LSTM-DCNN, simulates the progress of wave physics by collecting information from geometry (or object boundary) and field. The trained network, deep-learning algorithms using electromagnetic analysis used for rapid time-domain, shows deep-learning methods' approximation capabilities. Figure 2 shows a possible DCNN model based on a neural network.

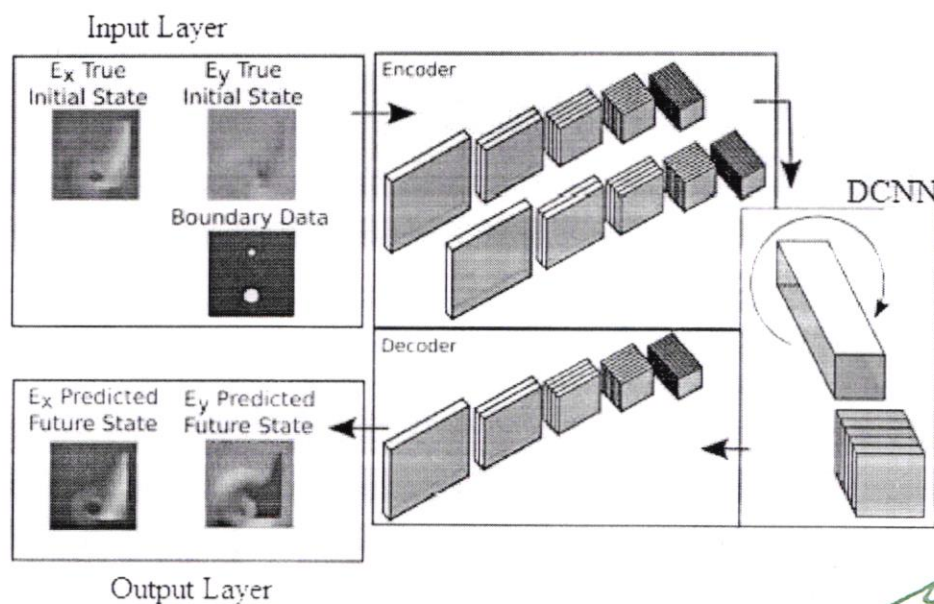


Figure 2. DCNN model architecture

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Our final network had a combination of convolutionary / dense / deconvolutionary architecture when it came down to it. At the start, there are three convolutionary layers, each intended to capture various features of the permittivity input, such as variations in the refractive index and thickness of layers. These are input into two thick layers, allowing the model to take more account than otherwise for nonlocal field interactions. Three transposed-convolutionary layers finally raise the size of the signal to that of the original input to provide the  $\vec{E}$  Prediction. Our results show that the model's performance was mainly influenced by kernel size decisions and the number of convolutional/deconvolutionary layers across three layers.

### DCNN Optimization steps to Training Dataset

Input: <Data startup>

Setting: DCNN reads data from DCNN.

Optimization: train dataset (DCNN).

1. Every dataset trained
2. Intermediate DCNN train (DCNN).
3. Output (<1, DCNN >).
4. End

Maxwell's equations, which provide a foundation for classical electromagnetism, control the magnitude and spread of electromagnetic fields in materials. The following symbols are indicated in SI units:

$$\nabla \cdot \vec{E} = \frac{\rho}{\epsilon} \text{ ---- (1)}$$

$$\nabla \cdot \vec{B} = 0 \text{ ---- (2)}$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \text{ ---- (3)}$$

$$\nabla \times \vec{B} = \mu \vec{j} + \mu \epsilon \frac{\partial \vec{E}}{\partial t} \text{ (4)}$$

$$[(\nabla \times \nabla \times) - \omega^2 \mu_0 \epsilon] \vec{E} - \vec{j} = 0 \text{ ---- (5)}$$

where  $\vec{E}$  is an electric field,  $\vec{B}$  the magnetic field at a given point in space and time,  $\frac{\rho}{\epsilon}$  are the permittivity and permeability of the material,  $t$  is time,  $\mu$  is charge density, and  $\vec{j}$  is the density of current.

This paper proposed the potential of using machine learning and deep learning techniques, especially for the resolution of Maxwell's equations, to speed up electromagnetic simulations to decrease simulation time. We propose a system based on deep convolutionary neural networks (DCNN), which will rapidly anticipate transmission in a defined manner. Maxwell will be utilized as a dataset to answer the Maxwell equation. The data is then used to evaluate



  
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and train prediction models that are subsequently used to predict: functional changes we also suggest and the prediction models of evaluations using different evaluation methods and loss functions.

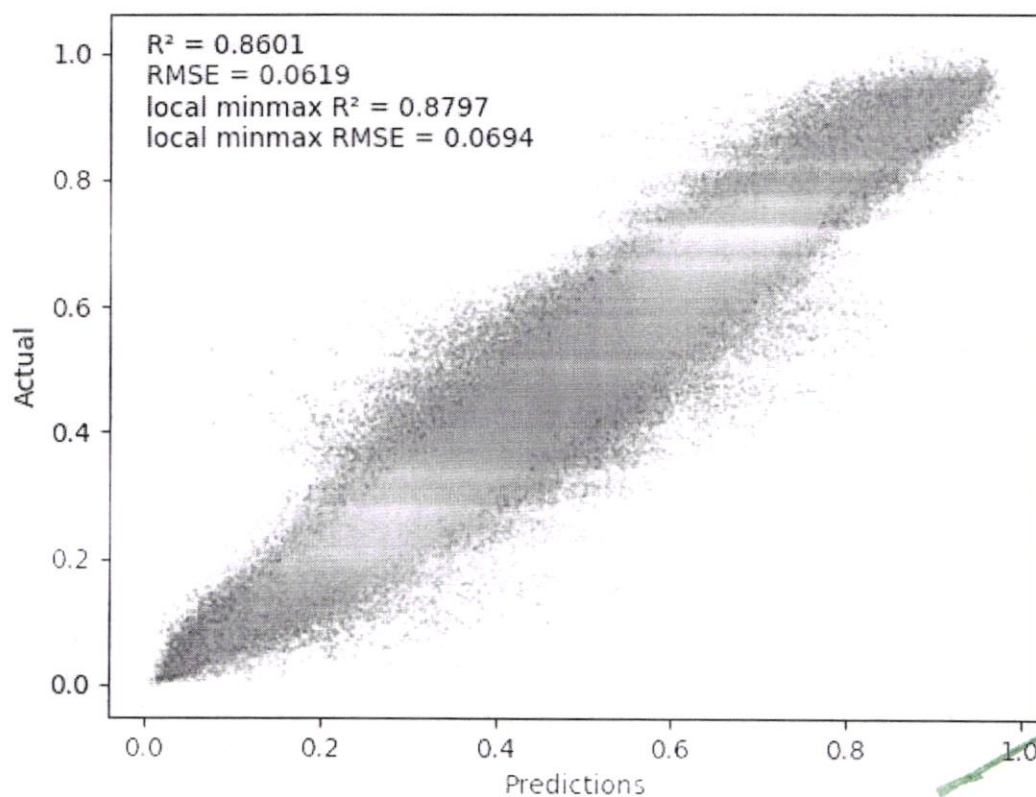
#### 4. RESULTS

By using regression models, scores of the validation set by Root mean squared errors and  $R^2$ . In the training set, an extra tree best – performed, but in the validation set, CNN performed the best, as shown in Table 1.

Table 1: Comparison with other regression models

Representations	Root Mean Square Error		$R^2$ score	
	Instruct	Instruct	Legalization	
DCNN	0.1364	0.0823	0.9596	0.9594
MLP	0.0530	0.0645	0.9385	0.7611
Random Forest	0.05016	0.0372	0.9072	0.7325
Extra tree	0.0092	0.0244	0.9093	0.7018

Trained Model of RMSE for Loss function with a different scattering of light as shown in Figures 3, 4, and 5 with its additional RMSE value and local minima value.



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Figure 3. Trained Model of RMSE for the Loss function

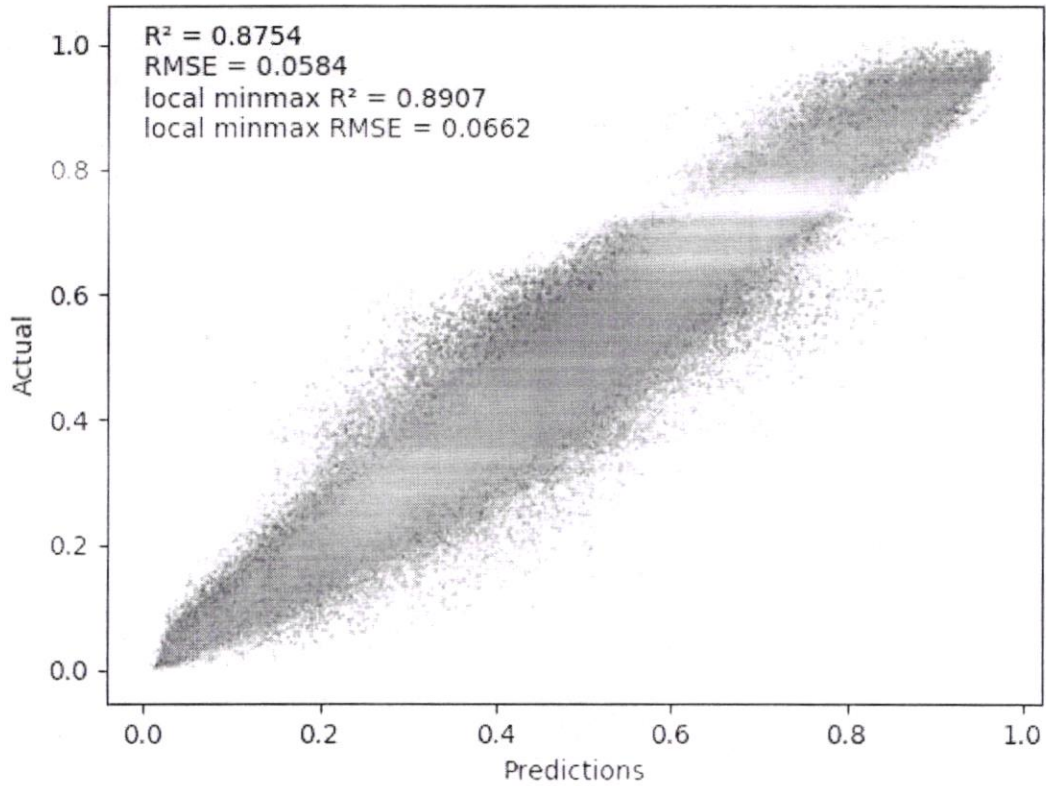


Figure 4. Trained Model of RMSE for Loss function with differential to the RMSE

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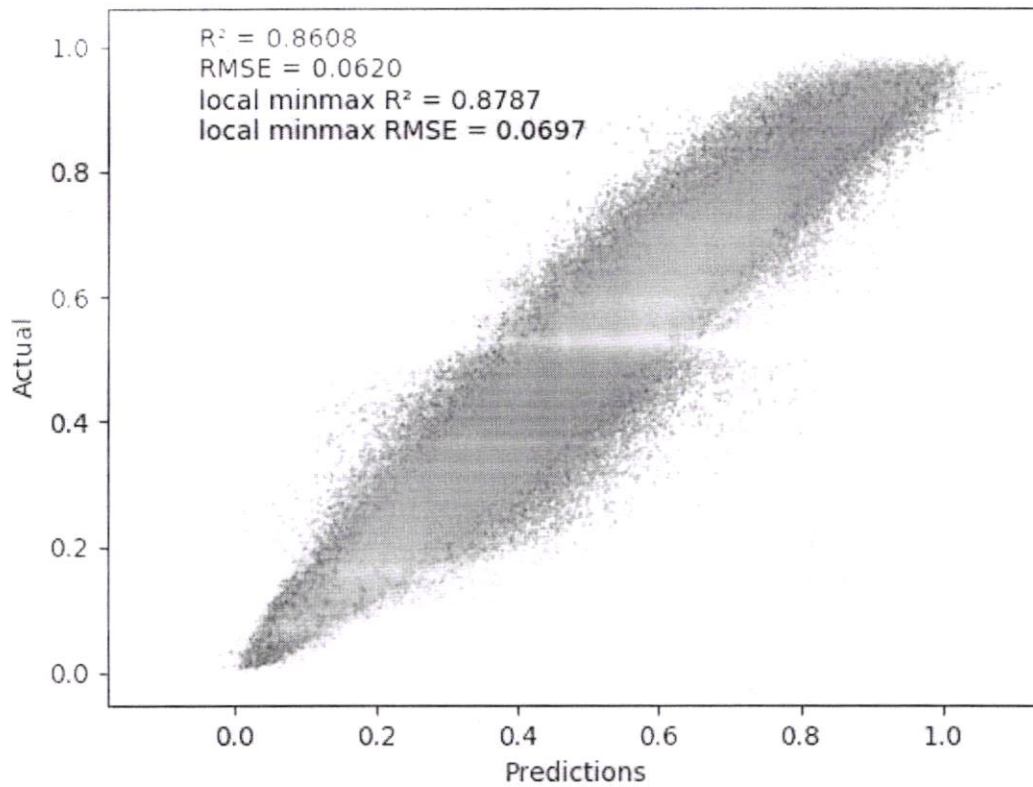


Figure 5. Trained Model of RMSE for Loss function with minima values

The loss function of the trained model is shown in figure 6 with its progress and iterations.

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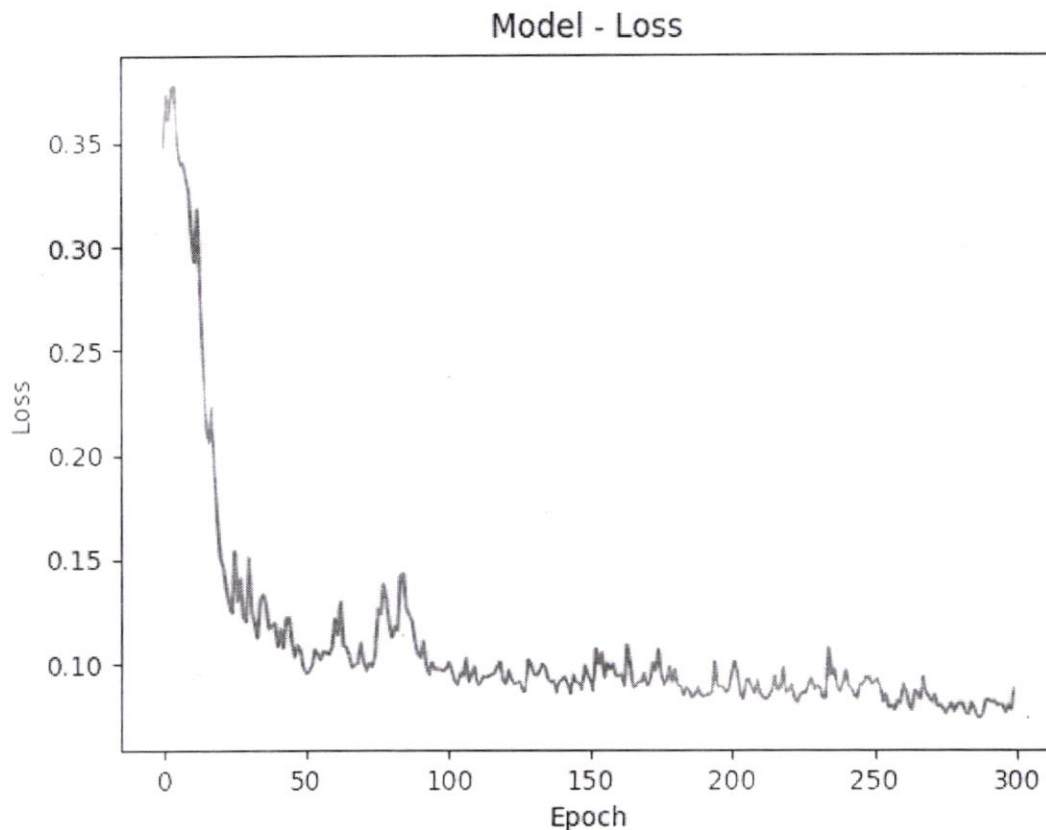


Figure 6. Train Progress of given dataset

## 5. CONCLUSION

To calculate transmission 160,000 times faster than before, we developed a deep learning method that enables the Maxwell simulator. The prediction of fast estimation of importance is transmittance when it comes to the design of optical devices since simulators repeat the transmission and device design prediction hundreds of times. The proposed model allows for more simulation due to the reduced calculation time, enabling the necessary performance to be achieved. Become one of the most significant disruptive achievements for advancing simulation-based discoveries because of data of incomparable availability, in computer power the exponential growth, data-driven, and machine learning technologies. We demonstrate the ability to build deep neural networks based on predictive physical models utilizing time-domain datasets by leveraging time-domain information obtained by simulation or observations. This article proposes a network for learning transient electrodynamic events representations that can be utilized as a predictive model based on data for the simulation of transient problems. By showing that the proposed network is a non-overlapping technique of decomposition of the domain in a building component that can be utilized efficiently, we showed that it can provide predictions across computational domains that are larger than those used in this paper.

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Avanthi Institute of Technology

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# A Survey On Ai In Different Application Domains

Dr.Shaik Shakeer Basha<sup>1</sup>, Dr.Sumaya Sanober<sup>2</sup>, P. Praveena<sup>3</sup>, Dr.S M Udhaya Sankar<sup>4</sup>,  
Dr.Syed Khasim<sup>5</sup>, Naveen P<sup>6</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>2</sup>Lecturer, Department of Computer Science, Prince Saatam Bin Abdul Aziz University, Saudi Arabia, Wadi Aldwassir, 1191.

<sup>3</sup>Assistant Professor, Department of EEE, KPR Institute of Engineering and Technology, Coimbatore- 641407.

<sup>4</sup>Professor, Department of Information Technology, Velammal Institute of Technology, Panchetti, 601204.

<sup>5</sup>Professor, Department of Computer Science and Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh-523316

<sup>6</sup>Assistant Professor, Department of computer Science and Engineering, St.Joseph's College of Engineering, OMR Chennai-600 119

**Abstract:** Artificial Intelligence (AI) is a branch of computer science that investigates computational models of problem solving, where the problems to be solved are of the same complexity as those solved by humans. Artificial intelligence is the study of how to make computers do things that people currently do better. It is machine intelligence and the branch of computer science that seeks to create it. Artificial Intelligence is another concept for both the study and design of intelligent agents. AI's central issues include reasoning, knowledge, planning, learning, communication, perception, and the ability to move and manipulate objects. The aim of this paper is to study artificial intelligence technology in all fields related to engineering in view of its applications.

**Keywords:** Artificial Intelligence, Health care, Cyber Security, ChatBot, Software Engineering

## 1. INTRODUCTION

Artificial intelligence (AI) is the most in-demand field in computer science, dealing with the simulation of intelligent behavior in computers. AI techniques are easily identifiable as product features. These techniques operate in the background, improving the system's overall performance.

Artificial intelligence attempts to explain all aspects of human intelligence through a computation process. It can interact with its surroundings using sensors and make decisions without the need for human intervention. In its most basic form, artificial intelligence (AI) is machine learning. Intelligence can be viewed as a distinct individual property or quality distinct from all other characteristics of an individual. Artificial intelligence can also be seen in actions or the ability to complete specific tasks. Classical AI, also known as symbolic AI, is the earliest approach to artificial intelligence. Artificial intelligence is only useful when it



contributes to society. AI has raised the bar for credit-scoring by enabling automation, high accuracy, and speed through the use of both big data and AI algorithms.

Artificial intelligence is generally classified as either strong or weak. Strong Artificial Intelligence is a system that can solve problems on its own. Modern working applications are examples of poor or weak Artificial Intelligence.

### *History of AI*

In 1956, John MC Carthy is regarded as the father of artificial intelligence at the [1] Dartmouth Conference. The origins of AI can be traced back to ancient Egypt, but with the advancement of technology, In 1941, the first electronic computer was built, and the technology was eventually commercialized available to create machine intelligence comparable to human intelligence. Artificial intelligence (AI) is the biological motivation of the human brain. AI grew because of cognitive thinking and natural language. The first artificial intelligence programme, known as "The Reasoning Theoretician "Allen Newell, J.C. Shaw, and Herbert wrote it. Simon was born in 1956 [1]. The paper is organized as follows: Section 1 contains the introduction to the Artificial Intelligence, Section 2 contains related work, Section 3 provides the conclusion and future work to be carried out.

## 2. RELATED WORK

### *In Medical field*

Apoorva et al. [2] proposed a simple neural network model that, using preliminary CBC test report data, can detect whether a patient has dengue. The patient information was obtained from a hospital. The system correctly classified the unseen test cases, as observed. The proposed system has a high test set accuracy of nearly 95%. Because time is critical in the treatment of dengue, the proposed system has the potential to assist doctors in saving many more lives in a short period of time. As a future research direction, more pattern recognition techniques for the classification procedure and introduction of localities' specific factors can further enhance the system to create a broadly reproducible model.

Shyama et al., [3] proposed cancer prediction based on Artificial Intelligence. New techniques are currently needed to diagnose and predict cancer diseases accurately. The model proposed is based on the prediction of the Artificial Neural Network. Data from patients with bladder cancer are provided in this article. Three different ANN networks train this model. This model uses the two methods of averaging and voting. This model performance is analysed using sensitivity, precision, and so on. The results show that the ANN methods perform better than other methods such as regression models.

Intelligent heart disease prediction system suggested by Parthiban et al., using the CANFIS and Genetic algorithms [4] Genetic Algorithms (GA), CANFIS, Heart disease, Member Function are all algorithms used in this document (MF). In order to analyse the existence of heart disease, CANFIS is combined with genetic algorithm. CANFIS has a huge potential to predict heart disease. By using this system, costs are reduced. The disadvantage is that CANFIS needed adequate database volume to construct the model.

Srinivas et al. Data Mining Applications in Health Care [5] introduced smart and smart methods of heart attack prediction, with significant patterns extracted from heart disease data stores. If the weight of frequent patterns exceeds the threshold value, those values will be chosen for prediction of a heart attack. Nave Bayes, ODANB and NCC2 are the main algorithms used here. The system's disadvantage is that the unstructured data in the health care database cannot be processed.



The review of the heart disease prediction system by hybrid smart and data mining techniques was recommended by Chithra et al.,[6]. States that offline neural network training is good for prediction of early-stage diseases and good performance can be achieved using pre-processed and normalised data. The study was based on ANN, an intelligent hybrid algorithm. The benefit of using a smart hybrid algorithm with feature subset selection is greater precision. The downside is that it is very complex to choose an algorithm for reducing features and a high training time.

Soni et al. proposed [7] a predictive medical diagnosis data mining technique. 15 cardiac analysis attributes are listed. The results of predictive data mining methods show that the decision tree performs better, and Bayesian classification also sometimes gives the same performance. Other predictive methods such as Clustering classification, Neural networking, Nearest Nearest Neighbor are not necessary. The accuracy of the Tree and Bayesian classifications is improved following the application of genetic algorithms.

Data Mining based early heart disease prevision was submitted by Methaila et al., [8]. Various experiments are conducted on various classifiers to identify heart disease patients in this system. The CART, ID3 and DT classifier have been used. This results in CART being more accurate than ID3 and DT. But priority associated algorithms for long item sets cannot be scaled.

The Data Mining Algorithm used to diagnose cardiovascular diseases was worked by Deepali [9]. This algorithm illustrates how the selection of features and information can be used in combination with the neurofuzzy adaptive inference system to diagnose patients. This research was based on ANFIS algorithms, such as Data Mining, K-NN, and good accuracy. However, the classification speed was low and the computing costs were high.

Sundar et al.,[10] proposed the system for the performance analysis for data mining classification technique in Heart Disease Database, using WAC, Naive Bayes, DMX query language, etc. Sundar and others. It creates, trains, predicts and uses the DMX query language for accessing the content. The model is evaluated for precision against test data sets before deploying the model in HDPS. Classification matrix methods are used to assess the efficacy of the model. The downside is that the system proposed only uses categorical methods.

Patel et al.[11] proposed a classification mining system using fewer attributes to predict cardiopathy. Here the Nave Bayes, Clustering Classification and the Decision Tree for prediction are compared. It shows that the decision-making tree works well in comparison with two more other techniques. It also demonstrates that the Nave Bayes performance is consistent. The result indicates that Clustering's performance in contrast to other techniques was poor.

Ishtake et al., [12] proposed a data mining system used to predict cardiovascular diseases that extracted encrypted information from one pre-existing heart disease database. DMX query operations can be used for building but rather retrieving model data. Five mining goals are analyzed based on business intelligence and data exploration. The trained models are used to assess the objectives. The models can respond with high accuracy to challenging problems. This provides good precision, but the dimensions of the dataset used are very small and only categorical.

A systems for the prediction of heart disease by Data Mining techniques were proposed by Taneja et al.[13]. Three unique supervised machine learning algorithms like the Nave Bayes, J48 classifier and Multilaying Watch have been built into the model. The result shows that the J48 rating is the most efficient of the three with a precision of 95,56%. All data mining objectives have been met by the J48 decision tree algorithm. Greater ANN performance and



less run-time were achieved. However, the rating consistency was indeed extremely low and cannot predict unique diseases such as heart diseases.

Amin et al. [14] proposed a data mining-based system for Heart Disease diagnosis, prediction, and treatment besides clinical decision support systems. The system is being developed in order to improve patient safety and reduce medical errors. The paper compares six CDSS systems using various data mining methods such as DT, Naive Bayes, ANN, Apta-CDSS-E, and support vector machines. Because medical data lacks performance and completeness, there's a need to highly specialized data mining methods for efficient methods. This provided good performance and accuracy, but it was unreliable and expensive. The system was not recommending treatment options to patients.

### *In Cyber Security*

Anitha et al. [15] introduced a model that can defend itself from intrusion detection and various network attacks in Cyber Defense Using Artificial Intelligence. The primary goal of this system is to develop a framework for mapping a variety of multitasking processes. AI techniques are used to detect intrusions. The artificial immune system identifies security threats to wireless sensor networks (WSN). The system's advantage is that it detects any suspicious activity on the server and reduces the server's network load. The disadvantage with this is that the sensors have limitations in terms of design, storage and functional limitations like communication and processing.

Amandeep et al. [16] proposed using artificial intelligence to improve cyber awareness. This paper demonstrates how intelligent the toolagent that can be used in the prevention of cyber-attacks can be. Cyber-attacks have a significant impact on the information technology industry. Because web applications are widely used for critical and basic tasks, they have become a popular target for security attacks. To achieve high performance in this experiment, a combination of Genetic Algorithms and Fuzzy Logic is used. The heart of this experiment is a 3 programme that implements a DSDV routing protocol. This programme includes three threads. Each thread state is denoted by a different colour.

Making Use of Artificial Intelligence Techniques Merat et al. [17] suggested that to maximise the objective function, a pattern of high index threads must be decided to attend to and handled throughout the planned zone. In order to improve performance, a low priority index thread should be ignored by the process's overreaction. The SHOWMAN analogy is used to describe a multitasking initiative. To achieve the desired state, traffic and future process loads are calculated. Because synchronised threads and many attempted threads are unable to disengage, there may be some out of margin penalty and poor performance. As a result, the switching time is reduced to zero.

Artificial Intelligence in cyber security proposed by Dr. Pranav [18] presents a survey on computing the applications in cyber security, and analyzes the probability of enhancing the capabilities of cyber security by suggesting necessary changes in the intelligence of security systems. He made use of Standard mounted algorithm. It concludes that the helpful applications belong to the applications of artificial neural networks in the field of perimeter security and some other cyber security areas.

Yakubu worked on the role of Cyber Security and Human-Technology Centric for Digital Transformation which focuses on the study of models of security [19] management to guide the maintenance of security on existing cyber infrastructures. He gave a method for the practical and theoretical analysis based on the security management models that are selected. The proposed model does the evaluation of the analysis that is used to get the insights into the configuration and also specifies desired and undesired configurations. In addition, framework model that is presented, allows the evaluation of changes in the configuration in dynamic and



agile cyber infrastructure environments with respect to the properties like expected availability or vulnerabilities. A review on various methods of IT security model management was also given.

#### *In Chatbot*

Sumit Wailthare et al. developed one approach to the concept of executing a web-based AI chat-bot to be users' personal assistant, which speeds up the setting and beginning of customer client meetings while using the algorithm of matching patterns [20].

Vibhor Sharma et al. proposed two methods for popular chatbot systems, ELIZA and ALICE, as well as their applications [21]. It describes the method of implementing a domain-specific information system to provide an answer to FAQs in a University Setting.

Anirudh Khanna et al. implemented one database as the chatbot's brain, as well as the performance of simple AI systems, Turing tests, and their flaws [22]. The term "partially intelligent systems" refers to systems that are only partially intelligent.

Nahdatul Akma Ahmad et al. had done work on overview of chatbot design and techniques. It goes over AIML, pattern matching, language tricks, chat script, parsing, SQL, and relational databases in detail [23]. The Markov Chain is a technique that works by recognising the probability of letter or word occurrence in a similar textual data set.

Kedar S Chikorde and colleagues discussed about the open source packages available for building chatbots, such as Apache's OpenNLP [24]. There are useful frameworks available, such as Google's API. AI, Amazon's Alexa, and a slew of other technologies more on the Internet that can be used directly in the application.

G.Tascini et al. represents an architecture that consists of multiple levels with non-linear operations, such as neural nets with many hidden layers. It explains the relationship between NL and NN [25]. Chatbots that were having difficulty with tasks were able to overcome them by Deep Learning techniques are being introduced.

Sarthak V. Doshi and colleagues developed the two modes of communication, text and voice. The response generation process is divided into two stages: pattern matching preparation and pattern matching execution behaviour that is similar Add-ons such as Wikipedia and weather prediction help the chatbot learn more Forecasting departments, sports, news, and so on are all used [26].

Prof.D.S.Thosar and colleagues proposed a mood sensing approach for classical music based on acoustic data [27]. In a song, a hierarchical framework is used. According to the user's response, this same system sends a few web pages and links.

Kshitij V.Wadanka et al. discussed chatbot design, implementation, comparison, and the future scope of chatbots [28]. Applets are used because it is difficult to create an exchange box for the conversation between the client and the bot.

#### *In Software engineering*

Hany M Ammar et .al. discussed how machine learning techniques such as KBS, CBR, Fuzzy logic, and automated programming tools help to overcome the problems associated with traditional software development in one's paper on the Current iteration and open troubles in the Software Engineering using artificial intelligence[29].

Certain unresolved issues, such as SBST, necessitate additional research. Mark Harman proposed a method with SBSE, Fuzzy, probabilistic methods, classification learning, and prediction can help the software engineering community, as well as the challenges that lie ahead in AI for SE [30].



Farid Meziane and Colleague discussed the current state of Artificial Intelligence in Software Engineering and its future prospects [31]. They work on testing as well as the other phases of software development.

Farah Naaz Raza explained in her paper “Artificial Intelligent Technique in Software Engineering (AITSE)” that by using AI-based systems with the help of an automated tool or an automated programming tool, one can eliminate the risk assessment phase, saving time in software development [32]. AITSE also helps to reduce development time in software development.

Parveen Ranjan Srivastava et.al., used Genetic Algorithms in Software Testing [33]. From this, clearly states that the GA is used to improve the efficiency of software testing.

Mark Harman et.al., developed Search-based software engineering, which explains how search-based techniques can be used to develop software measures [34].

Jonathan Onowakpo Goddey Ebbah presented a paper on Deploying Artificial Intelligence Techniques in Software Engineering [35]. The purpose of this paper is to review AI techniques from the standpoint of their application in software engineering. It focuses in particular on artificial intelligence techniques that have been developed (or are being developed) and can be used to solve problems associated with software engineering processes.

### 3. CONCLUSION AND FUTURE WORK

The aim of the literature survey is to give its various disciplines a wide range of insights into key technologies and issues. The area of AI offers huge promises such as solutions and optimization of various types of problem statements. AI nevertheless sets out key ethics and administration issues that play a key role in expanded technological acquisition. AI undertaking some stress between the efficiencies and the objection that those advocating greater consideration may be inappropriate in their acceptance, the important thing here is to find the conflicting points, so that we are able to review and, if need be, build new legal and regulatory arrangements.

The AI will create threats and opportunities for the future of the work. The creative work will remain the same as people are more creative than machines. Machines can be supported in the future by focusing more on creative work and working alongside machines that create unknown opportunities and new professions. Today, AI and machine learning algorithms are more precisely used in the medical field. Given that the old lives are no longer applicable, it is important for the government to act in a more common manner as AI.

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PRINCIPAL  
Avanathi Institute of Engg. & Tech  
Vijaya (M), Abulhasanpet (Mdt),



# Analyzing Various Graph Theory Applications Using Mathematical And Computational Intelligence Approach

<sup>1</sup>Dr.R.Vijaya, <sup>2</sup>Dr.K.Maheswari, <sup>3</sup>Utpal Saikia, <sup>4</sup>Dr.Shaik.Shakeer Basha, <sup>5</sup>Dr.Syed Khasim, <sup>6</sup>Dr. R. Sreeparimala,

<sup>1</sup>Assistant Professor, PG & Research Dept. Computer Science, Arignar Anna Govt. Arts College for Women, Walajapet - 632 513, Ranipet Dist., Tamil Nadu, India.

<sup>2</sup>Associate Professor, Department of Computer Science and Engineering, CMR Technical Campus, Kandlakoya (V), Medchal Road, Hyderabad 501401, Telangana, India.

<sup>3</sup>Assistant Professor, Department of Mathematics, Silapathar College, Dhemaji Assam-787059.

<sup>4</sup>Assistant Professor, Computer Science & Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal, Telangana-501512.

<sup>5</sup>Professor, Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316.


<sup>6</sup>Associate professor, Mathematics, Sri Eshwar College of Engineering, Coimbatore-641202.

## Abstract

*Graph theory is a part of mathematical analysis which studies the relationships between fundamental results in several fields with pure mathematics. The goal of this research is two - fold: first, to grasp the fundamental concepts of graph theory, second, to emphasise the importance of graph theory thru a practical case which was used as a framework investigation as well as character development of the structural brain system, similar to how machine learning can be used to apply models based on factors spatial information. Data pre - processing, associations, attributes, and techniques are some of the approaches used in this approach. The pictures from the Magnetic Resonance Imaging (MRI) device are used to demonstrate an automatic tool for performing a typical process. Pre-processing, graph creation for every area with various associations, mapping, essential extraction of features based on literature review, and lastly offering a collection of machine learning models which can give interpretable findings for clinicians or experts are all part of a process. This research will examine the most viable method of graph theory in numerous domains to emphasize the impact of graph theory. A summary of graph theory issues pertinent to their ideas and tactics is also included in this study.*

**Keywords:** Graph Theory, Applications, Computational Intelligence, Set Theory, Representations

## 1. INTRODUCTION

  
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Avanthi Institute of Engg. & Tech.  
Abdullahpurmet Mandal, R.R. Dist.



When a theory is used in actual life, it will be more significant. Arithmetic modelling is the use of statistical methods or instruments to depict or simulate real-world problems. One such technique for representing real-world objects and activities called graph theory. Graphs have some of the most used patterns with both environmental & man-made structures. A graph is indeed a geometrical formal expression of vertex that connect pairings of vertex which is used to depict the connection amongst items. Graphs could be used to represent a variety of real concerns. In economic, industrial, ecological, & computer programming domains, they will be used to depict a variety of relationships underlying operation dynamics.

Along with its experience in a variety domain including such knowledge discovery and picture processing, communications & code technique, grouping & sequencing, and optimization techniques & operations, the graph idea has really become a core of engineering and innovation. Using graph theory to solve a fundamental condition is the same as estimating solutions to source of actual scenario. Graph theory is indeed a subfield of mathematics education that studies the properties and characteristics of graphs [1]. It shows the elements' interconnections. A few of the advantages of graph theory is that it provides a common framework for a range of issues. It just gives you graph techniques to solve this issue. The vertex or node indicates the objects throughout all domains wherein graph are employed for modelling, while the edge indicates the relationships among the objects. The Konignberg bridging challenge is where graph theory begins. The answer to some well conundrum gave rise to the concept of Eulerian graph.

Euler examined this Konignberg bridges challenge & discovered a workable approach in 1736, when he published Euler's resolution to the Konigsberg bridging challenge, now known as the Eulerian graph [2]. Mobius proposed the full graphs with bipartite graph in 1840, and Kuratowski used leisure puzzles to show that they have been plane. Kirchhoff invented the concept of trees (a linked graphs having no loops) in 1845, and he is using graph concepts to estimate voltages and power within electronic systems. Guthrie created the well-known four-color dilemma in 1852. Later, in 1856, Hamilton studied polyhydra loops & came up with the concept of the Hamiltonian graphs via looking at journeys which visits specific places precisely only one time.

## 2. GRAPH THEORETIC NOTATIONS

It is required to be knowledgeable with all elementary concepts throughout the graph to get a strong understanding about graph theory. A graph is indeed an ordered pair  $G = (V, E)$  that contains a subset  $V$  comprising node vertex and a set  $E$  of edges that connect the node in  $V$ . Graphs get their name from the fact that they're being represented graphically, and this graphical depiction helps us grasp many of their characteristics. In graphic representations of graphs, nodes are represented by spots or tiny spheres. A graph's edge is composed of 2 node (e.g.,  $n_1, n_2$ ). Edges are usually represented graphically as curving or vertical/horizontal lines connecting the spots associated with the corresponding nodes. Points which sharing edges are mostly referred to as neighboring or neighbors. Occurrence to every one of the pair of nodes refers to such an edge which connects 2 node. Adjacent edge would be those who intersect at a specific layer. The vertex in Fig.1 were  $V_e = a, b, c, d, e$  as well as the edges were  $(a, b), (a, c), (a, d), (b, e), (c, d), (d, e)$ .



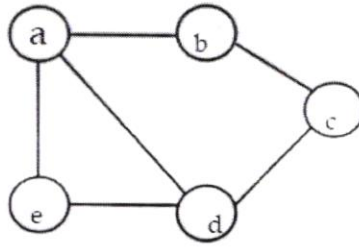


Figure 1: Graph

**Definition 1:** A bipartite graph is one in which the vertex set  $V_e(T)$  is made up of bipartitions X and Y, with the intersections of A and B being the empty set as well as the intersection with A or B being  $V_e(T)$ . A bipartite graph's corner subset is made up entirely of lines of one endpoint in A and the other in B. The nodes of a network shown in Figure 5 could be split into 2 groups:  $A = D,C$  and  $B = E,F$ . Set A nodes only connect with set A nodes, & conversely. Entities in same subset will not link together. As a result, it was a bipartite graph.

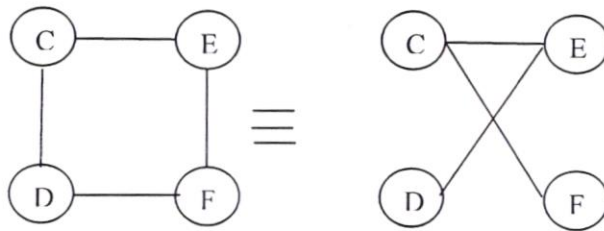


Figure 2: bipartite graph

**Definition 2:** A full bipartite graph was defined as a network in which each point of group A is connected to every point of group B, as shown in Figure 3

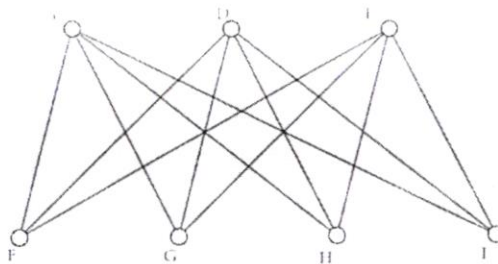


Figure 3: A complete bipartite

**Definition 3:** A sub-graph  $T_0$  of  $T$ , often known as  $T_0 T$ , is a graph where almost every edges & vertex within  $T_0$  is indeed present in  $T$ . Figure 4 shows how this works.

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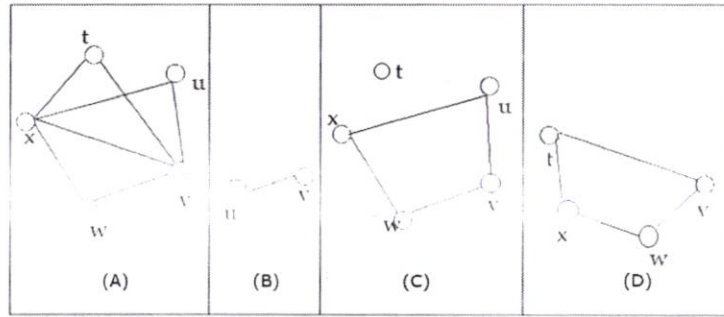


Figure 4: Graphs (B), (C) and (D) are subgraphs of the graph (A)

**Definition 4:** Assume that  $D \subseteq E$  is a sub-set of T's nodes group. The generated sub-graph  $T_0 = T[U]$  then is made up of node within D as well as solely these edges from T that have all these endpoints in D.

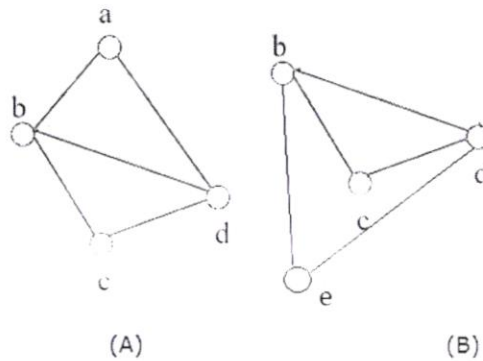


Figure 5: Graphs (B) is induced subgraphs of the graph (A)

**Definition 5:** A graph walk is also an alternate ordered set of nodes, with links displayed near to vertices acting as incidence edges to certain nodes. The number of edges in the array refers to the length of a path. If the path draws to a close in which it began, it is considered completed.

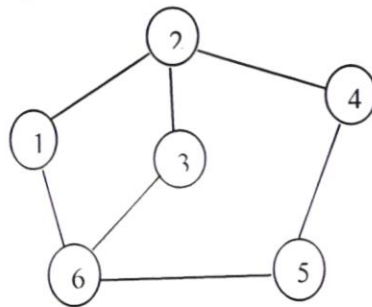


Figure 6: Example for walks in graph 1-2-3-6-5-4

**Definition 6:** A route inside a graph G is a sub-graph of T with  $V(\text{Path}) = i_0, i_1, i_2, \dots, i_k$  and  $E(\text{Path}) = i_0i_1, i_1i_2, \dots, i_{k-1}i_k$ , wherein  $i_0, i_1, \dots, i_k$  are unique graph vertices. The vertices  $i_0$  and  $i_k$  are known as Path's endpoints. The number of vertices throughout the pathway determines its length, as well as a shorthand method for denoting pathways has become an ordered set with vertices (e.g. Path =  $i_0i_1 \dots i_k$ ). Since no node were duplicated throughout the path, it is thus a route.



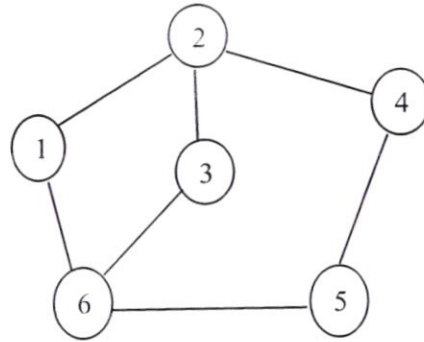


Figure 7: An example path in the graph 1-2-4-5-6

### 3. MATHEMATICAL REPRESENTATION OF THE GRAPH

The adjacency matrix is an arithmetical description for a graph. The adjacency matrix seems to be a 2D array which each square represents whether or not 2 nodes are connected. Whenever there is a link among the two nodes, cell include '1', & because there's not, cells contain '0.' Whenever self-edges really aren't permitted, diagonal cells have '0.' And for graph shown in Figure 1, Figure 8 illustrate the adjacency cell matrix.

Vertex ID	a	b	c	d	e
a	0	1	1	1	0
b	1	0	0	0	1
c	1	0	0	1	0
d	1	0	1	0	1
e	0	1	0	1	0

Figure 8: Adjacency Matrix for the Graph

Controlling Sets (CS) is a word that is used frequently in graph theory . A CS for a graph  $T=(V_e, E)$  is indeed a collection  $V_e'$  of  $V_e$  in which every vertex which isn't in  $V_e'$  is linked with at least single component of  $V_e'$  by an edge [4]. A controlling set of size 3 is shown in Figure 9, with the red node p, q, and r forming the controlling sets.

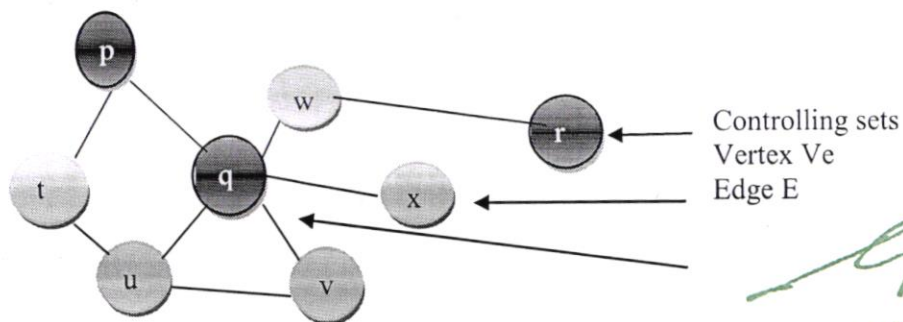


Figure 9: Dominating Set

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A Minimal Dominant Set (MDS) is a Controlling Sets that has the shortest cardinality between all the CS of T. MDS of size 2 is depicted in Figure 17, with the dark lines forming MDS.

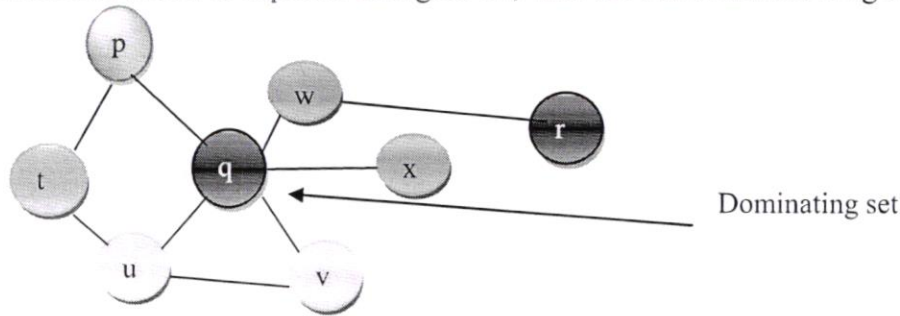


Figure 10: Minimum Dominating Set

Remember that even a node covering C is really a sub-set of the vertices in something like a simplified given Graph T that has at minimum 1 endpoint in C in each edge. As a result, in the dispute graph T, the goal is to find a min node overlap (it is an NP-complete problem). Lets take a glance at a particular instance of a Snps assembling dilemma from [8] and show how the nodes covers approach can help us solve it. A single system alteration within DNA is called a Single Nucleotide Polymerase reaction (SNPR, called "snip"). The most prevalent form of genomic variations in human chromosome is considered to be SNPs ( 91 percent of all human DNA polymorphisms).

This is how the SNPR Assembly Challenge is described. An SNPR assembly is indeed a trio (F, G, H), where  $F = f_1, \dots, f_n$  is a collection of n SNPRs,  $G = g_1, \dots, g_m$  is a subset of m segments, and H is a connection  $G: FG \rightarrow \{0, A, B\}$  that specifies if an SNPR  $f_i$  F does not appear on a fragmentation  $g_j$  G (marked by 0) and if it does, the non-zero number of  $f_i$  (A or B). 2 SNPs  $f_i$  and  $f_j$  are said to be in conflict if there are two fragments  $G_k$  and  $G_l$  with the same non-zero value in  $H(f_i, g_k), H(f_i, g_l), H(f_j, g_k), H(f_j, g_l)$  and the opposite non-zero value in  $H(f_j, g_l)$ . The objective is to end as few SNPs as feasible in order to remove any disputes. Figure 10 depicts the simple guidelines from [7]. It's worth noting because H is only specified for such a sub-set of FG derived from experimental data. For example, since  $H(f_1, g_2) = B, H(f_1, g_5) = B, H(f_5, g_2) = B, H(f_5, g_5) = A$ ,  $f_1$  and  $f_5$  are in dispute.  $(f_4, g_1) = A, H(f_4, g_3) = A, H(f_6, g_1) = B, H(f_6, g_3) = A$ , hence  $f_4$  &  $f_6$  are in dispute once more. Similarly, the table makes it simple to compute all pairings of opposing SNPRs. Figure 11 depicts the conflicts graph relating to this SNPR assembling difficulty.

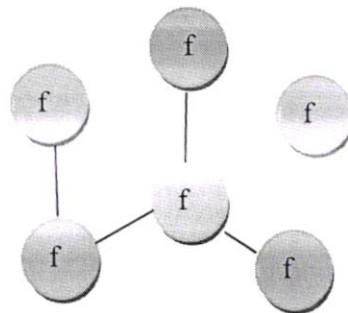


Figure 11: The conflict graph for SNP assembly problem

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The minimum node coverage throughout the dispute graph are now determined using the nodes covering methodology. The no of nodes 6 is provided as an input, accompanied by adjacency matrix including its graph shown in Figure 12. If another nodes  $f_i$  &  $f_j$  use an edge throughout the dispute graph, the item in column  $j$  and row  $i$  of the adjacency matrix is one, otherwise it is zero.

0	0	0	0	1	0
0	0	0	1	0	0
0	0	0	0	0	0
0	1	0	0	1	1
1	0	0	1	0	0
0	0	0	1	0	0

Figure 12: The input for the vertex cover algorithm

Two unique minimum vertex coverings are discovered by the vertex software.

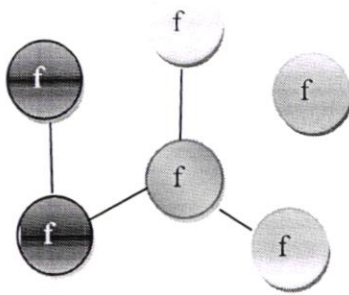


Figure 13: Minimum Vertex Cover:  $f_1, f_2$

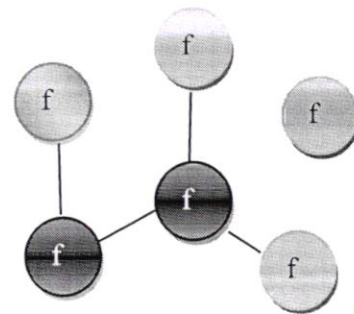


Figure 14: Minimum Vertex Cover:  $f_2, f_3$

As a result, whether removing  $f_1, f_2$  or removing  $f_2, f_3$  addresses the SNP assembling challenge. Figure 15 illustrates an image of a graph demonstrate the html page. The title, images, & phrases are used to mark the borders.

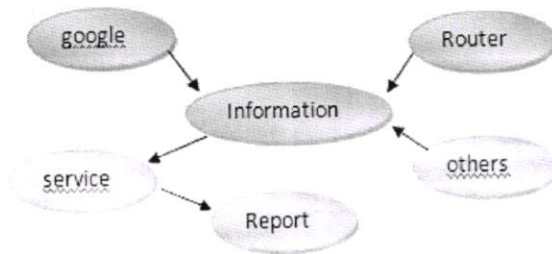


Figure 15: Web document – Graph representation

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Whenever entities pass the border from one detector, i.e. the sensing area of one detector, then join the sensing zone of yet another detector, the preceding detector must correctly communicate this to the adjoining detector. The detecting strength is determined by the incidence rates among two adjacent detectors. The system is described as just an undirected weighted network  $T(DeT, ET, WT)$  wherein  $v$  corresponds to DeT and edge  $(u,v)$  belongs to ET, assuming that perhaps the device's transmit power is broad enough so the two neighbours can interact directly with one another. The detectors are represented by  $D$ , whereas the neighbours are represented by  $u,v$ .  $WT(u,v)$  is the EG's weighed edge of  $(u,v)$ . The idea of wraps was employed by the scholars.

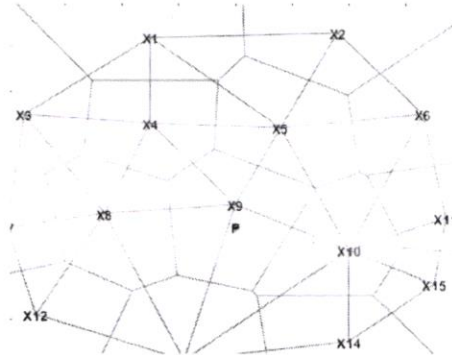


Figure 16: Voronoi diagram with regions

#### 4. RESULTS

Whenever the methodology was put into practice, a testing based on photos from either a prior migraines project was conducted.

Table 1 Graph theory results.

Char	Area	Controls N(M/SL)	SD(M/SL)	Sporadic Migraine N(M/SL)	SD(m/SL)	Medication abuse N(M/SL)	SD(M/SL)
	91	1.0678/1.0602	0.234/0.342	1.09/1.098	0.013/0.023	1.079/1.054	0.014/0.04
X	118	1.0655/1.093	0.032/0.477	1.08/1.089	0.013/0.003	1.066/1.075	0.012/0.031
M	91	1.004/1.045	0.003/0.008	1.095/0.323	0.008/0.002	1.006/1.045	0.001/0.007
	118	1.003/1.05	0.003/0.006	1.098/0.008	0.004/1.02	1.005/1.031	0.002/0.005

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N	91	0.993/0.895	0.005/0.283	0.997/0.987	0.001/0.9	0.994/0.05	0.003/0.015
	118	0.994/0.865	0.003/0.012	0.8976/0.98	0.993/0.84	0.9953/0.884	0.003/0.014

From the data in Table 1, a classification with different classifiers, areas, and correlations was To accomplish so, a research containing 91 & 118 segments of AAL areas, necessarily coincide, and SL with either the following criteria:  $X=1$ ,  $M=1$ ,  $N=5$ , and  $Pr=0.06$  is incorporated into the technique. After 45 random iterations of a dataset, most values are standardized. The outcomes of a graph theory computations are shown in Table 1. With every one of the groups. The 3 characteristics average score & standard deviation were investigated. The findings are supplied for all of the parts (118), as well as 91 explanatory segments.

A categorization using several classifier, regions, and relationships were carried out using the data from Table 1. Table 2 indicates the results. The results of accuracy and precision are listed. The sensitivities of a classification determines its capacity to identify diseases in sick patients, whereas the specific determines its ability to recognize diseases with in lack of sickness. The new framework can handle the entire procedure, including acquiring fMRI pictures to delivering complete details that doctors or experts can understand. It is an effective algorithm in which the client merely inputs fMRI data then determine the best cartography and connections. To test this strategy, researchers looked at people who had migraines and were also drug addicts. The method does a thorough study and suggests various classifiers, some of which achieve 92.86 percent accuracy (Nn) and some others 86 percent (SVM). Different research using comparable machine learning algorithms in all the other diseases found chances of success of 76 to 88%, indicating that the suggested methodology has yielded satisfactory outcomes. The current discrepancies in classification outcomes can be attributed to a variety of factors, along with the kind of classification (supervised, uncontrolled, or partial-supervised) or the variation among classifier using same information that may achieve regional or global effectiveness.

Due to the random learning framework, some few classifier, such as NN, might produce diverse outputs. Increasing the amount of respondents inside each participating organization would allow for a more thorough investigation. These method is challenging for migraine sufferers since the noise produced by the MRI scanner causes individuals discomfort. Furthermore, one of the study results present limitations is the inability to employ automated classifier throughout conjunction with the entire map or a personal association. New atlases and relationships must be introduced in the order to improve the outcomes by allowing experts to study pathologies with a larger variety of factors.

Table 2 Classifiers.

Classifier		Success percentage	Connection percentage	AB %	Specification	Sensitivity
SVM	91	65.09/45.03	66.87/56.97	80/45	0.59/0.86	0.99/0.54

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	118	67.98/68.09	78.99/56.00	60/30	0.094/0.65	0.65/0.64
K-means	91	89.00/66.98	87.99/67.95	40/70	0.87/0.77	1/1
	118	87.09/56.98	56.98/59.98	60/50	0.56/0.45	1/0.98
Knn	91	56.96/47.99	89.00/90.76	60/30	0.53/0.66	0.59/0.87
	118	57.99/52.87	48.98/65.98	0/80	0.76/0.66	0.65/0.73
AdaBoost	91	64.55/57.95	55.67/66.94	80/30	0.79/0.44	0.94/0.34
	118	64.44/46.96	63.75/66.56	60/40	0.93/0.56	0.44/0.64
Nn( 3 layers)	91	86.09/45.03	84.87/56.97	100/100	0.80/0.86	0.49/0.84
	118	83.98/68.09	74.99/56.00	100/20	0.93/0.65	0.85/0.74
LDA	91	90.43/67.94	87.44/95.99	100/40	0.64/0.334	0.77/0.97
	118	51.55/21.93	45.77/86.44	60/100	0.77/0.83	0.86/0.22

Graph theory-based numerical methods are simple to develop using common graphs methods, as well as the predictions were simple to identify thanks to the graph's links and routes. Nevertheless, because graph technologies primarily analyse comparatively home network knowledge, predictive accuracy is usually poor. Graph connection estimations are frequently biased in favour of connected dominating nodes in the cluster, resulting in poor rankings for novel medications and far less genomes. As a result, graph connectedness measurements are hardly used to estimate.

## 5. CONCLUSION

This study looked at several aspects of graph theory, like computer-assisted graph representations as well as graph-theoretic database systems like lists & matrices hierarchies. This study provides a better approach in representing and characterisation of a brain connection network, as well as machine learning in categorizing clusters based on factors retrieved from photographs, to emphasise the importance of graph theory. Data pre-processing, correlates, attributes, and techniques are some of the approaches used by this program. This research shows how an automated tool can be used to automate a systematic pattern utilizing MRI templates. Pre-processing, graph creation per topic using various connections, mapping, important extraction of features found in the literature, and lastly



offering a set of machine learning techniques that really can give interpretable findings for doctors or experts are all component techniques of the method. This paper also discusses a most typical advantages of graph theory in numerous domains to emphasize the highlights of graph theory. A summary of graph theory difficulties pertinent to their ideas and tactics is also included in this study.

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Avanhi Institute of Engg. & Tech.  
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# Development Of Machine Learning Techniques To Differentiate COVID-19 Indications From Serious Diseases

Dr. Neelamadhab Padhy<sup>1</sup>, Praveen Yadav<sup>2</sup>, Dr. Syed Khasim<sup>3</sup>, Dr. Shaik Shakeer Basha<sup>4</sup>, Purshottam J. Assudani<sup>5</sup>, S. Ranjana<sup>6</sup>

<sup>1</sup>Associate Professor, Department of Computer Science and Engineering, GIET University, Gunupur, Odisha 765022.

<sup>2</sup>Assistant Professor, Department of Computer Science and Engineering, University Institute of Technology, RGPV Bhopal Madhya Pradesh-462033.

<sup>3</sup>Professor, Department of Computer Science and Engineering, Dr. Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316.

<sup>4</sup>Assistant Professor, Department of Computer Science and Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>5</sup>Assistant Professor, Department of Information Technology, Shri Ramdeobaba College of Engineering and Management, Gittikhadan, Katol Road, Nagpur, Maharashtra, India-440014.

<sup>6</sup>Assistant Professor, Department of Computer Science, Anna Adarsh College for Women, A1, II street, 9th Main Road, Anna Nagar, Chennai -600040.

**Abstract:** Considering the identical signs of both covid-19 and influenza, most individuals are unable to distinguish between the two, which can result in a person's death. To control the death rate, several approaches are needed to categorize the signs of covid-19 and other diseases. Severe sickness is more likely to hit the elderly and individuals with underlying medical conditions and diseases lung diseases and cancer. In the context of the present outbreak, identification of these diseases is limited to a few clinical studies like RT-PCR and CT-Scan of lung pictures to detect the covid-19. We will develop a method to solve the present issues experienced by people in the outbreak condition, as these examinations take a long time and are highly expensive. Researchers discovered that image processing, data mining, artificial intelligence, and pattern recognition are widely utilized approaches for solving these problems after doing a research study.

**Keywords:** Covid-19, Lung illness, cardiovascular disorder, diabetes, Data mining, machine learning

## 1. INTRODUCTION

Since 2019, the Corona Virus has had a significant impact, resulting in several injuries and deaths. The COVID-19 outbreak was proclaimed at the global level. COVID-19 began with flu-like indications, progressed to influenza, and eventually invaded the lungs. For the majority of COVID-19 sufferers, however, a heart attack was the cause of death. Within 2 to 14 days, the virus-infected individual began to exhibit indications. In summary, the COVID-19 revealed a wide range of illnesses. COVID-positive individuals have recovered fully and



have begun living a healthy life in some circumstances, although in the majority of cases, the condition has deteriorated and individuals have been admitted to a hospital.

Designers use several Machine Learning algorithms to discriminate COVID-19 illness apart from flu throughout the research design, and once we have such indicators, we add them to COVID-19 clinical symptoms and divide the dataset into three groups. Slight, Medium and Serious Clients are the three types of patients. The dataset expands as COVID-19 reveals signs of different diseases. For a larger dataset, machine learning techniques are an excellent choice. For separating COVID-19 from flu, designers utilized K-Nearest Neighbors, Linear Regression, and Decision Tree methods. For treatment outcomes, decision trees, Nave Bayes, and K-Means methods are employed.

## 2. LITERATURE SURVEY

The investigation was conducted out [1] using approaches such as real-time data query, visualization on their site, and then use of the queried data for Susceptible-Exposed-Infectious-Recovered (SEIR) synthesis processes. The author analyzed the information and divided it into pleasant and unpleasant feelings to fully understand the impact of the information on people's choices social - financial behavior. The five top authors talk about teamwork and personal strength in the face of the pandemic, whereas the top five negative stories discuss uncertainty and bad illness outcomes, such as fatalities. Ultimately, it was determined that the infectious illness is still unknown, implying that the author will only be able to make an accurate SEIR forecast once the epidemic is over.

A study [2] looks at theoretical equations for the distribution of a group organized by age. Because illness spreads via social contact and varies with age, it's critical to forecasting disease transmission based on changes in social structure. The COVID-19 was evaluated using a computational formula that combined contact pattern synthesis with empirical evidence. The model shows that a long duration of shutdowns followed by occasional relaxation reduces the number of instances.

It was given the term novel since it was the first time an animal Coronavirus mutation had been detected. Cases range from moderate to severe, with extreme cases resulting in significant medical problems or even death. The virus's incubation period in the human is 2-14 days 3, although the exact duration is unclear. COVID-19 infection is linked with several clinical symptoms, that are classified into Moderate and Severe pneumonia. The CT- SCAN findings are classified into 3 phases: Low, Medium, and Serious ARDS. The last two phases of the findings are extremely hard to define. Cleaning your hands is a typical measure for preventing the COVID-19 virus.

Deep learning algorithms were developed in this study paper [3] for estimating COVID-19 positive cases in India. Long short-term memory cells based on neural networks were utilized for prediction. Convolution LSTM produces the lowest outcomes, whereas bi-directional LSTM produces the highest performance. This study shows [4] the forecast of COVID-19, which has been done since traditional methods had demonstrated low accuracy for long-term forecast cases. The number of people in class S increases with time, which is commonly calculated to use simple equations [5].

The current study was based on readily viewable data of newly confirmed every day reported incidents from the tenth of January to the tenth February in this paper [6]. The key epidemiology metrics, such as the basic reproduction number and case recovery ratios, were estimated using the average scores of the main epidemiological indicators [7]. The magnitude



of the outbreak in Wuhan was assessed with cases imported from Wuhan to all places around the world [8].

### 3. METHODOLOGY

**K-Nearest Neighbors** is a Supervised Learning-based Learning Algorithm that is one of the most basic. It saves all of the information and group a data point depending on its resemblance to the available data. This implies that fresh data may be quickly categorized into a well-suited group using the K-NN method as it arises. Below are basic formulae for K-Nearest Neighbour categorization. Distance measure formula

$$d(x, y) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2} \text{----- (1)}$$

Manhattan Distance equation

$$d(x, y) = \sum_{i=1}^m |x_i - y_i| \text{----- (2)}$$

Minkowski Distance equation

$$\left( \sum_{i=1}^n |x_i - y_i|^p \right)^{1/p} \text{-----(3)}$$

**A Decision Tree** is a machine learning algorithm that may be applied to regression and classification issues. Input data contain data characteristics, the organization decision rules, so each leaf node provides the conclusion in this tree-structured classification.

Leaf nodes are the result of those selections, while Choice nodes are utilized to make the decision and contain numerous paths. The decision tree classifier's theoretical formulae are as continues to follow:

1. Information Gain = Entropy(S) - [(Weighted Avg) \* Entropy (each feature)]
2. Gini Index = 1 -  $\sum_j P_j^2$

The supervised machine learning framework method logistic regression was used to estimate the likelihood of a target variable. The structure of the objective is binary in this case, which implies there are only two groups. There are two sorts of variables: mean and standard deviation. The response variable is binary, with data recorded as 1 (yes) or 0 (no) (no). Logistic regression predicts P(Y=1) as a variable of X Empirically, a linear regression model predicts P(Y=1) as a variable of X.


$$P(X) = P(Y=1|X)$$

Logistic regression equation

$$y = e^{(b_0 + b_1 * x)} / (1 + e^{(b_0 + b_1 * x)}) \text{----- (4)}$$

The Naive Bayes method is based on the Bayesian network, which would be a data mining and machine learning approach. The Naive Bayes designer's following equation can be seen here.

$$P(c|x) = p(x|c) p(c) / p(x) \text{----- (5)}$$

  
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K means is an incremental technique that attempts to divide a dataset into K pre-defined groups, each of which includes just one piece of data. It attempts to maintain based on inter datasets as comparable as feasible and maintaining groups as distinct as feasible. It operates on the idea of computing the sum of squared lengths between two points and ensuring that the cluster's center is as small as possible.

$$J(V) = \sum_{i=1}^C \sum_{j=1}^c (|Xi - vj|)^2 \text{ ----- (6)}$$

**4. RESULTS ANALYSIS**

In this work, researchers tested several of the approaches for predicting covid-19 illness and stratifying the degree of covid-19 illness. We came to the following findings after completing the installation of the supplied machine learning models. The efficiency of the K-NN algorithm is 0.7611 to begin off. It has an accuracy of 0.886, a memory of 0.890, and an f1-measure of 0.89. Secondly, the Decision tree classification model has a 0.905 accuracy. Accuracy is 0.89, recall is 0.91, f1- measure is 0.990, and confidence is 93 for this model. Ultimately, the Regression Model has an effectiveness of 0.889. It has a 0.90 accuracy.

Table 1 Accuracy rate of different methods

Sl. No	Algorithm	Precision
1	K Classifier	0.886
2	Decision Tree Classifier	0.910
3	Logistic Regression	0.849
4	Naive Bayes	0.954
5	K- Means	0.840

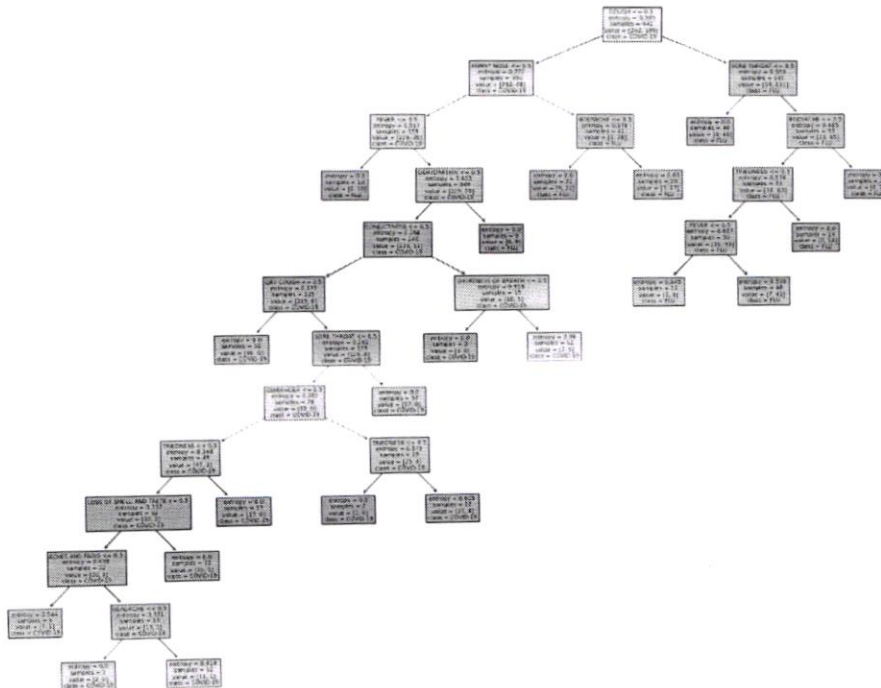


Figure 1: Decision Tree Classification

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 2065  
 Hyderabad (V), Andhra Pradesh, India



	Real Values	Predicted Values
0	Moderate	Moderate
1	Moderate	Moderate
2	Moderate	Moderate
3	Moderate	Moderate
4	Mild	Mild
...	...	...
257	Mild	Mild
258	Severe	Severe
259	Mild	Mild
260	Mild	Mild
261	Mild	Mild

Figure 2: Real observations and identified observations

Figure 1 and 2 shows the decision classification trees and Real observations and identified observations form the different method. Table 1 describes the accuracy rate in contrast to a different method. It's impossible to determine the similarity between COVID-19 and influenza since the indications of COVID-19 are possible to specify. In the instance of data segmentation, researchers arrived at the following findings after completing the installation of the supplied machine learning techniques. To begin, the Decision tree model's efficiency is 0.994. It has an accuracy of 0.993, a recall of 0.993, and an f1-measure of 0.892. Secondly, the Naive Bayes classification algorithm has an efficiency of 0.894. Ultimately, the K Means analysis has an efficiency of 0.880.


## 5. CONCLUSION

According to the modeling levels of accuracy achieved for the data using machine learning algorithms, the decision tree algorithm produces the highest results (0.925), followed by the Regression model and KNN classifier, which are the weakest point. Whenever it comes to information segmentation, the feature selection and Naive Bayes are nearly identical, with the feature selection yielding the greatest results (0.934 accuracies), whereas the K Means method yields the most reliable data. As a result, researchers believe that this project on COVID-19 forecasting and severity distinction is complete and that it might have been utilized to save physicians time & expense when diagnosing the illness and determining which phase the individual.

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Dr. Neelamadhab Padhy<sup>1</sup>, Praveen Yadav<sup>2</sup>, Dr. Syed Khasim<sup>3</sup>, Dr. Shaik Shakeer Basha<sup>4</sup>,  
Purshottam J. Assudani<sup>5</sup>, S. Ranjana<sup>6</sup>

<sup>1</sup>Associate Professor, Department of Computer Science and Engineering, GIET University, Gunupur, Odisha 765022.

<sup>2</sup>Assistant Professor, Department of Computer Science and Engineering, University Institute of Technology, RGPV Bhopal Madhya Pradesh-462033.

<sup>3</sup>Professor, Department of Computer Science and Engineering, Dr. Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316.

<sup>4</sup>Assistant Professor, Department of Computer Science and Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>5</sup>Assistant Professor, Department of Information Technology, Shri Ramdeobaba College of Engineering and Management, Gittikhadan, Katol Road, Nagpur, Maharashtra, India-440014.

<sup>6</sup>Assistant Professor, Department of Computer Science, Anna Adarsh College for Women, A1, II street, 9th Main Road, Anna Nagar, Chennai -600040.

**Abstract:** Considering the identical signs of both covid-19 and influenza, most individuals are unable to distinguish between the two, which can result in a person's death. To control the death rate, several approaches are needed to categorize the signs of covid-19 and other diseases. Severe sickness is more likely to hit the elderly and individuals with underlying medical conditions and diseases lung diseases and cancer. In the context of the present outbreak, identification of these diseases is limited to a few clinical studies like RT-PCR and CT-Scan of lung pictures to detect the covid-19. We will develop a method to solve the present issues experienced by people in the outbreak condition, as these examinations take a long time and are highly expensive. Researchers discovered that image processing, data mining, artificial intelligence, and pattern recognition are widely utilized approaches for solving these problems after doing a research study.

**Keywords:** Covid-19, Lung illness, cardiovascular disorder, diabetes, Data mining, machine learning

## 1. INTRODUCTION

Since 2019, the Corona Virus has had a significant impact, resulting in several injuries and deaths. The COVID-19 outbreak was proclaimed at the global level. COVID-19 began with flu-like indications, progressed to influenza, and eventually invaded the lungs. For the majority of COVID-19 sufferers, however, a heart attack was the cause of death. Within 2 to 14 days, the virus-infected individual began to exhibit indications. In summary, the COVID-19 revealed a wide range of illnesses. COVID-positive individuals have recovered fully and



have begun living a healthy life in some circumstances, although in the majority of cases, the condition has deteriorated and individuals have been admitted to a hospital.

Designers use several Machine Learning algorithms to discriminate COVID-19 illness apart from flu throughout the research design, and once we have such indicators, we add them to COVID-19 clinical symptoms and divide the dataset into three groups. Slight, Medium and Serious Clients are the three types of patients. The dataset expands as COVID-19 reveals signs of different diseases. For a larger dataset, machine learning techniques are an excellent choice. For separating COVID-19 from flu, designers utilized K-Nearest Neighbors, Linear Regression, and Decision Tree methods. For treatment outcomes, decision trees, Nave Bayes, and K-Means methods are employed.

## 2. LITERATURE SURVEY

The investigation was conducted out [1] using approaches such as real-time data query, visualization on their site, and then use of the queried data for Susceptible-Exposed-Infectious-Recovered (SEIR) synthesis processes. The author analyzed the information and divided it into pleasant and unpleasant feelings to fully understand the impact of the information on people's choices social - financial behavior. The five top authors talk about teamwork and personal strength in the face of the pandemic, whereas the top five negative stories discuss uncertainty and bad illness outcomes, such as fatalities. Ultimately, it was determined that the infectious illness is still unknown, implying that the author will only be able to make an accurate SEIR forecast once the epidemic is over.

A study [2] looks at theoretical equations for the distribution of a group organized by age. Because illness spreads via social contact and varies with age, it's critical to forecasting disease transmission based on changes in social structure. The COVID-19 was evaluated using a computational formula that combined contact pattern synthesis with empirical evidence. The model shows that a long duration of shutdowns followed by occasional relaxation reduces the number of instances.

It was given the term novel since it was the first time an animal Coronavirus mutation had been detected. Cases range from moderate to severe, with extreme cases resulting in significant medical problems or even death. The virus's incubation period in the human is 2-14 days 3, although the exact duration is unclear. COVID-19 infection is linked with several clinical symptoms, that are classified into Moderate and Severe pneumonia. The CT- SCAN findings are classified into 3 phases: Low, Medium, and Serious ARDS. The last two phases of the findings are extremely hard to define. Cleaning your hands is a typical measure for preventing the COVID-19 virus.

Deep learning algorithms were developed in this study paper [3] for estimating COVID-19 positive cases in India. Long short-term memory cells based on neural networks were utilized for prediction. Convolution LSTM produces the lowest outcomes, whereas bi-directional LSTM produces the highest performance. This study shows [4] the forecast of COVID-19, which has been done since traditional methods had demonstrated low accuracy for long-term forecast cases. The number of people in class S increases with time, which is commonly calculated to use simple equations [5].

The current study was based on readily viewable data of newly confirmed every day reported incidents from the tenth of January to the tenth February in this paper [6]. The key epidemiology metrics, such as the basic reproduction number and case recovery ratios, were estimated using the average scores of the main epidemiological indicators [7]. The magnitude



of the outbreak in Wuhan was assessed with cases imported from Wuhan to all places around the world [8].

### 3. METHODOLOGY

**K-Nearest Neighbors** is a Supervised Learning-based Learning Algorithm that is one of the most basic. It saves all of the information and group a data point depending on its resemblance to the available data. This implies that fresh data may be quickly categorized into a well-suited group using the K-NN method as it arises. Below are basic formulae for K-Nearest Neighbour categorization. Distance measure formula

$$d(x, y) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2} \text{ ----- (1)}$$

Manhattan Distance equation

$$d(x, y) = \sum_{i=1}^n |x_i - y_i| \text{ ----- (2)}$$

Minkowski Distance equation

$$\left( \sum_{i=1}^n |x_i - y_i|^p \right)^{1/p} \text{ -----(3)}$$

**A Decision Tree** is a machine learning algorithm that may be applied to regression and classification issues. Input data contain data characteristics, the organization decision rules, so each leaf node provides the conclusion in this tree-structured classification.

Leaf nodes are the result of those selections, while Choice nodes are utilized to make the decision and contain numerous paths. The decision tree classifier's theoretical formulae are as continues to follow:

1. Information Gain = Entropy(S) - [(Weighted Avg) \* Entropy (each feature)]
2. Gini Index = 1 -  $\sum_j P_j^2$

The supervised machine learning framework method logistic regression was used to estimate the likelihood of a target variable. The structure of the objective is binary in this case, which implies there are only two groups. There are two sorts of variables: mean and standard deviation. The response variable is binary, with data recorded as 1 (yes) or 0 (no) (no). Logistic regression predicts P(Y=1) as a variable of X Empirically, a linear regression model predicts P(Y=1) as a variable of X.

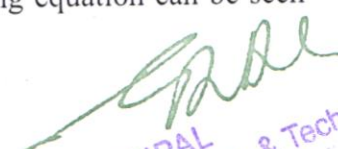
$$P(X) = P(Y=1|X)$$

Logistic regression equation

$$y = \frac{e^{(b_0 + b_1 * x)}}{1 + e^{(b_0 + b_1 * x)}} \text{ ----- (4)}$$

The Naive Bayes method is based on the Bayesian network, which would be a data mining and machine learning approach. The Naive Bayes designer's following equation can be seen here.

$$P(c|x) = \frac{p(x|c) p(c)}{p(x)} \text{ ----- (5)}$$

  
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K means is an incremental technique that attempts to divide a dataset into K pre-defined groups, each of which includes just one piece of data. It attempts to maintain based on inter datasets as comparable as feasible and maintaining groups as distinct as feasible. It operates on the idea of computing the sum of squared lengths between two points and ensuring that the cluster's center is as small as possible.

$$J(V) = \sum_{i=1}^c \sum_{j=1}^c (|Xi - Vj|)^2 \text{ ----- (6)}$$

**4. RESULTS ANALYSIS**

In this work, researchers tested several of the approaches for predicting covid-19 illness and stratifying the degree of covid-19 illness. We came to the following findings after completing the installation of the supplied machine learning models. The efficiency of the K-NN algorithm is 0.7611 to begin off. It has an accuracy of 0.886, a memory of 0.890, and an f1-measure of 0.89. Secondly, the Decision tree classification model has a 0.905 accuracy. Accuracy is 0.89, recall is 0.91, f1- measure is 0.990, and confidence is 93 for this model. Ultimately, the Regression Model has an effectiveness of 0.889. It has a 0.90 accuracy.

Table 1 Accuracy rate of different methods

Sl. No	Algorithm	Precision
1	K Classifier	0.886
2	Decision Tree Classifier	0.910
3	Logistic Regression	0.849
4	Naive Bayes	0.954
5	K- Means	0.840

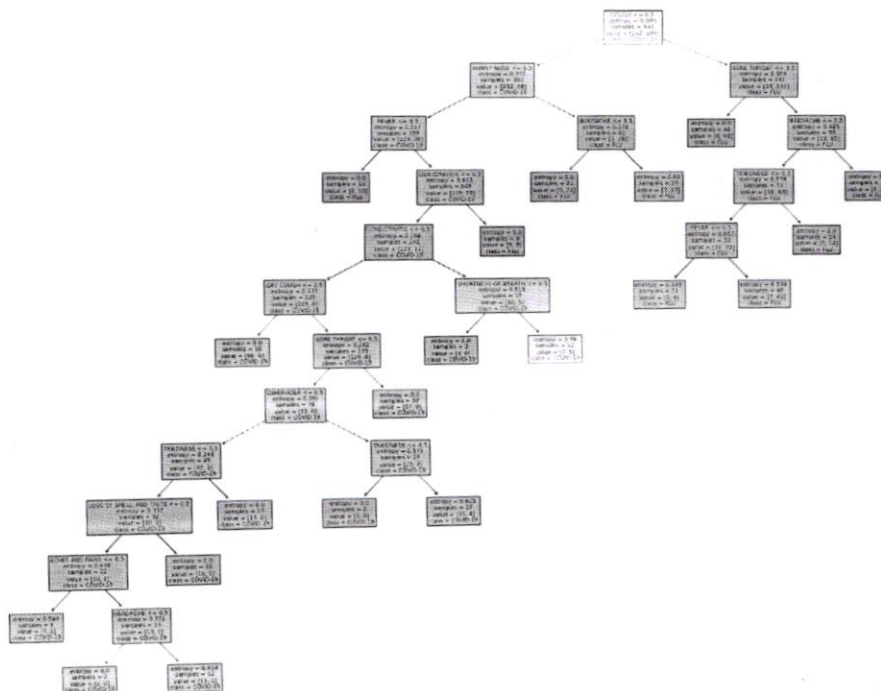


Figure 1: Decision Tree Classification

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 Avanthi, (Vijayawada), A.P.



	Real Values	Predicted Values
0	Moderate	Moderate
1	Moderate	Moderate
2	Moderate	Moderate
3	Moderate	Moderate
4	Mild	Mild
...	...	...
257	Mild	Mild
258	Severe	Severe
259	Mild	Mild
260	Mild	Mild
261	Mild	Mild

Figure 2: Real observations and identified observations

Figure 1 and 2 shows the decision classification trees and Real observations and identified observations from the different method. Table 1 describes the accuracy rate in contrast to a different method. It's impossible to determine the similarity between COVID-19 and influenza since the indications of COVID-19 are possible to specify. In the instance of data segmentation, researchers arrived at the following findings after completing the installation of the supplied machine learning techniques. To begin, the Decision tree model's efficiency is 0.994. It has an accuracy of 0.993, a recall of 0.993, and an f1-measure of 0.892. Secondly, the Naive Bayes classification algorithm has an efficiency of 0.894. Ultimately, the K Means analysis has an efficiency of 0.880.

## 5. CONCLUSION

According to the modeling levels of accuracy achieved for the data using machine learning algorithms, the decision tree algorithm produces the highest results (0.925), followed by the Regression model and KNN classifier, which are the weakest point. Whenever it comes to information segmentation, the feature selection and Naive Bayes are nearly identical, with the feature selection yielding the greatest results (0.934 accuracies), whereas the K Means method yields the most reliable data. As a result, researchers believe that this project on COVID-19 forecasting and severity distinction is complete and that it might have been utilized to save physicians time & expense when diagnosing the illness and determining which phase the individual.

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Avanthi Institute of Engg. & Tech.  
Guntur (T), West of Rajamahendravaram (Mdt.), R.R. Dist.



# Automated Visual Assessment From Optical Data Sets To Enhance The Accuracy Of Data Analysis

Dr.Syed Khasim<sup>1</sup>,Dr.Neelamadhab Padhy<sup>2</sup>,Dr. Sarita V Balshetwar<sup>3</sup>, Dr. G. Sivakumar<sup>4</sup>  
Dr.Shaik Shakeer Basha<sup>5</sup>,Jeipratha P N<sup>6</sup>

<sup>1</sup>Professor, Department of Computer Science and Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316.

<sup>2</sup>Associate Professor, Department of Computer Science and Engineering, GIET University, Gunupur, Odisha 765022.

<sup>3</sup>Associate Professor, Department of Computer Science and Engineering, AGTIs DACOE, Karad, Satara, Maharashtra-415002.

<sup>4</sup>Professor, Department of Computer Science and Engineering, Erode Sengunthar Engineering College, Erode, Tamilnadu- 638057, India

<sup>5</sup>Assistant Professor, Department of Computer Science and Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>6</sup>Assistant Professor, Department of Computer Science and Engineering, St.Joseph's College of Engineering, OMR Chennai 600119.

**Abstract:** Data visualization is a technique for extracting information from massive amounts of data. For their assumption, software engineers constantly generate multiple visualizations from datasets. Evaluating databases with a large number of characteristics may be time-consuming and error-prone. The objective of this study is to use optimal datasets from several sources to automatically propose attractive visualization patterns. It helps you save time by reducing the amount of time you spend on low-value visualizations and displaying suggested pattern.

**Keywords:** Query optimizer; Big Data Analyst; Data science; Visualization; Data analyst

## 1. INTRODUCTION

Data scientists and analysts are increasingly using data visualization technologies. They load alternative datasets and use visualization tools to test their theory; this step is followed numerous times until they discover an obvious pattern. Data scientists must use this time-consuming trial and error technique to gain insights. The primary objective of this study is to discover intriguing patterns in huge datasets from various sources [1].

In identify diverse patterns and abnormalities, data scientists must create various representations from fresh datasets. Finding numerous patterns in a dataset with a large dimensionality becomes a time-consuming process. For data analysis, connections between characteristics and their subsets must be determined. If the mapped information differs significantly from the reference points or historical information, important observations seem to be likely to occur. The variety of visualizations that may be created is enormous, even for a

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tiny dataset. The visualizations should be shown at an engaging speed, with a faster reaction speed to the consumers.

Data is now stored in a variety of databases with storage models tailored to their specific requirements. When information needs to be evaluated, it must be retrieved from a variety of sources. To benefit from the performance advantages of native systems particularly built to handle them, organized data is saved in relational databases while unorganized information is stored in NoSQL relational databases.

MIMIC-III is a database that stores information about clients who have been admitted to hospitals. It includes vital sign information, medical equipment data, doctor comments, and patient admission information. After the patient information has been de-identified, the data is made available to researchers [2]. To create a graphical suggestion tool, data federation across these many databases is necessary. This would make it easier for data scientists and analysts to test their hypotheses using various datasets. Currently, this procedure is manual, the user is required to collect relevant data and then walk through all of the visualizations, which is a time-consuming effort [3].

De-identified patient data obtained from various sources can be displayed in graphs. It contains information such as the patient's admittance date, identity, physician remarks, and medical equipment time - series. This becomes complicated to get rid of all the visualizations created. Users are drawn to visualizations in which the training set differs significantly from the related data. They can concentrate on their duties since they have a federation SQL architecture that fetches data rapidly across systems [4,5].

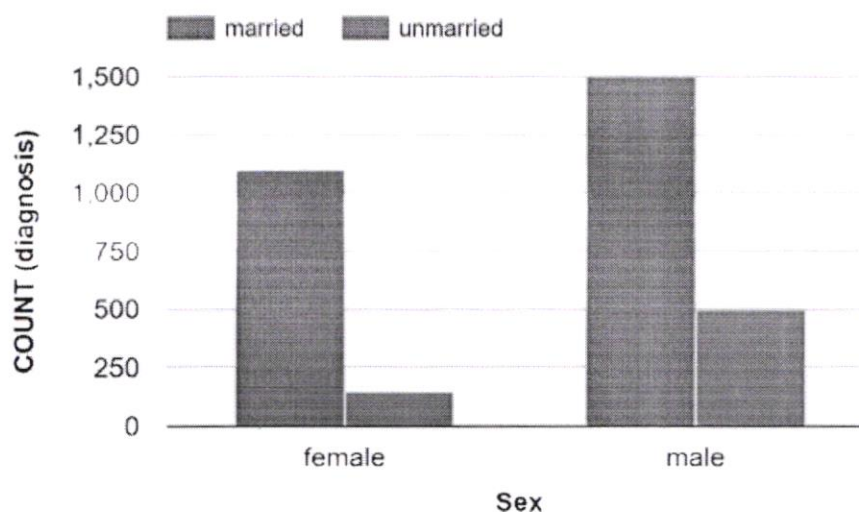


Figure 1 depicts the chart for hospitalized married and unmarried patients with cardiac issues. Figure 1 demonstrates how deviating target data from standard points aids in finding anomalies and abnormalities in the data, which can then be investigated subsequently.

## 2. RELATED WORKS

Data analysts examine information acquired from a variety of sources. The facts are represented by functional aspects, while the observed characteristics are obtained using conditional formatting. These two characteristics are utilized in visualization software [6]. This review concentrates on SeeDB [7], which suggests visualizations for a query based on a high utilitarian calculus that shows greater variances by collecting data from several



databases. Healthcare and medical equipment produce data in a variety of forms, which must be kept in several systems [8].

The customized SQL architecture searches data from any of the identified databases, and the classification process, where applicable, replace optimal data and gets the data fast, which is then utilized to construct the needed suggested visualization. The query's group-by attributes are represented as dimensional attributes D [9-11]. The measurement characteristics M and a collection of accumulation functions A are used to quantify the dimensional attributes. These searches are run against a collection of S databases that have been registered. Dimension characteristics D can be grouped and aggregated depending on measurement characteristics M.

This creates a two-dimensional table that may be used to visualize the data. Suggested Q (target) = SELECT d; a (m) FROM T(S) GROUP BY d

Q (reference) = SELECT d; a (m) FROM R(S) GROUP BY d

Utilitarian manufacturing is derived from the perspectives of Q (goal) and Q (source) (reference). The discrepancy in views is used to determine which visualizations should be presented (see Figs. 2 and 3).

SELECT sex, count (diagnosis) FROM admission\_married GROUP BY sex;  
 SELECT sex, count (diagnosis) FROM admission\_unmarried GROUP BY sex;

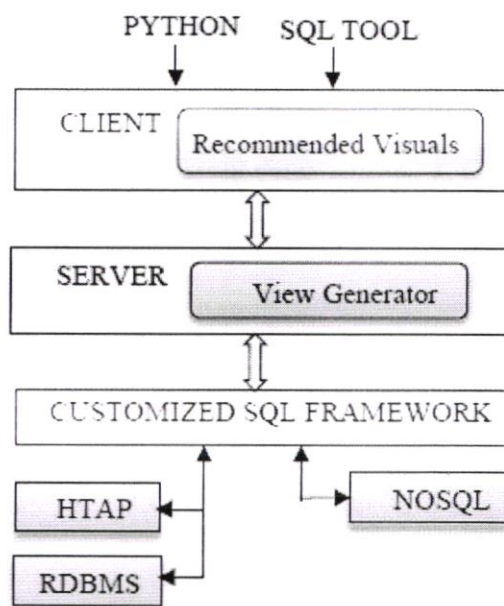


Figure 2 shows the visual suggestion application's architecture.

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 Chittoor, Andhra Pradesh, India

### Recommended Visualizations

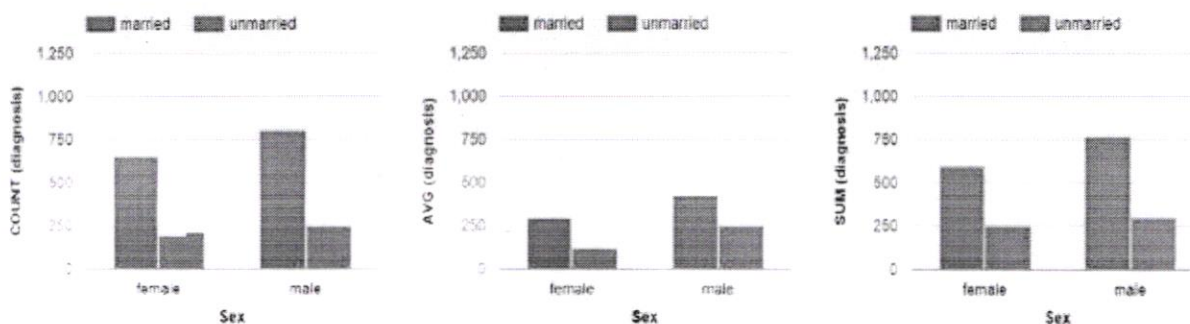


Fig. 3. Visualization chart

### 3. PROPOSED SYSTEMS

To get the data, it interacts with a bespoke SQL architecture that functions as a federated query layer. The technology revises the inquiry to the optimized copy and returns the result set at runtime. The relational node is transformed by the query optimizer by replacing it with whole or partial rules that fit the description. The various registered data is kept in a catalog, which the scheduling algorithm uses during runtime. It gives insights into the query's total execution price, the data size in tables, and CPU and Memory consumption.

Several group-by are merged when aggregate queries with the same group-by characteristics are aggregated into a single display. This leads to a reduction in query latency and performance improvement.

### 4. EVALUATION

The visualizations with the highest usefulness factor amongst these top perspectives, as well as improved precision and faster response times, were evaluated and shown in Figure 4.

  
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## Visual Recommendation for Data Science and Analytics

Dataset 1

Table Name: admission\_married

Column Name	Operator	Value
where diagnosis	=	Respiratory Rate

SELECT \* FROM admission\_married WHERE (diagnosis = 'Respiratory Rate');

Submit Queries

Dataset 2

Table Name: admission\_unmarried

Column Name	Operator	Value
where diagnosis	=	Respiratory Rate

SELECT \* FROM admission\_unmarried WHERE (diagnosis = 'Respiratory Rate');

### Recommended Visualizations

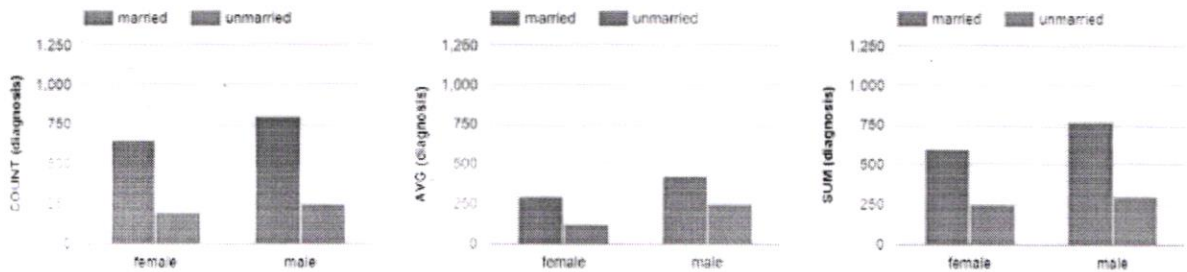


Fig. 4: Presentation of suggested visualizations for hospitalized treatment of respiratory problems.

## Visual Recommendation for Data Science and Analytics

Dataset 1

Table Name: admission\_married

Column Name	Operator	Value
where diagnosis	=	Congestive Heart Failure

SELECT \* FROM admission\_married WHERE (diagnosis = 'Congestive Heart Failure');

Submit Queries

Dataset 2

Table Name: admission\_unmarried

Column Name	Operator	Value
where diagnosis	=	Congestive Heart Failure

SELECT \* FROM admission\_unmarried WHERE (diagnosis = 'Congestive Heart Failure');

### Recommended Visualizations

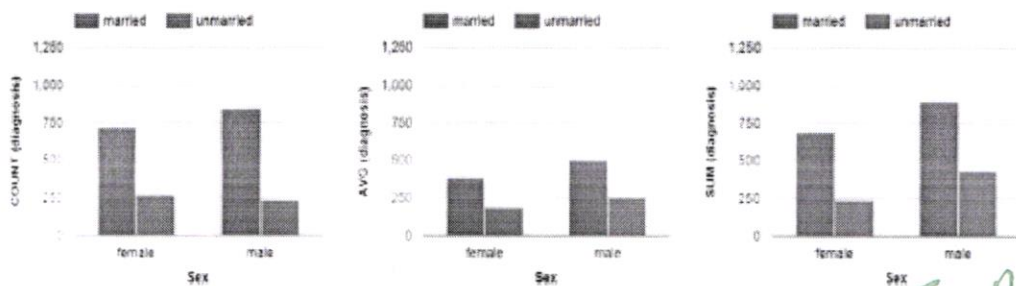


Fig. 5: Presentation of suggested visualizations for patients with heart-related problems.

*Prof. Dr. P. S. S. S. S. S.*  
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 "Dr. Abdulrahman" 2021

## Visual Recommendation for Data Science and Analytics

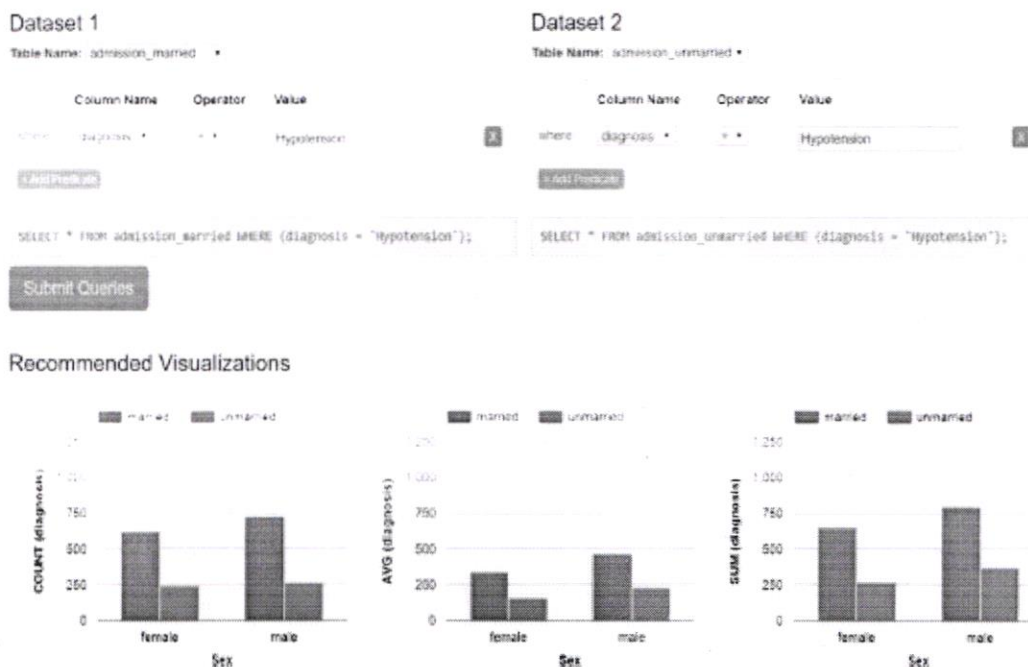


Fig. 6: Display of recommended visualizations for patients with hypotension-related problems.

All tests were run on a 32-bit Linux system with a 3.25 GHz Intel Xeon CPU and 8 GB of RAM. To store patient-related data, PostgreSQL was utilized. Splice Machine was used to store medical equipment data, while MongoDB was used to store text notes. The objective data is dataset1 and the comparison dataset is dataset2, as illustrated in Figs. 4, 5, and 6. The suggested visualizations are those that have a high usefulness factor and deviate from the reference points a most.

## 5. CONCLUSION

This research uses a visual analytical model in conjunction with an optimization to suggest intriguing visualizations from a variety of datasets on its own. This effort aids data scientists and analysts in their interactive information collection. Integration using data centers will be a significant expansion of this research.

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Avanathi Institute of Engg. & Tech.  
Mandapally (V), Addala, guntur (dist.), R.R. Dist.

# Artificial Heavy-Duty Structural Technology For Ai Mobile Robots To Control Dynamic Programming

Dr.Syed Khasim<sup>1</sup>, Dr. M.S. Rohokale<sup>2</sup>, Sathish Kumar D<sup>3</sup>, B Sarath Chandra<sup>4</sup>, Dr.Shaik Shakeer Basha<sup>5</sup>, Rahul Neware<sup>6</sup>

<sup>1</sup>Professor, Department of Computer Science and Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh-523316.

<sup>2</sup>Professor, Mechanical Engineering, SKN Sinhgad Institute of Technology and Science Kusgaon (Bk) Lonavala Pune Maharashtra-410401.

<sup>3</sup>Assistant Professor (Sr.G), Department of EEE, KPR Institute of Engineering and Technology, Coimbatore-641407.

<sup>4</sup>Assistant Professor, Department of Computer Science and Engineering, PSCMR College of Engineering and Technology, Vijayawada, Andhra Pradesh 520001.

<sup>5</sup>Assistant Professor, Department of Computer Science and Engineering, Avanathi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>6</sup>PhD Research Fellow, Department of Computing, Mathematics and Physics, Høgskulen på Vestlandet, Inndalsveien 28, 5063 Bergen, Norway.

## Abstract

*This article offers an intelligent four-wheeled mobile robot movement controller with four omni directional drive wheels equally spaced by each other at 90° using a Field-Programmable (FPGA) with artificial immune system algorithm. The suggested FPGA-based Artificial Intelligent System (AIS) method combines machine learning with FPGA technology. These FPGA-based AIS auto-stunning intelligent controls are projected to outperform standard non-optimized controls, the dynamic programming controllers and the particle swarm controller.*

**Keywords:** Mobile robots; Artificial Immune System; using field-programmable gate array

## 1. INTRODUCTION

In terms of locomotion mechanism, these robots outperform those using differential wheels [1]. Byun et al. [2] built a mobile robot with a changeable wheel movement in particular. Purwin [3] suggested a four-wheeled omnidirectional vehicle trajectory generating system. For an omnidirectional mobile robot, it was suggested a fuzzy route proposed a fuzzy controller for an directional inspection machine [4].

Between these contemporary metaheuristic-based solutions to address classification problem in mobile robots, de Castro and Timmis [5] introduced the AIS algorithm, which is based on the biological immune system and has proven to be a effectual and computational example for NP-hard combinatorial method. Its paradigm is based on the immune system's natural reaction. By leveraging their high optimization ability, the adaptive and AIS method been



effectively utilized in a variety of fields, including machine learning, classification, and pattern recognition.

FPGA invention has ushered in a fundamental shift in integrated circuit design for AI computing. In various fields, such as fuzzy positioning algorithm, it has been demonstrated to be an advanced and productive way of realizing complex algorithms. This FPGA technology has indeed been demonstrated to be effective in designing computational intelligence in embedded systems that incorporate memory, and processor cores, with the advantages of adaptability, hardware/software co-design, and copyright recyclability. However, no attempt has been made to build a mobile robot-specific intelligent FPGA-based AIS controller. The work is to develop practical algorithm controller based on FPGA integrated AIS for autonomous vehicles that can monitor and stabilize their path.

## 2. KINEMATIC CONTROL

This report explains the kinematics of an directional robotic system with wheels separated at 90° each other. The integrated controller is presented to accomplish stabilization and path tracking using the kinematics. In relation to a global frame, Figure 1 illustrates the set of driving arrangement.

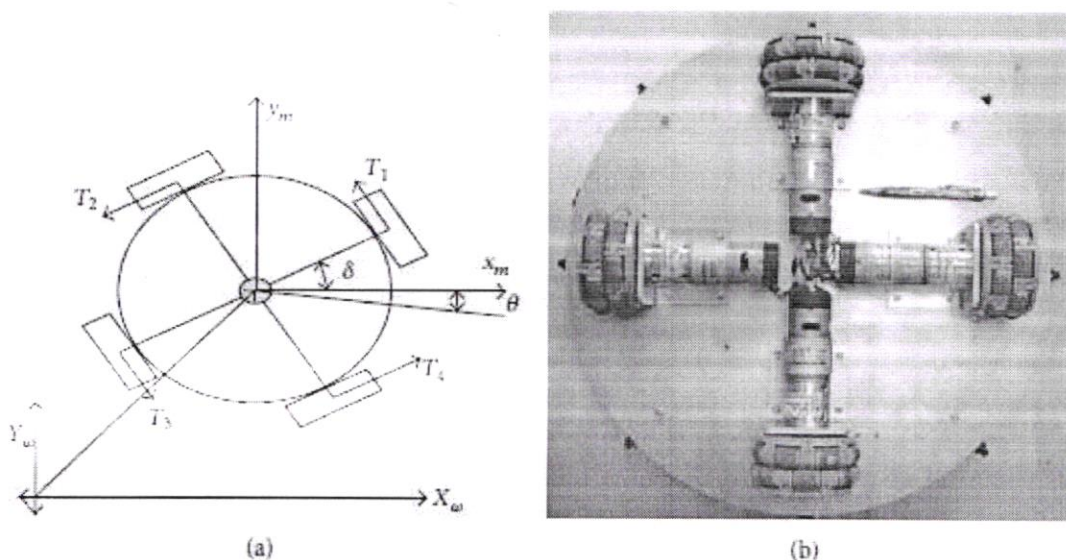


Figure 1: Arrangement of four-wheeled robot.

$$v(t) = \begin{bmatrix} v_1(t) \\ v_2(t) \\ v_3(t) \\ v_4(t) \end{bmatrix} = \begin{bmatrix} r\omega_1(t) \\ r\omega_2(t) \\ r\omega_3(t) \\ r\omega_4(t) \end{bmatrix} = P(\theta(t)) \begin{bmatrix} \dot{x}(t) \\ \dot{y}(t) \\ \dot{\theta}(t) \end{bmatrix}, \quad (1)$$

where

$$P(\theta(t)) = \begin{bmatrix} -\sin(\delta + \theta) & \cos(\delta + \theta) & L \\ -\cos(\delta + \theta) & -\sin(\delta + \theta) & L \\ \sin(\delta + \theta) & -\cos(\delta + \theta) & L \\ \cos(\delta + \theta) & \sin(\delta + \theta) & L \end{bmatrix}, \quad (2)$$

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where  $r$  signifies the wheel radius;  $L$  denotes the space between the wheel's centre and the geometric centre of the movable platform; The velocities of wheel was denoted by  $i(t)$  and  $i(t)$ , with  $I = 1, 2, 3, 4$ , etc. The mobile robot's posture is represented by  $[x(t) \ y(t) \ \theta(t)]$ .

$$P^r(\theta(t)) = \begin{bmatrix} \frac{-\sin(\delta + \theta)}{2} & \frac{-\cos(\delta + \theta)}{2} & \frac{\sin(\delta + \theta)}{2} & \frac{\cos(\delta + \theta)}{2} \\ \frac{\cos(\delta + \theta)}{2} & \frac{-\sin(\delta + \theta)}{2} & \frac{-\cos(\delta + \theta)}{2} & \frac{\sin(\delta + \theta)}{2} \\ \frac{1}{4L} & \frac{1}{4L} & \frac{1}{4L} & \frac{1}{4L} \end{bmatrix} \quad (3)$$

This part uses the kinematic model in (1) to develop kinematic controls for the directional mobile robot in Figure 2 to accomplish point stabilization and trajectory tracking. To create the controller for motion, one must first specify error, the difference between the current and point position.

$$Z_e(t) = \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} = \begin{bmatrix} x(t) \\ y(t) \\ \theta(t) \end{bmatrix} - \begin{bmatrix} x_d \\ y_d \\ \theta_d \end{bmatrix} \quad (4)$$

which gives

$$\begin{bmatrix} \dot{x}_e(t) \\ \dot{y}_e(t) \\ \dot{\theta}_e(t) \end{bmatrix} = \begin{bmatrix} \dot{x}(t) \\ \dot{y}(t) \\ \dot{\theta}(t) \end{bmatrix} = P^r(\theta(t)) \begin{bmatrix} r\omega_1(t) \\ r\omega_2(t) \\ r\omega_3(t) \\ r\omega_4(t) \end{bmatrix} \quad (5)$$

$$\begin{bmatrix} \omega_1(t) \\ \omega_2(t) \\ \omega_3(t) \\ \omega_4(t) \end{bmatrix} = \frac{1}{r} P(\theta(t)) \times \left( -K_P \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} - K_I \begin{bmatrix} \int_0^t x_e(\tau) d\tau \\ \int_0^t y_e(\tau) d\tau \\ \int_0^t \theta_e(\tau) d\tau \end{bmatrix} \right) \quad (6)$$

The PID control is extensively used in industrial applications [6], is employed in the control system presented in (6). When (6) is added to (5), the closed system error system's behaviors become

$$\begin{bmatrix} \dot{x}_e(t) \\ \dot{y}_e(t) \\ \dot{\theta}_e(t) \end{bmatrix} = -K_P \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} - K_I \begin{bmatrix} \int_0^t x_e(\tau) d\tau \\ \int_0^t y_e(\tau) d\tau \\ \int_0^t \theta_e(\tau) d\tau \end{bmatrix} \quad (7)$$

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$$\begin{aligned}
 V_1(t) &= \frac{1}{2} [x_e(t) \quad y_e(t) \quad \theta_e(t)] \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} \\
 &+ \frac{1}{2} \left[ \int_0^t x_e(\tau) d\tau \quad \int_0^t y_e(\tau) d\tau \quad \int_0^t \theta_e(\tau) d\tau \right] K_I \\
 &\times \begin{bmatrix} \int_0^t x_e(\tau) d\tau \\ \int_0^t y_e(\tau) d\tau \\ \int_0^t \theta_e(\tau) d\tau \end{bmatrix}.
 \end{aligned}
 \tag{8}$$

Taking the time derivative of  $V_1(t)$ , one obtains

$$\begin{aligned}
 \dot{V}_1(t) &= [x_e(t) \quad y_e(t) \quad \theta_e(t)] \begin{bmatrix} \dot{x}_e(t) \\ \dot{y}_e(t) \\ \dot{\theta}_e(t) \end{bmatrix} \\
 &+ \left[ \int_0^t x_e(\tau) d\tau \quad \int_0^t y_e(\tau) d\tau \quad \int_0^t \theta_e(\tau) d\tau \right] K_I \\
 &\times \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} \\
 &= - [x_e(t) \quad y_e(t) \quad \theta_e(t)] K_P \begin{bmatrix} x_e(t) \\ y_e(t) \\ \theta_e(t) \end{bmatrix} < 0.
 \end{aligned}
 \tag{9}$$

### 3. AIS ALGORITHM

In order to discover better solutions to complex combination problems, AIS algorithms employ an immune system and hypermutation. This methodology offers many strategies to address actual issues when conventional methods do not work, comparable to bio-inspired metaheuristics from GA [7] and PSO [8]. In order to test its efficacy, each antikörper is carefully preset with the optimization approach. The AIS-affinity anticorps are cloned, hypermutated and selected while the population is also increased with arbitrary anticorps. Worsening antibodies are substituted by superior mutation clones. This group is developed until the end is satisfied.

The steps in the AIS algorithm follows.

Step 1: Set up the AIS and iteration count.

Step 2: Create antibodies community of size (Ab1, ..., Abs) at random.

Step 3: Using affinities tool, compute the affinity ratio for each antibody.

Step 4: Create a group set for effective antibodies. The length of the replica is determined by the number of duplicates: the greater the affinity, the bigger the replica.

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Step 5: Refresh your antibody.

Step 6: Use the hyper mutation process to expand the variety of the clone set and create the developed cloning group.

Step 7: Examine the criterion for stopping.

An antigen is a chain of integral variables of the AIS method consisting of parameters for optimization problems. It should be noted that the beginning number of each antibody is randomly generated. This coding method is all similar to optimization computation, PSOs, and GAs. The notion of space-form was created to measure and resulting in basic conclusions on interactions between receptors and antigenes. The length can be represented in euclidean as the Ag-Ab binding vectors (14).

$$D = \sqrt{\sum_{i=1}^L (Ab_i - Ag_i)^2} \quad (14)$$

The chosen antibodies are then cloned in order to increase their affinity for the invading antigens.

When a B cell is activated, a hypermutation mechanism in the cell's variable area is initiated, according to the suggested AIS.

The mechanism is essential for the development of different antibody receptors as well as the improvement of antibody sensitivity and selectivity.

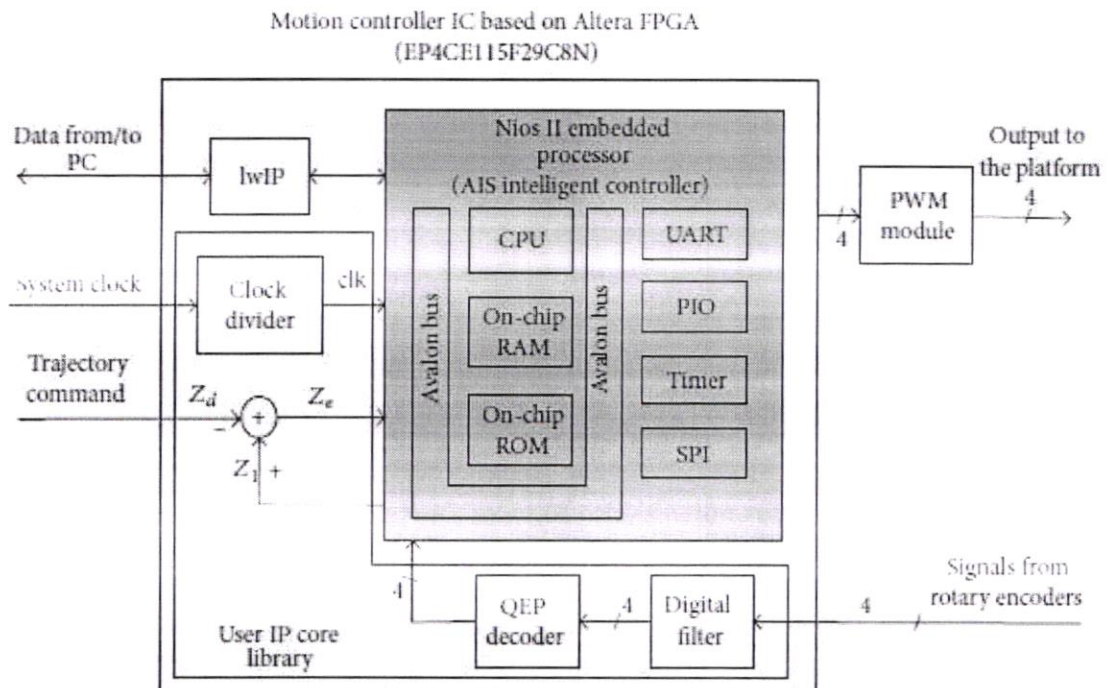


Figure 2: FPGA with AIS

#### 4. CONCLUSIONS

This paper proposes a smart motion control system using FPGA/AIS computing capability for monitoring and stabilizing the course of a robot manipulator directionally with 4 distinct 90° drive rotors. The AIS computer architecture built on the cinematic movement model was converted to an intelligent kinematic actuator. The AIS parameter tuner and the film



movement controller are integrated on one FPGA Chip to efficiently produce a functional robotic system.

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# Empirical View Of Financial Management Survey In Block Chain Technology Issues, Risk And Mitigation

Ashwini N<sup>1</sup>, Sumangala Biradar<sup>2</sup>, Kattupalli Sudhakar<sup>3</sup>, Dr.B.Indira<sup>4</sup>,Dr.Shaik Shakeer Basha<sup>5</sup>, Dr.Keerthika T<sup>6</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, BMS Institute of Technology and Management, Doddaballapur Main Road, Avalahalli, Yelahanka ,Bengaluru-560064.

<sup>2</sup>Assistant Professor, Department of Information Science and Engineering, BLDEA's V.P.Dr.P.G.Halakatti College of Engineering and Technology, Vijayapura-586103.

<sup>3</sup>Associate Professor, Department of Computer Science and Engineering, PSCMR College of Engineering and Technology, Vinchipeta, Vijayawada, Andhra Pradesh-520001.

<sup>4</sup>Assistant Professor, Department of Computer Science and Engineering, Vignan's Foundation for Science, Technology & Research(Deemed to be University), Vadlamudi, Guntur-522213,Andhra Pradesh.

<sup>5</sup>Assistant Professor, Department of Computer Science & Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>6</sup>Assistant Professor, Department of Information Technology, Sri Krishna College of Engineering and Technology, Kuniyamuthur, Coimbatore-641008.

**Abstract** -A blockchain is simply a shared database of information or public ledger of all completed and shared transactions or digital activities between cooperating occurrences. Each transaction in the public ledger is confirmed by a majority of the participants within the device. Data cannot be removed once it has been input. The blockchain is a secure and verifiable record of every single transaction ever made. The most popular example of blockchain generation is Bitcoin, a decentralize dpeer-to-peer digital currency. Although the virtual foreign currency bitcoin is debatable, the blockchain technology that underpins it has performed admirably. The main hypothesis is that the blockchain creates a system for reaching a distributed consensus in the virtual online world. By developing an irrefutable file in a public ledger, participating entities may be certain that avirtual event occurred. It paves the way for the development of a democratic, open, and scalable digital economy from a centralised one. This disruptive period offers incredible prospects, and the change in this field has only just begun. The blockchain age is described in this white paper, as well as some intriguing specific applications in the monetary and non-financial sectors. We then research the difficulties ahead of time as well as the commercial opportunities in this critical age.

**Keywords:**Blockchain, Chain cods, Risk, Issues, Mitigation



## 1. INTRODUCTION

A blockchain is essentially a shared database of data or public ledger of all completed transactions or digital events that may be shared among participants. Every transaction in the public ledger is verified by a majority of the device's members. Records can't be deleted once they've been submitted. The blockchain is a secure and verifiable record of all transactions that have ever taken place. To give a simple instance, stealing a cookie from a cookie jar kept in an isolated spot is far easier than stealing a cookie from a cookie jar kept in a market location and being discovered by hundreds of people. Bitcoin is the most well-known example of a cryptocurrency that is inextricably linked to blockchain development. It's also the most divisive because it allows for a multibillion-dollar global marketplace of anonymous transactions with no official oversight. As a result, it must deal with some regulatory issues relating to national governments and monetary institutions [1].

The Blockchain generation, on the other hand, is unquestionable and has performed admirably throughout time, and it is now being successfully used to both economic and non-economic world projects. Marc Andreessen, the doyen of Silicon Valley venture investors, named the blockchain-based consensus model as the most important investment opportunity in 2018. BNP Paribas' Johann Palychata said in Quintessence that bitcoin's blockchain, the software programme that allows the virtual currency to function, should be viewed as an invention similar to the steam or combustion engine, with the potential to transform the world of finance and beyond [2]. The current digital financial system is founded on the trustworthiness of a positive authority. All of our online transactions rely on trusting someone to tell us the truth—it could be an e-mail provider informing us that our e-mail has been introduced [3], a certification authority informing us that a certain digital certificate is valid, or a social network such as Facebook informing us that our posts about our existence activities have been hacked. The truth is that we live precariously in the virtual world since we rely on a third party for our safety and privations. The reality is that these resources for the third celebration could be hacked, controlled, or hijacked [4].

This is where the blockchain generation may be found. It has the potential to transform the digital international by establishing a distributed consensus in which every online transaction, both past and present, involving digital property can be validated at any moment in the future. It accomplishes this by circumventing the privations of the virtual assets and parties involved. Blockchain technology is defined by its allocated consensus and anonymity [5].

## 2. LITERATURE REVIEW

Smart Property is a related concept that involves using blockchain and Smart Contracts to control the ownership of goods or assets. The belongings can be physical, such as a car, a house, or a cellphone. It can also be non-bodily inclusive of a business enterprise's stock. It is important to note that Bitcoin is not a foreign currency; rather, Bitcoin is all about managing the ownership of money. The blockchain era is bringing programmes to a wide number of industries, both financial and non-financial. Blockchain technology is no longer seen as a threat to existing business models by financial organisations and banks. The world's major banks are researching novel blockchain applications to see if there are any opportunities in this sector. Rain Lohmus of Estonia's LHV bank stated in a recent interview that they found Blockchain to be the most tested and comfortable for a number of banking and finance-related applications [7].



The possibilities for non-financial applications are likewise limitless. In the music industry, we might imagine storing evidence of all crime records, health information, and loyalty bills in the blockchain, as well as notaries, private securities, and marriage licences. The anonymity or privacy goal can be achieved by storing the fingerprint of the virtual asset instead of the virtual asset itself [8].

In the year 2008, Satoshi Nakamoto published a paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System" under the pseudonym Satoshi Nakamoto. This paper defined a peer-to-peer model of digital coinage that might allow online invoices to be sent directly from one party to another without going through a financial institution. Bitcoin was the first to recognise this principle. Now, the term "cryptocurrency" is used to describe all networks and mediums of exchange that utilise cryptography to secure transactions—as opposed to those systems where transactions are routed through a centralised trusted institution. Because the first paper's author wished to remain anonymous, no one knows who Satoshi Nakamoto is today. A few months later, an open source programme based on the new protocol was released, beginning with the Genesis block of fifty dollars. Anyone can instal and use this open source software to join the bitcoin peer-to-peer network. When you think about it, it's grown unnoticed.

Internet trading is solely dependent on financial institutions acting as trusted third parties to process and mediate each electronic transaction. The function of the 0.33 celebration is to validate, protect, and maintain transactions. A certain percentage of fraud is unavoidable in online transactions, necessitating financial transaction mediation. As a result, transaction costs are exorbitant. Instead of using the accept as true with inside the third birthday celebration for willing parties to execute a web transaction over the Internet, Bitcoin employs cryptographic evidence. A virtual signature is used to encrypt each transaction. Each transaction is sent to the receiver's "public key," which is digitally signed with the sender's "private key." To spend money, the owner of a cryptocurrency must show that he or she has the "private key." The entity receiving the digital foreign money validates the digital signature on the transaction using the sender's "public key" (therefore possessing a corresponding "non-public key").

### 3. BLOCKCHAIN WORKING MODEL:

Each transaction is broadcast to every node in the Bitcoin network and then verified before being recorded in a public ledger. Before a transaction can be recorded in the public ledger, it must first be confirmed to be valid. Before recording any transaction, the verifying node must ensure two things:

1. The spender owns the cryptocurrency, as evidenced by the transaction's digital signature verification.
2. Spender has enough cryptocurrency in his/her account: inside the ledger, examine each transaction towards the spender's account ("public key") to ensure that he/she has enough cryptocurrency in his/her account.

However, maintaining the order of transactions broadcast to each separate node inside the Bitcoin peer-to-peer network is a concern. Because the transactions are not public in the sequence in which they are generated, a computer may be required to ensure that double-spending of cryptocurrency does not occur.



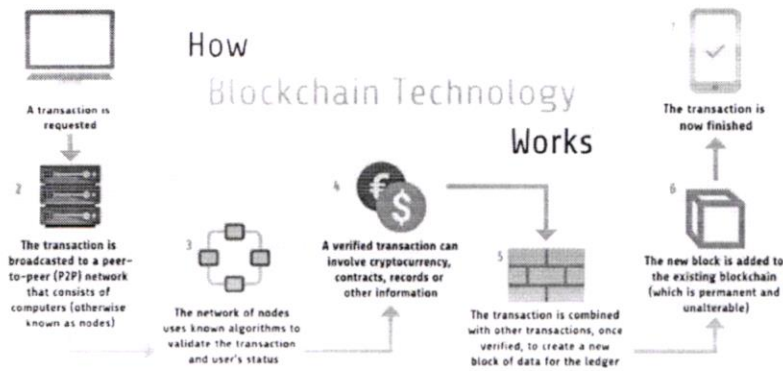


Figure 1: Blockchain Technology – Process and Model

Because transactions are passed from node to node over the Bitcoin network, there is no guarantee that the orders gained at a node are the same as the order in which the transactions were generated. It's a data structure in which each block is linked to the next in a time-stamped chronological manner. It's an append-only transactional database that's no longer a replacement for traditional databases. Every node keeps a copy of all previous transactions, which are safeguarded cryptographically. All records are verifiable and auditable after they are saved in the ledger, but they are no longer editable. Because there is no single point of failure, it is extremely fault tolerant.

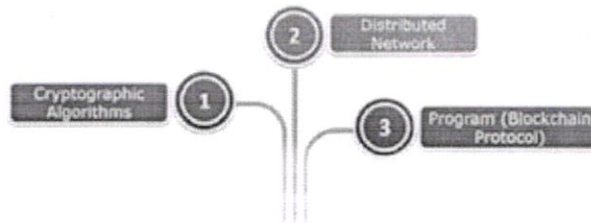


Figure 2: Input of Blockchain Model

Modern cryptographic mechanisms are used to secure blockchains. On the Blockchain, everything is encrypted. Let's return to our previously mentioned example, when Kevin transfers five BTC to James, to give you a better idea of how it's far used on Blockchain. This transaction will be broadcast to the community as an encrypted message. Every transaction receives a unique message. You might now wonder what distinguishes the message. Because the transaction is signed using the sender's unique key, known as a non-public key, the virtual signature is created. The mechanism appears to be as follows:

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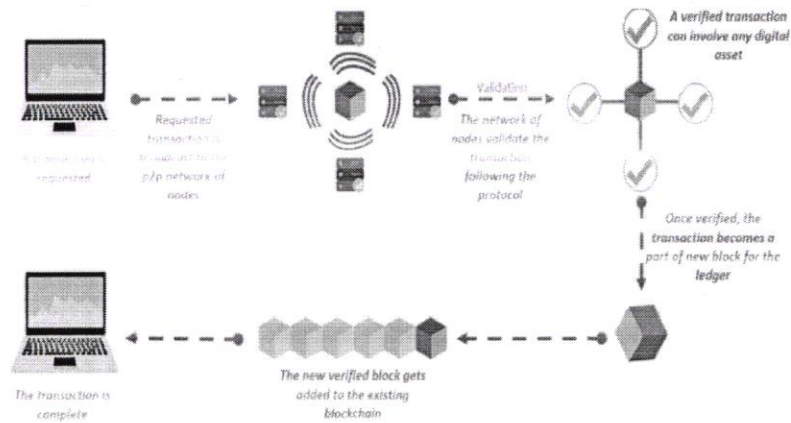


Figure 3: Cryptography Mechanism

#### 4. FINANCIAL MODEL

- Medici is being developed as a securities trading that makes advantage of Bitcoin 2.0's Counterparty implementations. The goal is to build a marketplace with a smaller inventory area. Counterparty is a system for converting traditional financial instruments into self-executing smart contracts. These ingenious contracts eliminate the need for a physical record by facilitating, verifying, or enforcing the agreement. This eliminates the need for a middleman, such as a dealer, exchange, or financial institution.
- Blockstream is an open source project that keeps track of sidechains—interoperable blockchains—to avoid fragmentation, security, and other concerns that come with opportunity crypto-currencies. Securities, such as stocks, bonds, and derivatives, can be registered, as well as bank balances and mortgages.
- Coinsetter is a bitcoin exchange situated in New York. It is developing Project Highline, a way of using the blockchain to settle and clear monetary transactions in T+ 10 minutes rather than the usual T+ 3 or T+ 2 days.
- Augur is a decentralised prediction marketplace that allows users to purchase and sell shares in advance of an event with the probability of a specific outcome. This can also be used to produce monetary and economic forecasts based on "crowd-sourced knowledge."
- Bitshares are digital tokens that exist within the blockchain and correspond to specific assets such as cash or commodities. Token holders may also be able to earn income on commodities such as gold and oil, as well as greenbacks, euros, and foreign exchange contracts.
- Stampery is a company that uses blockchain to stamp e-mails and other files. It simplifies email certification by simply emailing them to a custom-created electronic mail address for each customer. Stampery's era is being used by law firms as a cost-effective way to certify documents.
- Viacoin is one of the companies that uses the clearinghouse protocol to provide notary services.
- Block Notary is an iOS app that uses the TestNet3 or Bitcoin networks to create proof of existence for any material (pictures, files, or other media).
- Crypto Public Notary is a service that uses the BitcoinBlockchain to notarize documents by using a small amount of bitcoins to register the record's checksum on the public blockchain.



- Every other carrier that uses blockchain to SHA256 digest of the record in the bitcoinblockchain is known as Proof of Existence.
- Ascribe is another another company that uses blockchain to perform authorship certification. It also provides ownership transfer with attribution to the original creator.

## 5. ISSUES AND RISK

- BlockChain is a promising next-generation technology. As previously stated, BlockChain-based technology can be used to solve a wide range of applications or issues. This includes everything from financial (remittances to investment banking) to non-financial (notary services). The majority of these are significant enhancements. There are significant risks of acceptance, just as there are with radical inventions.
- Behavioral trade: Change occurs on a regular basis, but there is resistance to change. Customers must become accustomed to the fact that their electronic transactions are secure, secure, and complete in the world of a non-tangible, trusted third party, which BlockChain provides.
- Modern middlemen, such as Visa or Mastercard (in the case of credit cards), may even take on different duties and responsibilities. We believe they will invest in and pass their systems to be entirely BlockChain-based. They will continue to deliver customer relationship-oriented services.
- Scaling: Scaling of cutting-edge fledgling BlockChain solutions allows for assignment. Consider the first time you carried out a BlockChain transaction. Before conducting your first transaction, you need download the entire collection of existing BlockChains and validate them. As the number of blocks grows exponentially, this could take hours or even days.
- Bootstrapping: Migrating existing contracts or business files/frameworks to the new BlockChain-based technique necessitates a large number of operations. For example, in the case of real estate ownerships/liens, the current documents held by County or Escrow organisations should be converted to the BlockChain equivalent. This could also include information on the date and pricing.

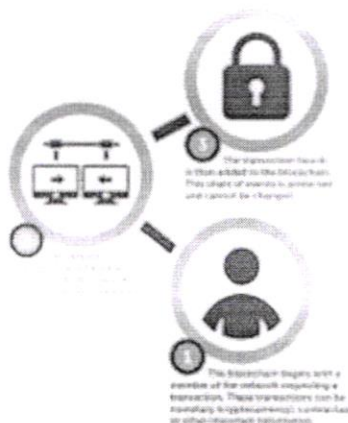


Figure 4: Risk Management in Blocks

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- **Government Regulations:** In the new world of BlockChain-based completely transactions, government agencies such as the FTC, SEC, and others can stifle adoption by enacting new regulations to monitor and change the industry for compliance. This can help adoption in the United States because these companies provide consumer trust. Adoption will confront significant challenges in extra-managed economies like as China.
- **Fraudulent Activities:** Due to the pseudonymous nature of BlockChain transactions, along with the ease with which they can move goods, the heinous men may also use it for fraudulent activities such as currency trafficking. That said, law enforcement groups can filter and prosecute them with adequate legislation and eraguide.
- **Quantum Computing:** The foundation of BlockChain generation is based on the fact that due to a lack of required compute energy, it is theoretically impossible for a single birthday party to host the system. However, with the advent of Quantum Computers (in the future), cryptographic keys may become clean enough to crack using the brute-force method in a reasonable amount of time. This will bring the entire device to a halt. The counter-argument is that keys should get more powerful so that they are more difficult to crack.

## 6. SOLUTIONS AND MITIGATIONS

### A. Anti-Counterfeit Solution:

BlockVerify offers anti-counterfeiting solutions based on the blockchain that bring transparency to supply chains. It's used in the pharmaceutical, luxury goods, jewels, and electronics industries. The pharmaceutical business, for example, can employ BlockVerify anti-counterfeit systems to prevent fake drugs from entering the market. This covers a major issue that has ramifications for both the economy and those who require medication. Similarly, luxurious precise producers can leverage this technology to create a gadget that verifies the authenticity of luxury goods, creating a win-win situation for both customers and luxury goods manufacturers. This technique can be used by the diamond industry to build trust in diamond certificates and avoid fraud. This technology can be used in the electronics industry to ensure that customers receive genuine items.

### B. Chain Link:

Any industry can utilise the BlockVerify era to define a process for ensuring the authenticity of its products. The following is how BlockVerify operates:

- A Block Verify tag is attached to each product.
- Even corporations are prevented from counterfeiting their personal things because each product is validated and logged in the BlockChain.
- To verify each product, the supply chain uses BlockChain creation.
- Mobile devices can be used in retail venues to verify the authenticity of products purchased.
- Similarly, a customer looking for a goods might check to see whether it is genuine and then ignite it.

Each product has a record that is permanently stored in the blockchain, allowing everyone in the supply chain to verify the product's authenticity. ChainLink is another anti-counterfeiting tool that uses coloured banknotes to prevent counterfeit luxury products, such as handbags and watches, from entering the market. By adding a layer of accept as true with to secondary markets like eBay and Craigslist, the carrier makes them safer.

### C. Distributed Storage



As it stands now, cloud storage relies on data carriers to carry out each transaction. It demonstrates the traditional cloud-based completely storage architecture for transferring and saving data via dependable cloud carrier carriers like Googleforce, Dropbox, and One pressure. They adhere to industry standards for redundancy by storing several copies of the records ( usually 3 copies). However, because there is no well-known method of performing end-to-end encryption, traditional cloud-based architecture is vulnerable to a wide range of security threats, including malware, man-in-the-middle attacks, and alertness hacks, which could expose sensitive and personal customer or company information.

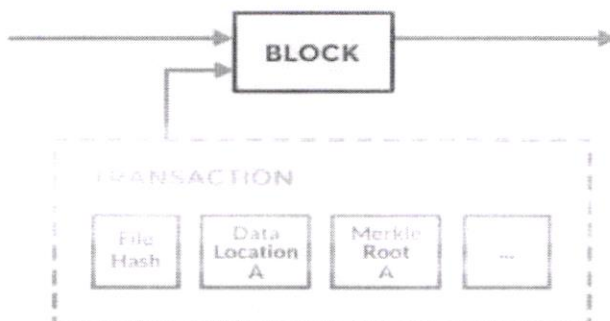


Figure 6: Metadata model of each blocks

The difficulties of the traditional garage community can be addressed by implementing a peer-to-peer cloud storage community with continuous encryption, allowing users to safely transmit and share information without relying on a third party for security and reliability. It eliminates reliability because there is no reliance on a third party, and hence traditional information breakdowns and outages are eliminated. Furthermore, it significantly increases the statistics' security and privacy.


## 7. CONCLUSION

Finally, Bitcoin's generation spine is Blockchain. The dispensed ledger feature, together with BlockChain's security, makes it a very appealing era for resolving existing financial and non-financial business issues. In terms of the generation, cryptocurrency-based technology is either on the upward slope of inflated expectations or in the trough of disillusionment. There is a lot of interest in BlockChain-based commercial applications, and as a result, there are a lot of startups working on them. As previously said, the adoption confronts a strong headwind. Large financial institutions including as Visa, Mastercard, Banks, NASDAQ, and others are investing in researching the use of modern business models on BlockChain. In fact, a number of them are looking for new business models in the world of BlockChain. Some people would desire to be ahead of the curve when it comes to BlockChain's altered regulatory settings. To sum up, we expect BlockChain adoption to be slow due to the risks involved. The majority of startups will fail, with only a few exceptions. In a decade or two, we should see widespread adoption.

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# Ubiquitous Management System For Monitoring E-Learning Applications: A Study

Dr.Syed Khasim<sup>1</sup>, Dr.V.LakshmiPrasanna<sup>2</sup>, Nirupama Prakash<sup>3</sup>, Gayatri Parasa<sup>4</sup>,  
Dr.Shaik Shakeer Basha<sup>5</sup>, Dr. Krishnasamy Srinivasan<sup>6</sup>

<sup>1</sup> Professor, Department of Computer Science & Engineering, Dr.Samuel George Institute of Engineering & Technology, Markapur, Prakasam Dt, Andhra Pradesh, 523316

<sup>2</sup> Associate Professor, Humanities and Sciences, Gokaraju Rangaraju Institute of Engineering and Technology, Bachupally, Hyderabad, 500090.

<sup>3</sup> Associate Professor, Humanities and Social Sciences, Ajeenkya DY Patil University, Charoli, Pune 412105.

<sup>4</sup> Assistant Professor, Department of Computer Science and Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur 522502.

<sup>5</sup> Assistant Professor Department of, Computer Science & Engineering, Avanathi Institute of Engineering and Technology, Gunthapally, Abdullahpurmet Mandal-501512, Hyderabad, Telangana.

<sup>6</sup> Assistant Professor, Management Department, College of Business and Economics, Arba Minch University, Arbaminch, Ethiopia.

*Abstract: Some economic activities were influenced by our initial impressions of computerised libraries, virtual libraries, or electronic libraries. The European Union, the National Science Foundation's Digital Library Organizations in the United States, and the Electronic Libraries Program in the United Kingdom all funded novel library initiatives in the early and mid-1980s. JISC is also known as eLibrary. Sexual orientation, racism, religious and political beliefs, personality traits, intelligence, enjoyment, addiction, drug misuse, parental separation, age, and gender are only few of the issues that people face. The analysis is based on a dataset of 70,000 volunteers who contributed their Facebook likes, extensive demographic information, and other information. To analyse individual psychodemographic profiles from favourites, specific model dimensional reduction is utilised to like data entering logistic / linear regression. (A) give logical entry through the content wrapped around the teacher's slides, with or without synchronisation, and (b) view slides and ink that the teacher is communicating with. Non-tablet ink is not offered at a discount, and instructor ink is available shortly after.*

*Index: ELibray, Social Media, Communication, E-Learning, Link access*

## 1. INTRODUCTION

We've found information that's truly been recorded, as well as quantitative data from those recordings. Individuals may opt not to reveal certain details about their lives, such as their sexual orientation or age, yet this information can be gleaned from other aspects of their lives. For instance, the well-known U.S. The business gives its female customers purchasing data in order to handle their pregnancy and sends them well-planned and well-targeted offers (2). Unpredictable coupons for prenatal vitamins and maternity clothing are appreciated in some situations, however they can have disastrous consequences, for example, it is for her family in a culture where this is not tolerated (1). As this case shows, tapping personal data,



as well as promotional aspects, administrations, and attention, can result in insecure security incursions. Sophisticated administrations and devices are now recommending an expanding range of human activities, such as social connection, entertainment, purchasing, and data collection. The growth of computational sociology is aided by the ability to quickly record and dismantle such systems of meticulous intervention.

(1) Newer administrations, such as customised web crawlers and suggested frameworks (2), and Internet promotion-focused administrations (3). However, having unrestricted access to huge records of personal behaviour poses genuine challenges in terms of understanding clients and content, as well as data security and ownership.

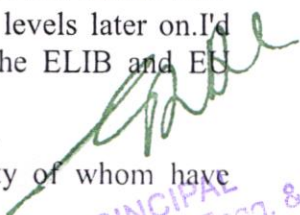
In short, the two elements that are all-encompassing can be traced a little in this work, as can other sophisticated library tasks. I refer to it as "exposure transfer" in particular (D2D). It restricts client access to the transferred library property, streamlining distribution networks and any hubs in the process mix. The main difficulties of property declaration, connection, and query are discussed here. Quest / Meta Search, Access Path / Agents, Alliance, then Collection and Goals were all developed over time. Metadata setups and conferences for follow-up and on-demand have gotten a lot of attention. A portion of this activity is predicated on previous work. In the mid-1980s, for example, an EU centred on OSI (Open Systems Interconnection) developed the OSI Convention Framework for Library Applications. For EU funding companies, the transition from OSI to the Internet, as well as related conferences, is a critical problem. This move resulted in the creation of various different library conferences on the OSI system, as well as ISO-IL and Z39.50. This reduced their ability to receive seamless modifications to the library framework, which was later limited. For metadata created in 2015, as well as an investigation into the Dublin core technique[6].

## 2. LITERATURE REVIEW

The second part is storehouse and administration administration, where managing the large archives of digital content and accessing it in a variety of ways is a top responsibility. By enhancing access to computerised materials, this acceleration was later computerised or modified (replaced by another organisation). Subsequent meetings were held at the time to synchronise the store's development foundations. This coincides to the period's shift away from a desire for metadata (because to the fact that the conspiracy's materials are still being printed in big volumes) [7]. In these ways, it's fascinating that these activities were established before the web's actual existence, and they speak to the need to find shared means to address needs in a time of great change. Surprisingly, no element of the e-folate lib's report-ination greeting clarifies the site. They discussed virtual, computerised, or electronic libraries [8] and exhibited an experiment in planning and developing new administrations.

As a programme, call draughtsman, appraiser, bidder, venture analyst, and acquisition member, we need EU and eLibprogrammes. We contributed directly to the initial NSF programme, but we also had some contacts at the work and programme levels later on. I'd want to focus on five issues in these significant projects, particularly the ELIB and ES programmes, from behind the scenes:

1. They are substantial learning opportunities for members, the majority of whom have proven critical library network activities.



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2. They have demonstrated that the improvement of new administrations is dependent on formal and business reforms, as well as the difficulty of implementing venture-based projects. The issue is still present.

3. Created a number of umps haes on web-specific design, benefit models, and client practises in order to improve computerised library improvements. We really like the model that combines contact, application, and data. This restricts information flow and increases the framework's distance, resulting in a storeroom condition that is not conducive to our world of compliant adjustment. Appropriate policies developed during this time are often not accepted in end-client administration: they are based on B2B pre-web experience and are primarily employed in that circumstance.

4. These have a broad and circular influence that is difficult to predict. In contrast to popular belief, In reality, a sizable number of them have fulfilled their business objectives on their own. For example, the meta search for eB and flow improvements, as well as the collection of commercially accessible digitisedrecognisable objects, demonstrate this.

5. How does one go about achieving general governance? On the plus side, the JSC status near the task work has improved, despite the fact that it has been removed from the focal setting.

For the time being, give us a speedy chance to transfer. By the end of the decade, how will the world have changed?

### 3. UBIQUITOUS MODEL

Scholarly libraries, we recognise, do not close on them: they promote their institutions' investigation, learning, and purpose. In another system space, there is a requirement to extend libraries as well as change testing and learning methodologies. We concentrate on the upgrade's impact on libraries, but how library clients go forward and how the upgrade affects their expectations is a true long-term concern.

Here, we'll try to explain a bit of etiquette that impacts library responses and transforms the existing scenario. I also work on improving the overall framework's patterns, building a data foundation around long tail aggregators, and modifying client approaches, research, and development.

Frameworks in the web world - When it comes to system frameworks, three advanced themes intrigue me. Take a look at this: Fluid content and level applications - We're heading towards a world of narrow complementary configurations that connect online and commercial apps. On the web, applications run. In client circumstances, information is transmitted more quickly. Web administrations and RSS feeds are important parts of a larger connective tissue that allows clients to benefit from a variety of scenarios. Work processes and company forms are more mechanised without rules in this circumstance, information is more accessible and designed, and apps are more convenient. . Concerned with the distinction between open source and request purposes. Salesforce.com [9] (an excellent example of Customer Relationship Management Administrations' on-demand programming marvel) and WebX [10] (a conferencing and Internet meeting provider) are both here. The notion is that the organisation can use a central web-based application to display local samples of an

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Chittoor, Nellore District (Andhra Pradesh), India



application (CRM or conference / meeting administration, for example). Costs, risk reduction, convenience, and general redesign are all topics of interest. Customization and adaptation to the environment are two potential roadblocks. Following that, policies are based on data. Exercises are used to remove information, solidify it, and dig for knowledge in order to improve governance and options. Complex applications have clearly not yet been built, but the behaviour of describing and weaving them into the work environment is changing. Simultaneously, the content is reconstructed without being bundled. Consider how we keep track of reusable items like images, music, and TV shows: in collections, playlists, slideshows, in person, crosswise, and in places [8].

#### 4. NEW SOCIAL AND SERVICE AFFORDANCES

Fluidity and level applications open up new possibilities. Consider the following three points:

1. Process and Workflow Institutionalization encourages organisations to think about how to do the best source exercise possible, such as outsourcing certain tasks so they can focus on areas where they are valued. Associations are moving away from the notion that they will vertically coordinate all of their efforts. Examine the thinking surrounding the shift from a database to a process of collaborating with the web via a website or gateway. This is a result of the system's ability to move more exercises around. New support structures must be developed, as well as the associations and their activities.

This method, according to Thomas Downport, stimulates associations to focus particularly on what they are doing and allows them to gain fewer focal points remotely, while potentially providing their competitors [12].

2. Second, complementary applications and fluid information enable more essential community-based activity, such as sharing components, cooperating on sharing activities, or avoiding concerns with sharing. Stage administrations that integrate specific use or knowledge might establish respect through a variety of uses. Important system administrations, such as Google, Amazon, and eBay, as well as a few other administrative processes, are the pillars of gravity for customers.

3. Over time, we've seen significant improvement in social and remote-creating administrations that create new administrations with a level of connective tissue that includes websites, wikis, IM (instant messaging), and other technologies.

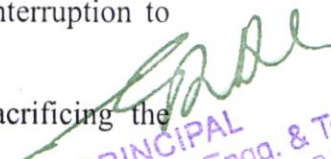
These goals are stated at the outset of the project:

1) Web availability of fully highlighted presenter slides in an unbiased application (resulting in teacher remarks being hidden), such as PNG or JPEG.

2) In UP, synchronise the slides and teacher ink between the presenter and the electronic storehouse.

3) Allows understudy entries to be made using the web interface (without interruption to normal presenter multicast entries).

4) Tablet PC users can continue to use the custom moderator without sacrificing the highlights.

  
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Each of these four goals was achieved, and by mid-2005, the framework download (c) was ready for scholarly usage following in-class testing.

The teacher introduces Microsoft PowerPoint and places it in the presenter's personal file cabinet (CSD or conferencing slide deck). Clients without PowerPoint can create CSD documents, and people familiar with PowerPoint can now send the PPT interface to the web (available when presented by the presenter). PowerPoint includes both (available when presented by the presenter) DeckBuilder, a free application that can be used to achieve this - clients without PowerPoint can create CSD documents, and now people familiar with PowerPoint can send the PPT interface to the web. Following the transfer, you can access the survey slides via the UP interface. When slides are transferred, synchronisation is disabled (due to the fact that there isn't enough time).

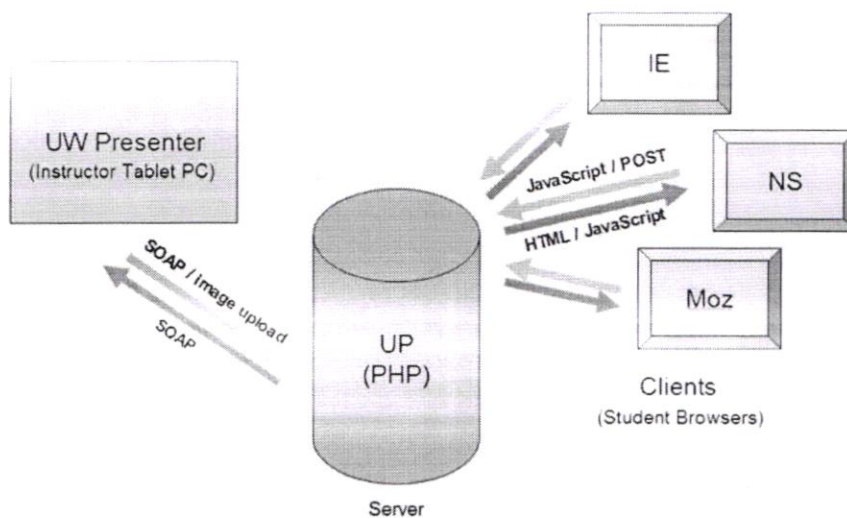


Figure 1: Setup of Ubiquitous Presenter system

The teacher introduces Microsoft PowerPoint and places it in the presenter's personal file cabinet (CSD or conferencing slide deck). Clients without PowerPoint can create CSD documents, and people familiar with PowerPoint can now send the PPT interface to the web (available when presented by the presenter). PowerPoint includes both (available when presented by the presenter) DeckBuilder, a free application that can be used to achieve this - clients without PowerPoint can create CSD documents, and now people familiar with PowerPoint can send the PPT interface to the web. Following the transfer, you can access the survey slides via the UP interface. When slides are transferred, synchronisation is disabled (due to the lack of a dynamic address), and Understudies can review the slides alone.

Organizational and business models that are new.

Specific changes and new administrations are made possible through action plans and institutional structures. Take a look at three items that flow from the above emphasis once more.

1. First, the method for transferring data assets into the system is either free or available for a minimal price. Google has a significant advantage in terms of promotion, its

revenue is far higher than that of this source. It was too late to start up a radio station with a modest portion. More individuals are using Google to search for objects, and more people are utilising various administrations to place Google advertising, which is fantastic for Google. As a result of this, the open web's content stream is growing, and vice versa. 'Off-web' items are not readily apparent to the passionate customer. Though web indexes and other large organisations are real hubs, we need to watch if more current 'vertical' administrations emerge that are cooking for more specialised goals.

2. Requests and phase administrations triggered by robotized work processes and process institutionalisation turn out to be more appropriate options. Thomas Friedman outlines how these processes lead to business change in his book *The World Is Flat* [13]. Communities gradually focus on their own abilities and rely on outsiders for overall administration. (See how UK universities profit from public confirmation.)
3. Moving Forward Depending on the Compliments World This suggests that administrations are gradually cooperating, and that this co-creation extends to the interaction between a collaborator and their clients. Consider eBay as a platform for bringing together sellers and customers. We are confident that an experiment with such co-creation models will be established, whether the client provides material on Amazon or differs from remote informal communication administrations.

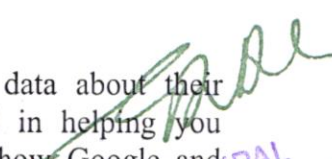
## 5. DATA HUBS, THE LONG TAIL AND ATTENTION

The existence of a true Internet by solid gravity draw is a distinguishing feature of the later half of this decade. Consider the companies Amazon, Google, Yahoo, eBay, and iTunes. The web domain was formed by these administrations, and it is one of their benefits:

They supply the client with such thorough knowledge that they no longer require or believe they need to go any farther. People looking on Google or Amazon, for example, assume they are getting the entire web or all printed books, regardless of whether they are willing to put in the extra work to explore elsewhere.

D Integrated D2D: Clients are happy to commit to giving up what they require. This means they're organising the area's administrations and wish to identify and request first. This includes limiting the use of snaps on the open web. It is the process of creating the appropriate inventory network and work procedure for a specific inventory. If you buy something from Amazon, for example, they will endeavour to manage your exchanges for your satisfaction and keep you updated on the status. They have surmounted the essential framework of reducing the cost of disclosure for chain transfers, how they productively oversee, stock transfers, online payments for administration, and trust s from that perspective.

Information Bucket Information Reduction: As a result, they collect data about their administration's configuration for use and utilisation. They're invested in helping you improve your experience and your relationship with them. Check out how Google and Amazon reflect information to change the administration, regardless of whether the focus is on customization headlines, page positions, or promotions.

  
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Provide clients with interoperable administrations, interpersonal, library personnel, and team members by connecting, asking, and working with them. However, there is a considerably higher level of discussion regarding articulation and respect in an extremely large area. Here are some examples of active dialogues about how to deconstruct administrations: Stores' utility layer. We have a variety of storage systems, but we lack large, dependable machine interfaces for searching, cutting, retrieving, inserting, and restoring.

Benefit layer for capabilities of the integrated library framework. The integrated library structure should be used by many administrations. Consider checking access, hanging on to another interface, or learning more about the framework. Individuals have so far relied on shoddy coding and scratching aspects, as well as limited URL language structures. It's fantastic to have a number of simple interfaces.

A registration system is the register. As I previously stated, we create registers in a variety of locations. For administrations, cash, organisations, and other purposes, registration is required on a regular basis. Is it appropriate to instal a dependable method for retrieving such registries in the system, and then re-investigate/collect/get/keep/update? These scenarios are repeatable. When more transition conditions are taken into account, a similar problem arises with effectively known approaches that must be found in new courses.

## 7. CONCLUSION

We're demonstrating that people who work in fields ranging from sexual interaction to knowledge are further encouraged by their Facebook likes. Because Facebook likes are similar to other remote computerised records, such as checking articles, looking for inquiries, or purchasing articles, clients' chances of obtaining benefits are likely not restricted to likes. In addition, this test reveals a large number of projected surplus qualities that, when combined with adequate production data, can detect a variety of properties and, in certain cases, make it possible. Teachers used to emphasise intelligent address with cryptic inquiries or arbitrary comments that ignored extra data and reviewable address materials like strategies to measure internal appreciation or isolate internal issues. The address is completed by using a ubiquitous presenter to access not only the live address, but also the address slides, teacher ink, and association entries.

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# A Survey On Life Skill Challenges, Development And Implementation In School Education System

Dr. Prashant Vijaysing Patil<sup>1</sup>, Dr.V.LakshmiPrasanna<sup>2</sup>, Dr N Saranya<sup>3</sup>, Dr.Shaik Shakeer Basha<sup>4</sup>,Dr. G. Padmapriya<sup>5</sup>, Dr. Nikhilesh<sup>6</sup>

<sup>1</sup>Assistant Professor, Department of Commerce, Dr. AGD Bendale Mahila Mahavidyalaya, Jalgaon 425001

<sup>2</sup>Associate Professor, Humanities and Sciences, Gokaraju Rangaraju Institute of Engineering and Technology, Bachupally, Hyderabad, 500090.

<sup>3</sup>Assistant, Professor, Department of Biotechnology, Nehru Arts and Science College, Thirumalayampalayam, Tamil Nadu 641105

<sup>4</sup>Assistant Professor, Department of Computer Science & Engineering, Avanthi Institute of Engineering and Technology, Gunthapally, Abdullapurmet Mandal-501512, Hyderabad, Telangana.

<sup>5</sup>Associate Professor, Department of Computer Science and Engineering, Saveetha School of Engineering, SIMATS, Chennai - 602 105.

<sup>6</sup> Assistant Deputy Director (Graphic Design), Shri Vishwakarma Skill University, plot no 147, sector 44, Gurugram, 122003.

**Abstract:** Education is about enabling talented young people to prosper and contribute to their communities. These skills are sometimes referred to as life skills, and they give life skills training. Education aids youth in overcoming life crises, but offering appropriate life skills education is difficult. As expected, there is a lot to fix. Administrators emphasised the non-grading state of life skills curricula in the current study, along with teacher input; advance service and service is not enough training for instructors; Parents and children have negative attitudes toward life skills education, and there isn't enough of it. Some of the key obstacles to the successful implementation of life skills education schools include teaching resources. Science, RS, Thinking, Current Affairs, Games / PE, and other disciplines in the Life Skills curriculum have a tight association with the department. Life skills grow as well. Individual members of staff, forms, and other groups hold meetings to enhance life skills and the capacity to think clearly both within and outside the classroom.

**Key terms:** Life Skill Education, School Education System, Challenges, Development, Implementation

## 1. INTRODUCTION

People must be prepared to handle challenging situations due to the constant increase in societal changes and complexities, as well as the development of social interactions. Psychiatrists are involved in the prevention of mental disease and social inadequacy in life skills education in schools all around the world. Life Skills Education (LSE) is a word that is frequently used to characterise developmental learning activities. Learners may take positive action to build and sustain healthy behaviours, settings, and quality of life by using their knowledge, attitude, and mental abilities (Boatwin & Griffin, 2018).



Attention deficit hyperactivity disorder (ADHD) has been shown to respond well to LSE. Disorder, anti-social behaviour, and drug use are all useful in preventing HIV infection. That is all there is to it. Many countries incorporate it in their educational curricula (Moski, Hassanzad, & Timurry, 2016; Yankee & Aggleton, 2018). Life skills are a set of mental, social, and cognitive talents that help youngsters become more aware of their surroundings. Make judgments and choices, manage their mental health, and successfully communicate (Singh and Menon, 2019). Life skills are defined by the World Health Organization (WHO) (2019) as positive and positive skills.

Individuals' ability to deal efficiently with requirements and obstacles in daily life. All of this indicated that there was a critical set of ten life skills that were intertwined and strengthened. These are the ones. Decision-making and problem-solving skills, creative thinking and critical thinking capacity, interpersonal and communication skills, self-awareness skills, and empathy; ability to manage with emotions and stress are five major life skills categories that can be linked to reveal. LSE is regarded as a vital participant in the implementation of innovative educational changes across the board. In response to demand, numerous governments around the world are exploring establishing life skills education.

Traditional educational systems must be reformed so that they can keep up with new social and financial realities. Life Skills is an important part of high school life and ethics. Of course, this might be argued as part of the school day's participation in developing life skills. Inside and outside the classroom, all members of the school community work together to develop boys into young men who are ready for and interested in their part in society. As a result, life skills are essential for all we wish to achieve in school. As part of the boy's education and progress, life skills are taught from the time of enrolment until the eighth year. The goal is for boys to grow up to be healthy and self-sufficient. The boys actively contribute to the religious life of the school and their surroundings by learning the fundamental concepts of detecting wrongdoing. A community that develops its own sense of self-worth and accountability.

## 2. RELATED WORK

Educators and policymakers in India have advocated for the inclusion of life skills education as part of the school curriculum. National Curriculum Framework (2019); National Curriculum Draft (2018); National Curriculum Framework (2019); National Curriculum Framework (2019); National Curriculum Framework (2019) Furthermore, the Adolescent Education Program (2015) advocated for school integration. By learning various life skills, pupils will be able to combat drug addiction, violence, teen pregnancy, AIDS, and other health difficulties. During the school years, students should engage in creative learning experiences, an inquiry-based approach, and work-related cognitive treatments. Students should have opportunities to learn new things and develop life skills.

Furthermore, according to NCF (2015), AAEP should not be separately trained and should instead be integrated in the school's reading programme. The Central Board of Secondary Education (CBSE), which recognises the value of life skills education, is one example. In 2010, life skills education was implemented as a continuous and integrated aspect of the curriculum. For instructors in grades 6 through 10, I created Comprehensive Evaluation (CCE) and life skills manuals. Critical thinking, creative thinking, decision making, problem solving, and self-awareness are the three primary areas of life skills identified by the World Health Organization. Skills Effective communication; Personal skills; Sympathy are examples of social skills. Emotional abilities include the ability to cope with emotions and the ability to



deal with stress. Life skills are abilities that allow a person to have a happy and productive life.

Life skills, according to the World Health Organization (WHO), are skills for constructive behaviour and adoption. It enables a person to properly cope with the average person's demands and challenges. Based on Life Experiences Education is the interactive process of teaching and learning that focuses on obtaining knowledge, attitudes, values, and abilities that support the learner's behaviour healthy life choices are accountable for their lives by lowering immunological stress hazardous behaviours. Life skills, according to UNICEF Wikipedia, are behaviours that are employed appropriately to handle personal concerns. They are a set of human abilities learned through instruction. Major issues have been noted in previous research studies on KTV (2013) and Kitimo (2014). Lack of suitable teaching / learning materials is cited as a hurdle to LSE adoption, but this is not confirmed. Due to a lack of status, a teacher shortage, and a dearth of trained teachers, there is a high workload. Time limits are also captured by Neelina (2012), Singh and Sharma (2016), and Behrani (2016). Teachers' lack of basic life skills training; Issues with evaluating qualitative abilities; Aspects of life skills that are social and emotional; Students' lack of interest as a result of their academic obligations; Incorrect time slots and settings; Weight Extracurricular activities pose significant obstacles to the implementation of life skills education in Indian schools.

### 3. OBJECTIVES AND CHALLENGES

The realities of life are addressed in life skill educations to develop mental health and capacity in adolescents. Life skills-based education is included into school curricula to assist students in developing a positive attitude toward self-care and health, as well as significant social life skills. Allow for an individual's complete and comprehensive growth in order for social life to function effectively. All persons must acquire the fundamentals of life skills as part of a life skill education system. They're also required for a variety of development security measures. Promoting primary immunity and caring for the development, causes of various diseases, changes in social situations, and socialisation of healthy children and adolescents through youth preparation. Generations of people, the issue of disabilities, basic education policy, gender equality, democracy, good citizenship, educational quality and efficiency, peacebuilding, and lifelong learning are all topics that need to be addressed. Life skills education is becoming more popular. Teachers and administrators are having difficulty integrating life skills education in CBSE schools, according to this report, which is based on a rigorous survey style of research. Principals and (10) instructors (43), as part of the pattern, deliver life skills education to ninth and tenth grade students at the schools of their option.

Two semi-structured interview schedules on LSE implementation and issue in schools have been established to gather information from principals, administrators, and teachers. Incorporation of LSE into the educational system. The data was gathered between December 2019 and March 2020. A semi-structured interview was used to gather information from teachers and administrators. To create summaries, the responses have been organised under numerous themes. Objectively displaying summaries - as follows:

According to CBSE requirements, life skills education classes are accessible in all schools. According to timetable E, after allotment for LSE alone, the interval is 60-90 minutes per week. The value of LSE is understood by all teachers. Each school has only 4-6 LSE-trained instructors. SCBSE's Teacher Manual Guidelines for LSE are followed. All ten schools have adopted the programme. LSE has been brought to the attention of parents by schools. Actions Teachers keep a tight eye on their students' actions. Students were given advice and materials for the SLSE. However, due to space constraints, most schools perform LSE events. Making



materials that assist SE in performing LSE processes is quite tough. Patrons and educators Teachers shared their findings.


A. Life Skill Emerging Vision

<p><i>Right of the child (CRC 2019)</i>  <i>The Declaration of Jomtein on Universal Education (2017)</i>  <i>HIV/AIDS Conference at the United Nations (2013)</i>  <i>The world has been programmed to promote human rights education (2014)</i>  <i>Decade of Education for Sustainable Development at the United Nations (2015)</i>  <i>The UN Secretary-General commissions a study on child violence (2016)</i>  <i>The 51st Commission on Women's Status (2017)</i>  <i>Problem Solving Interpersonal Relationships Coping with Stress Communication that works Empathy The ability to think critically thinking outside the box core elements core Life Skills through coping with emotion decision making self awareness core elements core Life Skills through (WHO).</i>  <i>Education in Life Skills (Approaches)</i>  <i>A. Special Study Methodology B. Extension Methodology C. Plug Point Methodology (Indirect) D. As a component of the curriculum (Direct)</i></p>	
<p>The Every Child Matters outcomes are to be healthy, keep safe, enjoy and achieve, and the Life Skills programme aims to encourage and enhance these outcomes. To make a positive difference, To attain financial stability</p>	<p>Students in both the life skill programme and the ICS mainstream gain from integration, socialisation, and role modelling. Trips, everyday living skills in a residential setting, confidence, socialising, and environmental awareness</p>

Table 1: Emerging Vision and Trends

4. IMPLEMENTATION PLAN

Examine the difficulties that teachers and administrators encounter in implementing life skills education in CBSE-affiliated secondary schools across the country. The following is a summary of the responses of administrators and teachers: SE Non-Graded LSE's current state: Students receive no results because LSE activities are not scored in their classes on final exams, therefore they participate in LSE activities in a passive manner. Students' educational burden: Subjects of the curriculum and other co-curricular activities in which ninth and tenth grade pupils should take lessons are the educational burden put on them. The majority of students are uninterested in concentrating more on LSE activities. Student involvement: Students attend LSE classes but do not participate actively in LSE events. Because students did not actively participate, the closing estimate was eliminated. Parents disagree: Most parents place a high value on their children's education, believing that life skills may be learnt later in life. More people think LSE is a waste of time

  
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 Gundlupet, Chittoor, Andhra Pradesh (Mdt.), R.F.  
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Teachers are overworked: The teacher is overworked in terms of academic and extracurricular obligations. Time and content contact with LSE are required by the LSE operations company. Teachers who are overworked as a result of LSE implementation are less motivated. No pre-service training: Teachers are not trained throughout their pre-service schooling. Concerning the integration of LSE into the educational system. Service training is for a short period of time: 3-5 days at LSE Teachers. Intensive teacher training on different facets of life skills instruction is lacking. Teacher preparation is insufficient for the proper implementation of LSE schools, according to an evaluation.

There is no LSE adaptation. Using SE for training Academic Subjects: LSE Minor Service Training It is distributed to 4-6 instructors in each school and does not meet the goals. In general, life skills curriculum should be taught to all instructors so that they can embrace LSE. In terms of their studies. LSE Stand-Alone Topic: How the LSE Program Works in the Classroom LSE is not expected to be included into academic courses by schools or teachers. This is the London School of Economics. It is not possible to attain the LSE goals in a time of 60 to 90 minutes per week.

Scarcity of resources: LSE activities are highly resource efficient and necessitate the use of qualified trainers. However, errors in teaching and learning resources are a typical occurrence, and properly spreading LSE in schools is a challenge. LLSE Evaluation: There are too many methods in place to measure life skills or abilities, making expert insight difficult and time-consuming. Teachers, on the other hand, are not trained to assess LSE assignments.

## 5. DISCUSSION

Life skills education implementation issues in CBSE affiliated secondary schools in India. 4-year life skills education programme applied in all district model schools Six teachers are in charge of LSE activities, according to CBSE norms. LSE was taught in schools as a stand-alone topic with no pre-service training. Chirwa (2019) and Mogoto (2011) underlined the importance of life skills education for teachers in order to attain the greatest results. Rather than doing it all at once, integrate it into the curriculum through lesson-by-lesson co-curricular activities. Subject. In addition, the NCF (2019) stated that adolescent education should be prohibited. Rather than being included in classroom education.

In addition, instructors claimed that in-service training was insufficient and that all school teachers were present. LSE does not address teaching and evaluation methodologies. LSE is a subject that is not graded since it is not a graded subject. Students and parents placed a lower priority on it. Furthermore, both teachers and pupils are obese. Final exams should take into account academic and co-curricular activity. Kitivui (2013); Kitimo (2014); Abobo&Ordo (2018) also found that LSE implementation was limited by a shortage of teaching / learning equipment, an unproven condition, and a high workload.

There aren't enough teachers, they're not well-trained, and there aren't any defined evaluation criteria. The study found that LSE training conditions in the field were inadequate. Teachers do not want to use academic courses to implement LSE. Intensive coordination training It is necessary to develop LSE activities and teaching materials. In this case, Neelina (2012); Behrani (2016) demands a limit on LSE age in India; Singh & Sharma (2016) Teachers who are able to collaborate with other trained and motivated educators are welcomed into



comprehensive schools. Methods of instruction that involve students in the learning process. Teachers must acquire the competence and incentive to integrate life skills into their classrooms by providing pre-service and in-service training.

Audiovisuals, board games, and digital devices are examples of related materials. Designed to make life skills more engaging and enjoyable. In schools, students are taught life skills. It should be adopted as part of a larger educational reform effort. In addition, OK and Roll (2015) advocated for a re-evaluation of LSE education. Teachers should take an unscientific approach to this subject and establish learning outcomes. Inquire about the domain that is influenced by the learner's personality. There are more interactive tasks that are required. Because life skills are incorporated in the LSE, they can be learned at any time. Teachers' lack of expertise in many parts of life skills instruction and evaluation, parental consent issues, and inadequacy.

## 6. CONCLUSION


There are a few obstacles to overcome in order to successfully adopt LSE in schools. This calls for it. There is a need to test life skills education in such a way that students, parents, and teachers take it seriously. There are also other things to consider in school curriculum during pre-service and in-service training, conditions to equip teachers with relevant and appropriate skills to facilitate quality teaching, and life skills study and evaluation. The role of life skills in everyday life personality is discussed in this study. Life skills are abilities that allow a person to have a happy and productive life. Promoting young people's mental health and capacity is just as vital as skill education in the midst of the challenges they confront. Life skills-based education is included into school curricula to assist students in developing a positive attitude toward self-care and health, as well as significant social life skills. Allow for an individual's complete and comprehensive growth in order for social life to function effectively.

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Avanathi Institute of Engg. & Tech.  
Chennai, India



# Zero Voltage Switching Technique For Bidirectional DC-DC Converter

Duddeda Raju

PG Scholar, Department of EEE, Avanathi Institute of Engineering and Technology, India.  
Email-Id: rajuchinna246@gmail.com

E Prasanna

Assistant Professor, Department of EEE, Avanathi Institute of Engineering and Technology, India.  
Email Id: Prasanna.earati81@gmail.com

**Abstract** - A high power bidirectional dc-dc converter with discontinuous conducting mode (DCM) and low inductance may reach greater power densities while using less power. DCM-related current ripple is minimised to a bare minimum with multiphase interleaved operation. It is required to discharge the energy stored in the capacitor before the device may be turned on. When the active switch is switched on, a complementary gating signal control approach is utilised to turn on the non-active switch, which aids in draining the capacitor and channelling the current through the active switch's anti-parallel diode. This technology achieves zero voltage resonant transition (ZVRT) in principal switches. In addition, utilising this method eliminates parasitic ringing in the inductor current. The approaches suggested in this study are based on snubber capacitors and optimising inductance. For the functioning of a bidirectional DC-DC converter, zero voltage switching is accomplished in this paper.

**Index Terms** - DC-DC converter, DCM's, ZVRT, snubber capacitors

## I. INTRODUCTION

Bidirectional dc-dc converters have surfaced as a viable solution for a range of power-related systems, including hybrid automobiles [1], fuel cell vehicles, renewable energy systems, and other similar systems. The outcome is that not only do costs and efficiency improve, but the general performance of the system is improved as well.

When an electric machine generates energy, it is stored in an auxiliary energy storage battery, which is utilised to power the vehicle in the case of electric vehicles. As indicated in the bidirectional dc-dc converter represented in the figure, it is also important to draw power from the auxiliary battery in order to improve performance of the high-voltage bus during vehicle starting, acceleration, and hill climbing. In order to transmit power between two dc

power sources in either direction, bidirectional dc-dc converters are becoming more common. These converters have the capability of reversing the direction of current flow and hence power transmission.

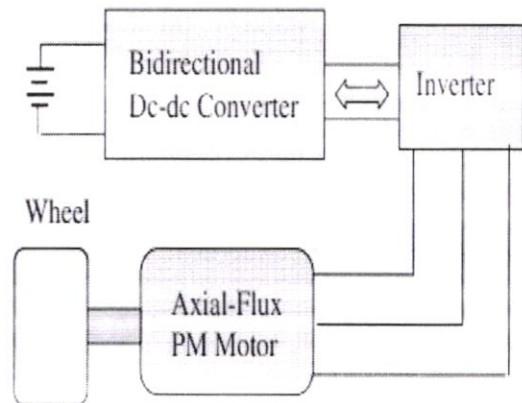


Figure 1. Bidirectional DC-DC Converter.

### A. Non Isolated Bidirectional converters:

An example of a non-isolated bidirectional DC-to-DC converter design is seen in Figure. It consists of a step-up stage that is connected in anti parallel with a step-down stage that is connected in parallel with one another. During motor driving operations, the converter jump stage is used to raise the battery voltage and regulate the inverter input, both of which are performed by the converter. Utilizing the step-down stage of the converter, it is feasible to create vehicle regenerative braking by providing a channel for the braking current and allowing for the recovery of vehicle energy stored in the battery.

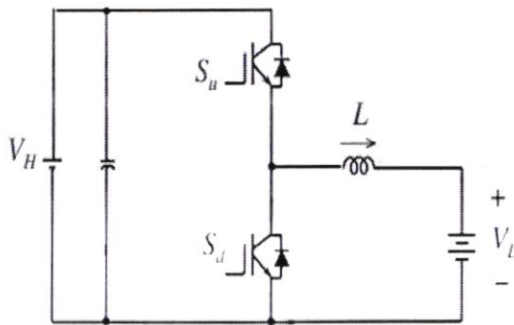


Figure 2. With Buck Boost structure.

**B. Bidirectional Isolated DC-DC Converters:**

Bidirectional dc-dc converters often use transformers to provide electrical isolation between the two sides of the converter. It is certain that the installation of a transformer would result in higher expenses and losses. However, since a transformer is capable of separating the two voltage sources while still supplying the appropriate characteristic impedance between them, it is a feasible option in these sorts of circumstances. In order for a current source to work properly, inductance is often necessary in the centre. Depending on the arrangement, the sub-topology for isolated bidirectional direct current to direct current converters may be a full-bridge, a half-bridge, a push-pull circuit, or a mix of these configurations.

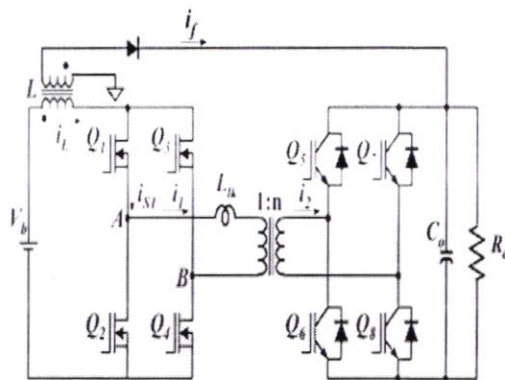


Figure 3. Isolated converter.

One type of isolated bidirectional dc-dc converter is constructed using a high frequency isolation transformer as both the primary and secondary of the converter. A half-bridge is used on the primary side

of the converter, and a push-pull current is supplied from the primary to the secondary of the converter.

The converter's operation is described in full in both modes: while the dc bus is available, the battery is charged, and when the dc bus is gone, the battery supplies power. In particular, this converter is well suited for battery charging and discharging circuits in uninterruptible power sources that run at a constant direct current (dc) voltage (UPS). Among the advantages of this proposed converter topology are electrical isolation between the two dc sources, which is achieved by using only a single transformer, a low part count, which is achieved by using the same power components for power flow in either direction, and a low part count, which is achieved through the use of the same power components for power flow in either direction.

**II DESIGN ASPECTS OF CONVERTER**

In non-isolated bidirectional direct current to direct current converter technology, half-bridge topologies of buck and boost converters are utilised in conjunction with each other. It is feasible to design the converter to operate in discontinuous conducting mode (DCM) in order to achieve high power density while at the same time minimising the size of the passive inductor used in the converter. It is necessary to interleave numerous phases in order to neutralise the high-frequency switching current ripple generated by the DCM operation since it creates a substantial quantity of current ripple during the process. It has been stated that work has been done on the creation of a 36-phase interleaved converter.

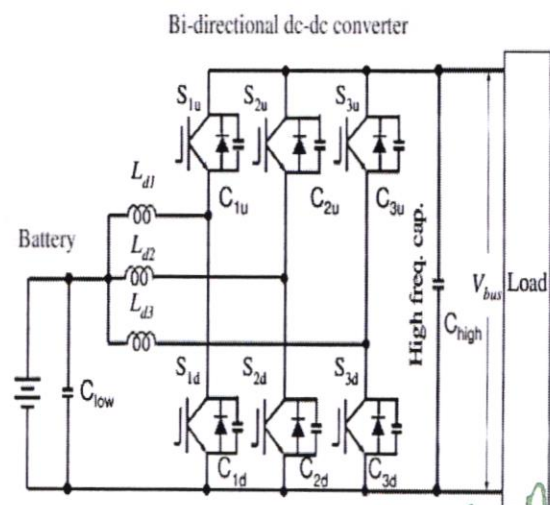


Figure 4. ZVS concept in interleaved converter

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Using a connected inductor approach, it is also possible to reduce the amount of ripple present in the signal. One additional key advantage of DCM operation is the lack of turn-on loss, which, as a consequence, allows the use of a low-power diode to completely reverse recovery loss. The functioning of the DCM, on the other hand, results in a large increase in turn-off loss since the main switch is shut down at double the load current or more when the DCM is operational.

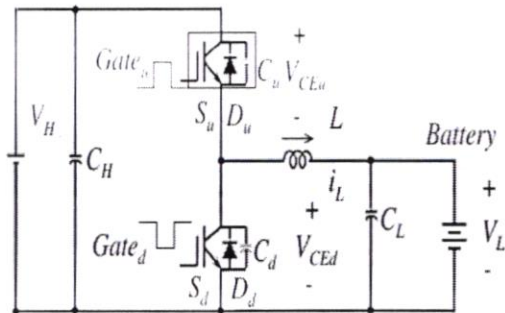


Figure 5. Circuit diagram.

The most major negative side effect of lowering the inductor size is the increase in the frequency of the inductor. Because the inductor's current fluctuates with the device's output capacitance throughout the device's turn-off period, inductor current parasitic ringing is also produced (also known as inductor ringing). All of these undesirable effects that may be generated by the DCM may have a detrimental influence on the device's overall effectiveness.

#### A. Inductor Design:

Following are the expressions used for inductor optimization.

$$\Delta I = \frac{1}{2} \cdot \frac{V_{in} - V_o}{L} \cdot \frac{V_o}{V_{in}} \cdot T_s$$

$$I_{Load} = \frac{P}{V_o}$$

$$I_{peak} = I_{Load} + \Delta I$$

$$I_{min} = I_{Load} - \Delta I$$

$$I_{rms} = \sqrt{I_{Load}^2 + \frac{\Delta I^2}{3}}$$

Following are the realization of soft switching

$$L_{cr} = \frac{1}{2} \cdot \frac{V_{in} - V_o}{P} \cdot \frac{V_o^2}{V_{in}} \cdot T_s$$

### III POWER CIRCUIT MODELLING

There is an introduction to a coupled-inductor system, which has the goal of improving the design of power stages in order to reduce core loss. In order to improve the overall performance of the system, it is necessary to model the coupled inductor and provide a simplified model for the system controller to be used in the design. Using coupled inductors, it is feasible to conduct a comprehensive analysis of the power stage. It is necessary to test the simplified coupled inductor model, which is offered as an example, with the help of the Simples ac analysis simulation.

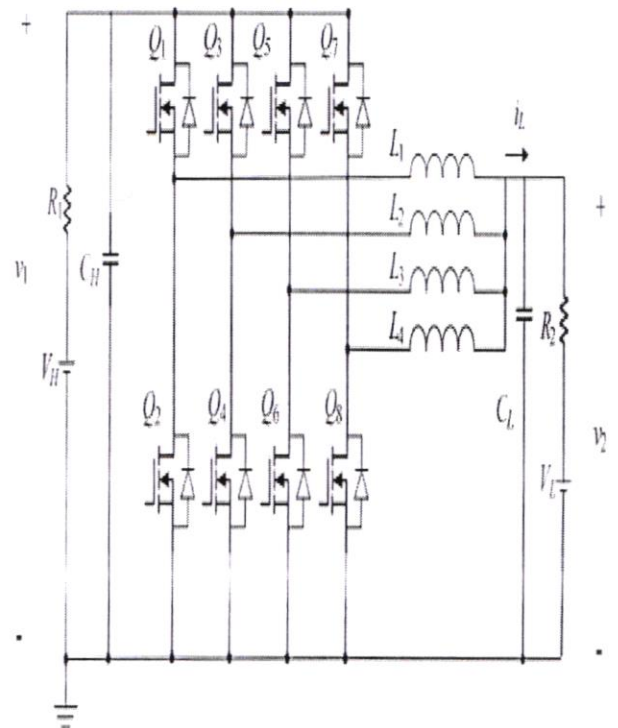


Figure 6. General purpose bidirectional converter.

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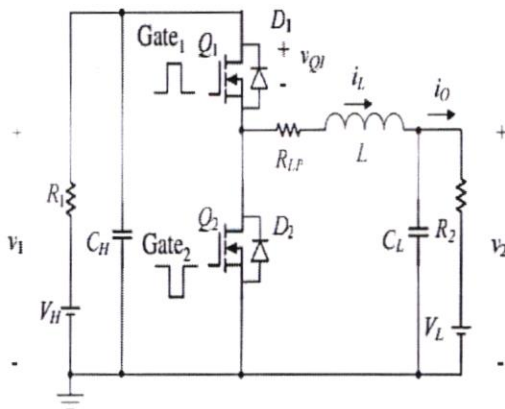


Figure 7. Single phase DC-DC converter.

Following are the assumptions:

- Very small ripple content is presented.
- It is assumed that current is small

A. State Space Model:

The discussion in Chapter 2 and the assumptions mentioned above lead to the observation that no matter whether operating modes are utilised, whether in battery charging mode or in battery discharging mode, there are always two subintervals tonne and toff, as shown in Figure 1. During the first subinterval, when the switch Q1 is switched on and the switch Q2 is turned off, the converter equivalent circuit may be seen in the figure below, which represents the converter equivalent circuit.

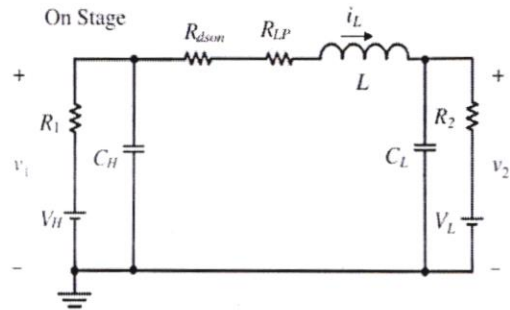
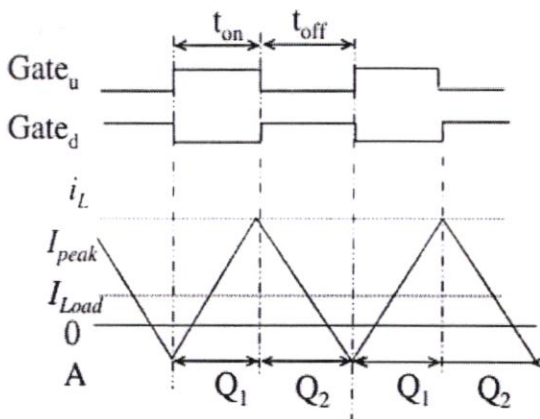


Figure 8. Gate signal and its model.

Following expressions represents its model.

$$L \frac{di_L}{dt} + i_L \cdot (R_{dson} + R_{LP}) = v_1 - v_2$$

$$\begin{cases} C_H \frac{dv_1}{dt} = -(i_L + \frac{v_1 - V_H}{R_1}) \\ C_L \frac{dv_2}{dt} = i_L - \frac{v_2 - V_L}{R_1} \end{cases}$$

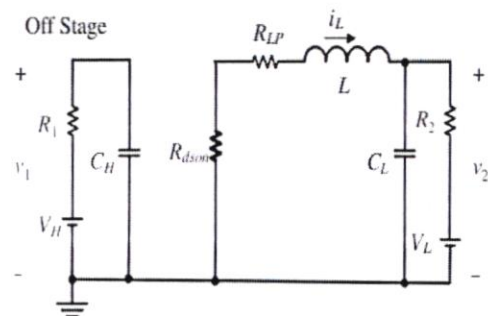


Figure 9. Snubber circuit.

$$L \frac{di_L}{dt} + i_L \cdot (R_{dson} + R_{LP}) = -v_2$$

$$\begin{cases} C_H \frac{dv_1}{dt} = -\frac{v_1 - V_H}{R_1} \\ C_L \frac{dv_2}{dt} = i_L - \frac{v_2 - V_L}{R_1} \end{cases}$$

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 G. Chandrababu Naidu Vengal Rao (MEd), R.R.



IV CONTROLLER DESIGN

It is difficult to synchronise several phases of PWM signals and achieve a precise PWM duty cycle in an analogue implementation due to the various performance of the discrete components due to their distinct performance. When producing multiphase interleaved gate signals, it is better to use a digital controller rather than a mechanical controller. When used in high-power applications where noise immunity is needed, it provides excellent noise immunity and is hence essential. Furthermore, since the error amplifier of the preferred mode may get saturated during the transition, the analogue implementation is more prone to difficulties during the transition than the digital one, which is a disadvantage.

A. System Design:

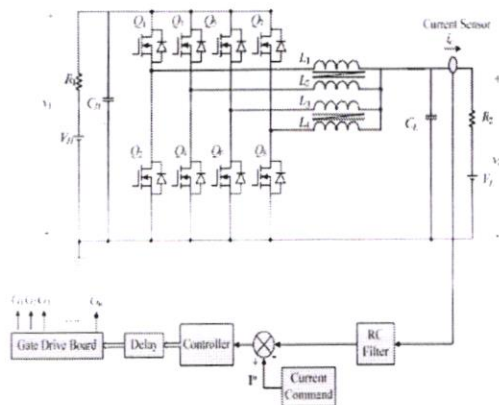


Figure 10. System Architecture.

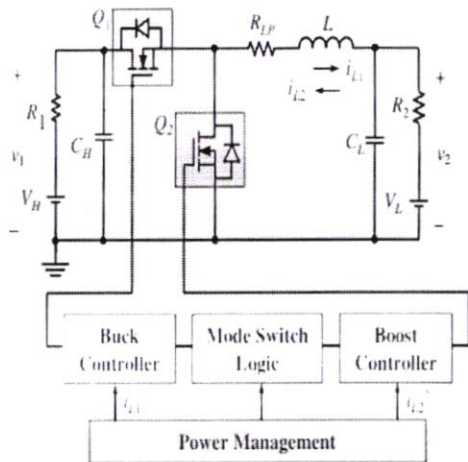


Figure 11. Individual controllers.

B. Filter Design:

The total current  $i_L$  of the inductor is characterised by large peaks and valleys. A four-phase interleaving waveform contains a switching frequency component that is four times as fast as the inductor current ripple frequency of the waveform. However, since there is an imbalance between the four phases, the switching frequency component remains in the waveform. It is thus necessary to use a filter with a low cut-off frequency in order to effectively eliminate the ripple effect. Because the cut-off frequency should be lower than the switching frequency, it is advised that the cut-off frequency be lower than the switching frequency.

$$RC(s) = \frac{1}{\left(1 + \frac{s}{2 \cdot \pi \cdot f_c}\right)^2}$$

$$BF(s) = \frac{1}{1 + 1.414 \cdot \frac{s}{2 \cdot \pi \cdot f_c} + \left(\frac{s}{2 \cdot \pi \cdot f_c}\right)^2}$$

V SIMULATION RESULTS

This is an example of a closed loop. It was necessary to simulate the Bidirectional Converter feeding the PMDC Motor with the appropriate values, which was done in Matlab Simulink using the planned values. They were deemed satisfactory and in accordance with expectations based on the results of the simulation. The following are some of the many waveforms that are available:

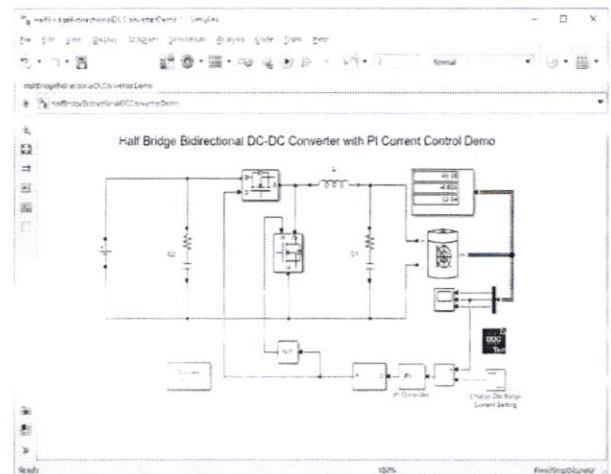


Figure 12. Model in SIMULINK.

*Principal*  
 Avanthi Institute of Engg. & Tech.  
 Guntur, Andhra Pradesh, India

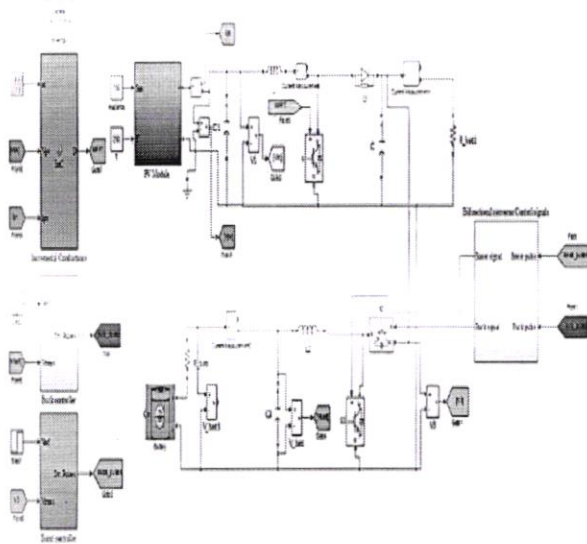


Figure 13. Internal Block.

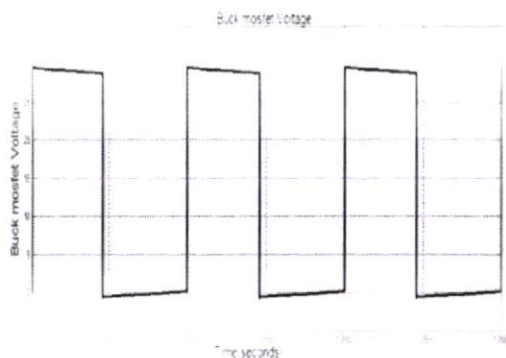
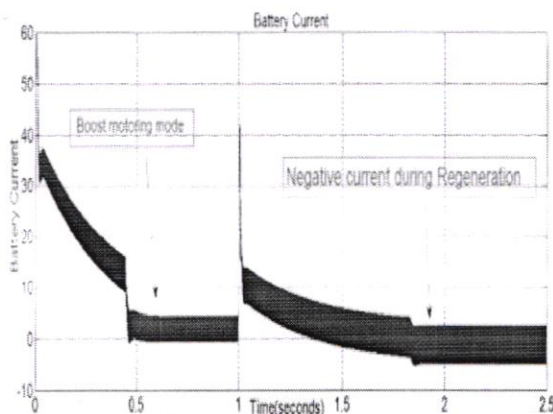


Figure 14. Buck voltage.

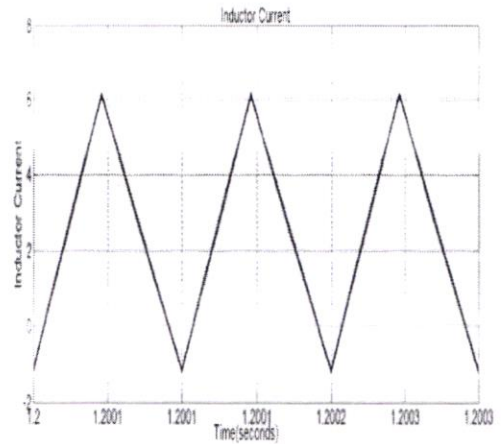


Figure 15. Inductor current.

### CONCLUSION

- Following are the conclusions of the work carried out
- A bidirectional DC-DC converter is designed.
- ZVS switching scheme is implemented
- Ripple content is reduced negligibly.

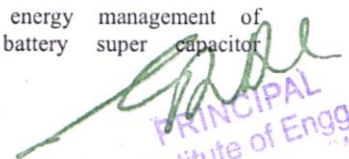
### FUTURE SCOPE

Following aspects are left as future scope of this project.

- Design needs to be verified with discontinuous load.
- Advanced control scheme needs to be implemented.

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#### AUTHORS PROFILE



Mr. Duddeda Raju is pursuing MTech (Electrical Power Systems) in Avanthi Institute of Engineering and Technology, Telangana. He obtained B.Tech (Electrical and Electronics Engineering).



Mrs. E. Prasanna is working as an assistant professor in the department of EEE, Avanthi Institute of Engineering and Technology, Telangana. She has more than 12 years of experience. She is a life member of the Indian Society for Technical Education.

# Back-to- Back HVDC modular multilevel converter operating as power quality conditioning system

Nadimpally Anusha,

PG Scholar, Department of EEE, Avanthi Institute of Engineering and Technology, Hyderabad, India.  
E-mail: n.anusha.nkp@gmail.com

E Prasanna

Assistant Professor, Avanthi Institute of Engineering and Technology, Hyderabad, India.  
E-mail: Prasanna.earati81@gmail.com

**Abstract:** Modular multilevel converters (MMCs) have recently piqued attention in the field of high-voltage direct-current (HVDC) transmission technology due to their unique properties. Three essential features of high-voltage direct current (HVDC) MMCs are intimately connected to the modulation and switching schemes utilised by the converters: power quality, converter cost, and system performance. For excellent power quality and performance, high switching frequencies and large cell capacitors are necessary, while for poor power quality and performance, low switching frequencies and tiny cell capacitors are required. In order to minimise the cost of the converter, a high frequency and a tiny cell capacitor are required. It is possible to obtain an appropriate choice of modulation and switching strategy via an optimal trade-off between these opposing criteria is found. The primary goal of this thesis is to offer a realistic switching technique that is both simple and effective. For HVDC MMCs that strikes a compromise between the previously stated conflicting criteria. An examination of the switching pattern of the converter in terms of mathematics, as opposed to an investigation of the power quality and converter costs has been carried out in order to develop an MMCs that are linked to the grid face an optimization issue. Various goal functions are used. Converter loss and other aspects of the stated optimization issue are being investigated. Minimising the amount of energy used, minimising voltage imbalance, and minimising computational load specifically, this thesis offers three approaches for achieving various objectives.

**Index Terms:** Modular multilevel converters, voltage imbalance, power quality, cell capacitors

## I INTRODUCTION

In conventional power transmission networks, high-voltage alternating current (HVAC) technology is

utilized to transport electric power. On the other hand, the necessity for more efficient transmission systems has prompted the introduction of modern transmission technologies such as high-voltage direct current transmission (HVDC). In the 1930s, ASEA, a Swedish industrial business, started developing high-voltage direct current (HVDC). The following are some of the most prominent technical benefits of high-voltage direct current technology:

As a consequence of these advancements, the adoption of this technology in power grids has been advocated. In 1951 and 1954, the Soviet Union and Sweden, respectively, developed the first high-voltage direct current transmission networks [1]. The converters in this set were designed using a line-commutated architecture with mercury-arc valves as switching devices. With the commissioning of the world's first thyristor-based high-voltage direct current (HVDC) station at Eel River, New Brunswick, Canada in 1972, Solid State Devices for Line-Commutated Converters and the replacement of mercury-arc valves started. The emergence of voltage-source topologies that could control reactive power accompanied the evolution of high-voltage direct current technology. In 1997, the world's first commercial voltage-source converter [3], which was placed in Hellsjön, Sweden, and worked on a two-level system, was commissioned. Later, in 2003 [4, for the first time, the modular multilevel converter (MMC) architecture is offered for commercial application. In terms of modularity and losses, MMC converters for high-voltage direct current (HVDC) systems surpassed two-level converters. In recent years, MMC has, as predicted, become a popular design for high-voltage direct current (HVDC) applications.



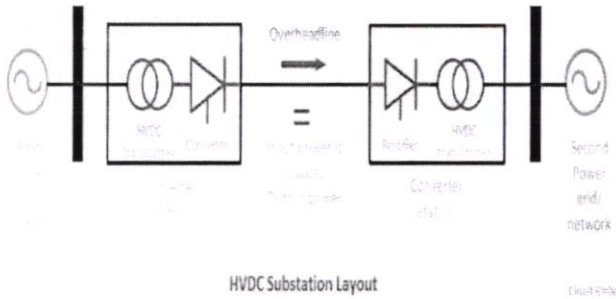


FIGURE 1 HVDC Layout.

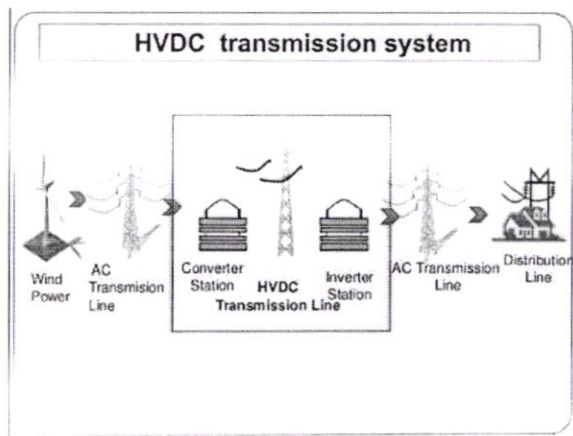


FIGURE 2 Schematic of HVDC.

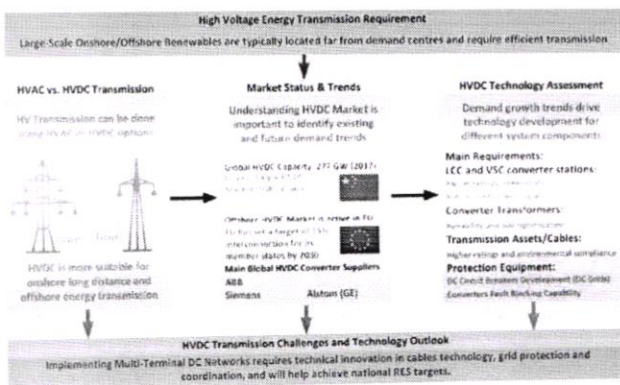


FIGURE 3 Challenges in HVDC.

II MODULAR MULTILEVEL CONVERTERS

An MMC HVDC station is generally shown in the picture, which is connected to an alternating current grid through a transformer at the point of common connection

(PCC). Each converter phase is made up of two converter arms, each with N cells coupled together in a cascade

$$-v_{dc} + v_p + Ri_p + L_{arm} \frac{di_p}{dt} + L_T \frac{di_s}{dt} + v_g = 0,$$

$$v_{dc} - v_n - Ri_n - L_{arm} \frac{di_n}{dt} + L_T \frac{di_s}{dt} + v_g = 0,$$

$$v_s = \frac{v_n - v_p}{2},$$

$$i_s = i_p - i_n,$$

$$L_{eq} = \frac{L_{arm}}{2} + L_T.$$

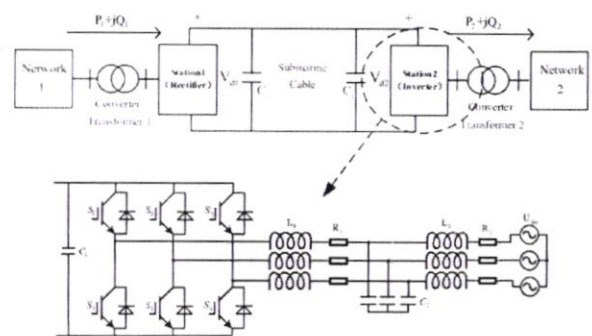


FIGURE 4 Structure of HVDC using MMC.

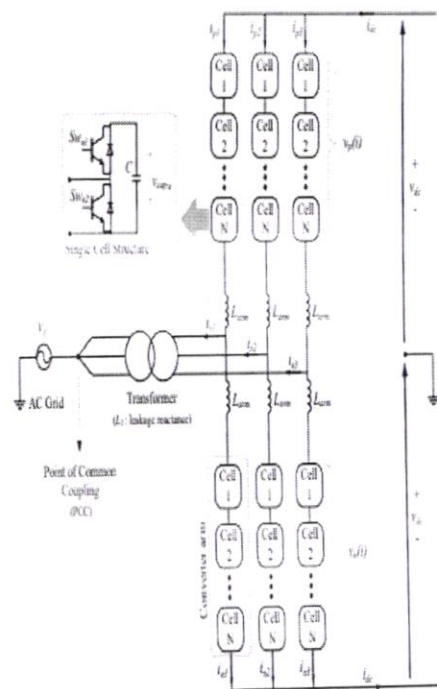


FIGURE 5 Schematic of MMC.

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$$L_{arm} \frac{di_c}{dt} = v_c - Ri_c,$$

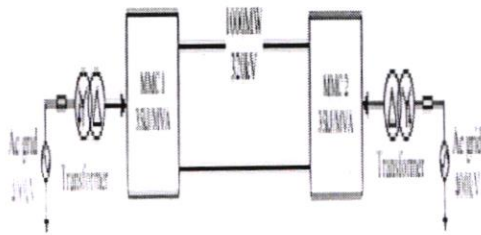
$$v_c = v_{dc} - \frac{v_n + v_p}{2},$$

$$i_c = \frac{i_p + i_n}{2}.$$

$$v_{c,ref} = \frac{2V_{dc}}{N} + \frac{1}{2\omega C_{arm} V_{dc}} \left( \pm \frac{S}{3m} \sin(\omega t - \varphi) + \frac{mP}{6} \sin(\omega t) \right. \\ \left. - \frac{S}{12m} \sin(2\omega t - \varphi) \pm \frac{k_{3rd} mP}{18} \sin(3\omega t + \varphi_{3rd}) \right. \\ \left. + \frac{k_{3rd} S}{12} \sin(2\omega t + \varphi_{3rd} + \varphi) \right. \\ \left. + \frac{k_{3rd} S}{21} \sin(4\omega t + \varphi_{3rd} - \varphi) \right).$$

A. Configuration of the HVDC:

Modulating the insertion index and switching the cells in modular multilevel converters may be done in a few different ways. This thesis proposes the adoption of a novel switch.



The benchmark model is based on the INELFE interconnection [7], a real high-voltage direct current (HVDC) link between France and Spain. A point-to-point HVDC connection with an active power rating of 1000 MW and a reactive power rating of 300 MVAR serves as the benchmark. The nominal dc-side voltage is about 320 kV, and the converter connects it to a 400 kV alternating current network. As illustrated in Fig. 2.2, this arrangement is first modelled in PSCADTM/EMTDCTM and subsequently in a real-time simulator. In the PSCAD simulation, there are 40

converter levels (cells), but in the real-time simulation, there are 512 converter levels (cells).

Each converter station requires a competent control system in order to give the necessary power contribution. The basic control blocks for a grid-connected MMC are shown in Figure 1. The control structure may be divided into two levels based on broad principles: high-level control and low-level control. An outer control loop, an internal control loop, and a converter modulator are the three components of high-level control (or modulator). The outside controller controls the amount of power transmitted to the alternating current (alternating current) grid and sets the current reference signals to stabilise the converter dc voltage.

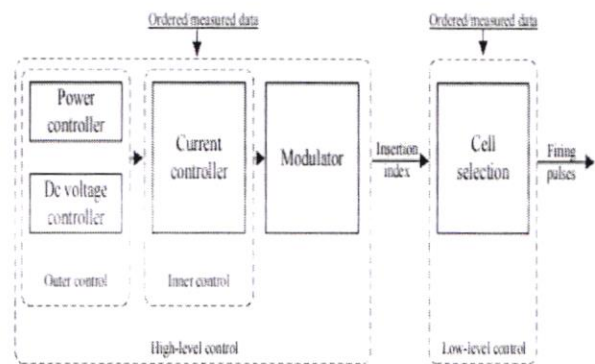


FIGURE 6 HVDC Control.

A reference signal that matches the normalised necessary voltage level of each converter arm is used as the insertion index for each converter arm. To compensate for this, each converter arm is equipped with a series-connected capacitor, which may be individually put into the current route or bypassed from the current path as needed.

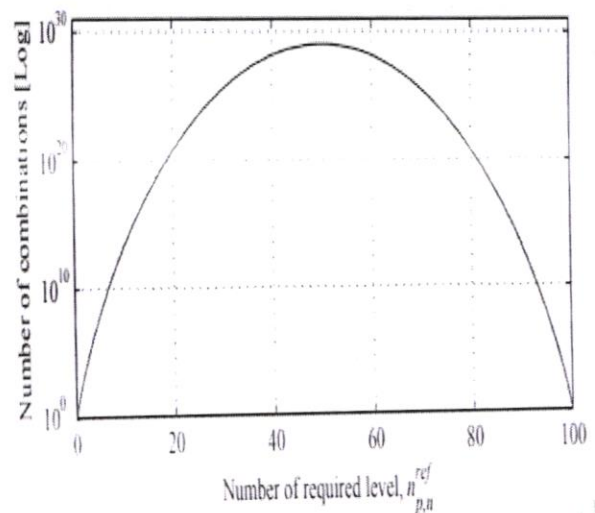


FIGURE 7 Converter cell configuration.



As a consequence, by combining the sum of the capacitor voltages that have been supplied, the total arm voltage is synthesised. Low-level control generates the firing pulses for each individual cell in the background, based on the voltage level required at each time step. The high-level control, for the most part, generates the reference signal for each converter arm, while the low-level control decides how many cells should be admitted and which should be rejected.

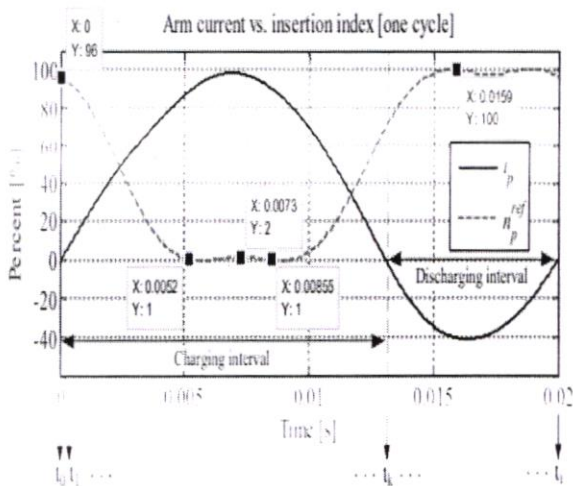


FIGURE 8 Cell performance.

While this is true, there are other permutations that might result in the required arm voltage level. The cell selection technique may be regarded of as a strategy for picking specific items from a collection of objects, assuming that the capacitor voltage levels in all cells are the same.

**B. MMC Topologies:**

Following are the various topologies available in modular multilevel converters

- Binary Inverters
- Trinary Inverters
- Assymmetric Inverters
- H bridge Inverters
- Generalized Inverters.

The description of every types and its topology are shown below.

**C. Binary MMC**

The figure shown below shows the topology of the binary inverter.

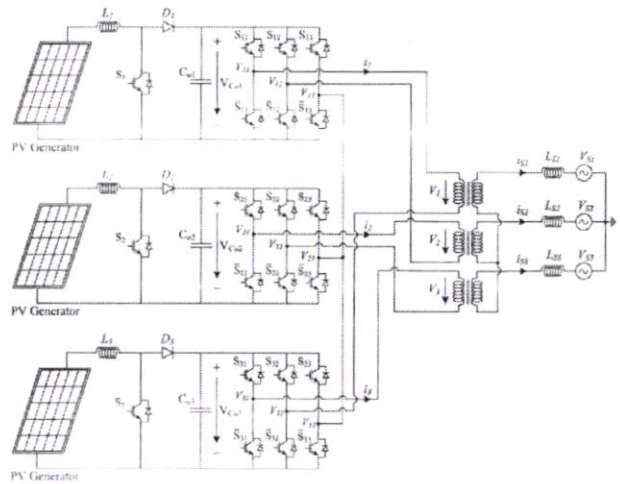
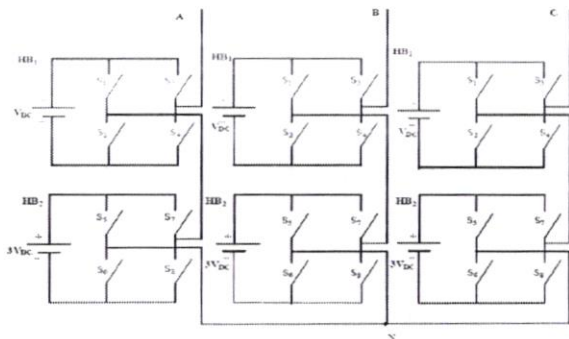


FIGURE 9 Binary MMC.

**C. Trinary MMC:**

The figure shown below shows the topology of the trinary inverter.



**D. Asymmetric MMC:**

The figure shown below shows the topology of the asymmetric inverter.

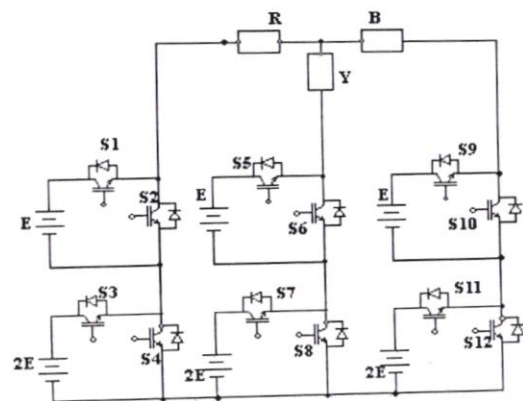


FIGURE 10 Asymmetrical inverter topology.

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Bin-packing and knapsack problems, two problems that are quite similar, are well-known as NP-hard problems in the field of computer science. Solvers for NP-hard problems often take a long time to execute, making them unsuitable for creating online switching patterns in multi-core microprocessors. Off-line optimal solution research, on the other hand, may contribute in the development of heuristic strategies for addressing this kind of problem quickly.

A variety of modulation and cell selection strategies have been proposed since the MMC was initially reported in [4]. In contrast to today's technologies, early published solutions, such as carrier-based pulse width modulation, were mainly developed for acceptable system performance with no loss reduction strategy (PWM). The switching cells that will be employed at the carrier-reference crossover are identified using carrier-based PWM methods. The carrier frequency, which may be directly modified by the converter control system, is equal to the number of switching occurrences, also known as the switching frequency. Switching actions, on the other hand, control the ripple in capacitor voltage indirectly. This approach, according to the research, creates a substantial capacitor voltage ripple at low carrier frequencies, rendering it inappropriate for HVDC applications.

### III SIMULATION RESULTS OF VSC HVDC

The simulation results of the modular multi level inverter based HVDC system are presented in this chapter. All the simulations are carried out in MATLAB/SIMULINK.

#### A. Description of VSC HVDC

- Following are the parameters of the MMC HVDC system 230 KV, 2000 MVA, and 50 Hz identical systems are used
- Systems are interconnected using 200 MVA, 100 KV DC
- A three-level Diode Clamped MLI is employed in the system modeling
- Sinusoidal pulse width modulation is used for producing the firing pulses
- The switching frequency used is 1.3 kHz.
- A 75 Km cable is used in the interconnection process
- A smoothing reactor is employed in the circuit
- Three-phase to ground fault is applied on AC side

The simulations are carried out with fault and without fault, conditions using the specifications as mentioned above of the VSC HVDC system.

#### B. Schematic of VSC HVDC

The schematic of the system under study consists of the following things, which is clear from the simulation diagram shown in the figure below

- Two identical AC systems
- Two Converter stations
- Fault block at the AC side in one of the two systems
- Filter for the Converters
- Pulse generation blocks for the VSCs
- Data analyzing block for observing the output waveforms

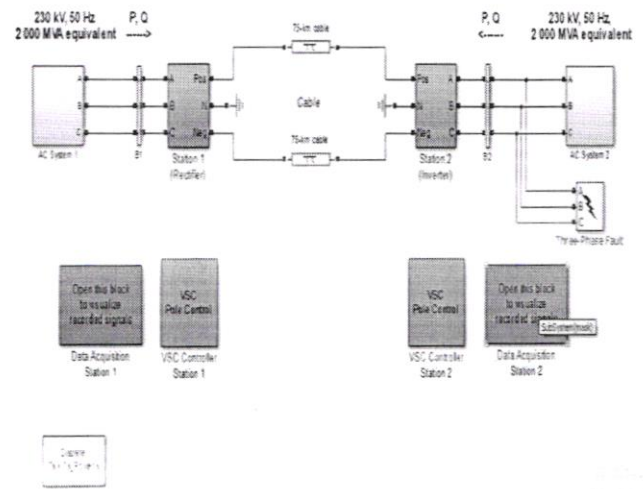


FIGURE 11 Main circuit of MMC HVDC.

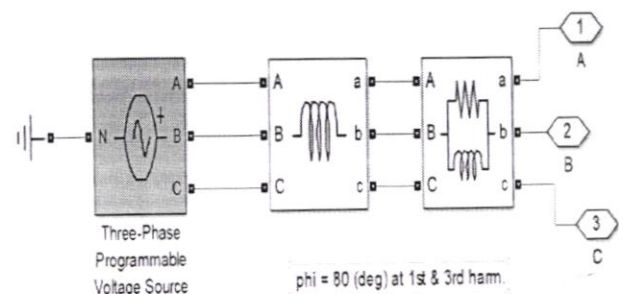


FIGURE 12 AC Source in System 1





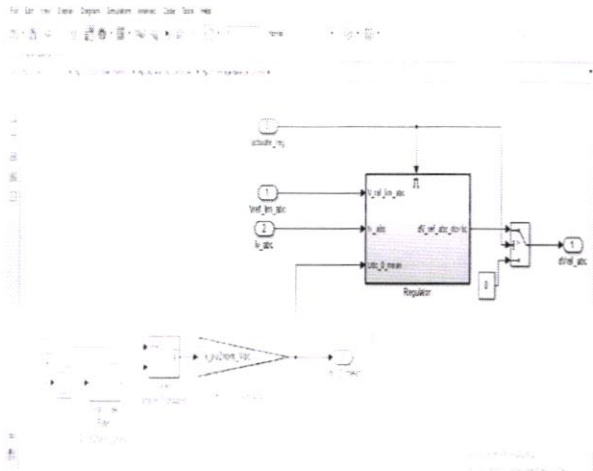


FIGURE 23 DC bus voltages balancing

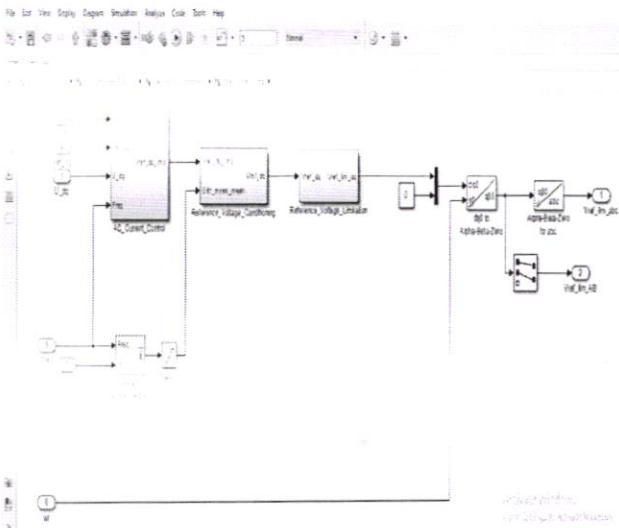


FIGURE 24 MMC current loop

C. Output waveforms of system 1

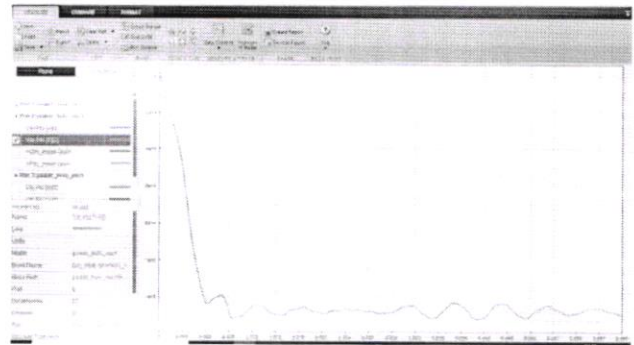
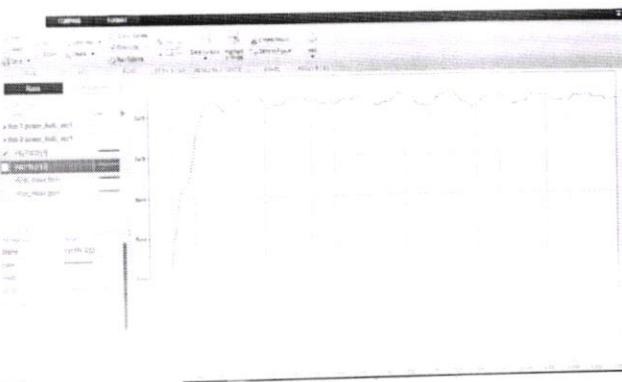


FIGURE 25 Positive and negative DC Voltages

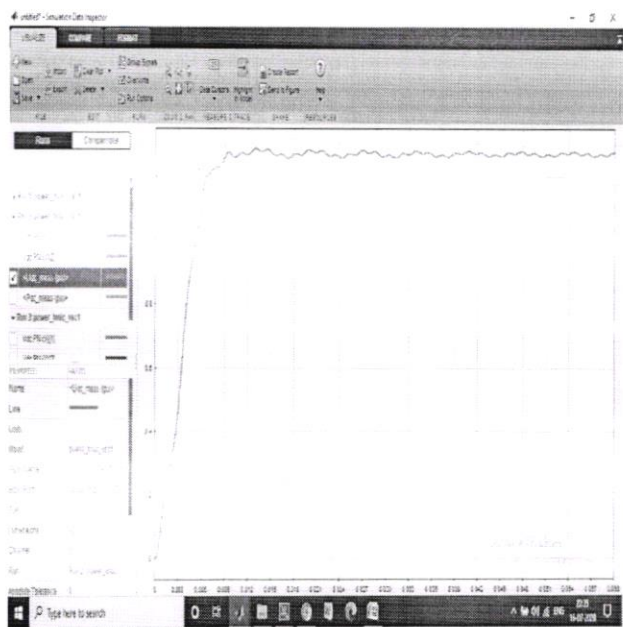


FIGURE 26 Reference DC Voltages

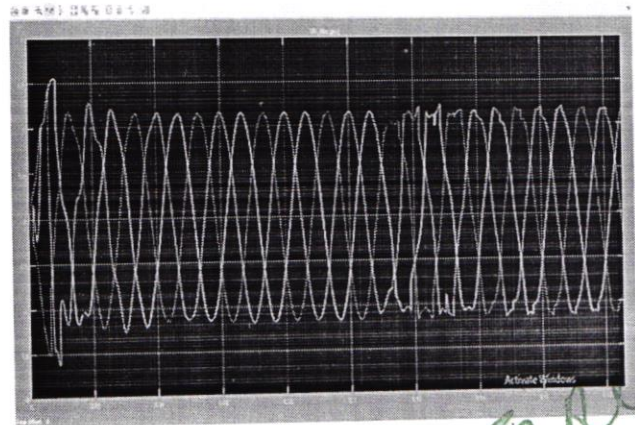


FIGURE 27 AC Voltage of first converter station



#### D. Output waveforms of system 2

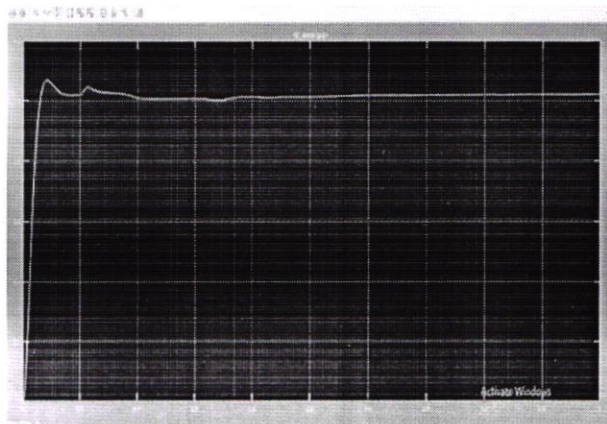


FIGURE 28 DC positive voltage

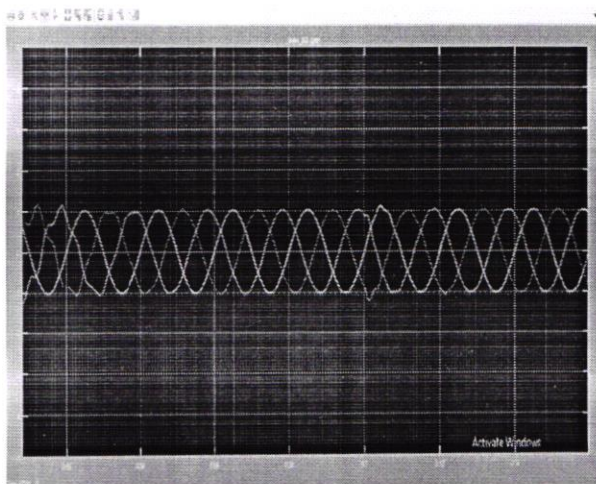


FIGURE 29 Three-phase balanced voltage after filtering

### CONCLUSION AND FUTURE WORK

#### A. Conclusions

Following conclusions are made from the work carried out in this project

- Bulk power can be easily transmitted using HVDC
- If the HVDC is operated using VSC, then the quality of the output voltages improves.
- Usage of active power filter can be avoided by employing the VSC in HVDC systems.

- The real power and the reactive power balances are good with VSC HVDC systems

#### B. Future Work

However, the following aspects of VSC based HVDC are not addressed in this project, which are left as a future scope of this project. Some of those aspects are

- The multi-terminal VSC HVDC systems are not considered in this project; hence, if the same study can be performed on multi-terminal systems.
- Stability study is another important aspect, which is not considered in the present study. This work can be addressed in future studies.
- This technology can be applied to the grid integration of renewable, which is left as future work.

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#### AUTHORS PROFILE



Nadimpally Anusha is pursuing MTech (Electrical Power Systems) in Avanthi Institute of Engineering and Technology, Telangana. He obtained B.Tech (Electrical and Electronics Engineering).



Mrs.E.Prasanna is working as an assistant professor in the department of EEE, Avanthi Institute of Engineering and Technology, Telangana. She has more than 12 years of experience. She is a life member of the Indian Society for

Technical Education.





# Deep learning binary fruit fly algorithm for identifying SYN flood attack from TCP/IP

Vankayalapati Nagaraju\*, Arun Raaza, V. Rajendran, D. Ravikumar

Department of ECE, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai 600117, Tamilnadu, India

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## ABSTRACT

SYN Flood Attack is one form of distributed denial of service attack that attains the handshake process of TCP. This attack consumes all available server resources and provokes legitimate traffic which aims to make the server unavailable. It causes serious damage to cloud server and networking protocols. The main objective of this research work is to train the neural network for detecting the attack and to secure network connection. A novel binary fruit fly optimization algorithm with deep learning is proposed to predict the syn flood attack. The proposed algorithm is implemented using the KDD cup dataset. DL-BFFA algorithm has achieved 99.96% detection accuracy for detecting the SYN Flood Attack. A comparison study is conducted to validate the proposed model.

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## 1. Introduction

Nowadays the internet offers online banking, e-commerce, and education services online. SYN flood attack is a type of cyber threat that can affect the internet services such as email, online accounting, and public networking. This attack occurs, and then the users aren't able to access network resources, devices, and information systems. SYN flood attack is a method to create a connection between the client and server in a transmission control protocol TCP/IP network. It can occupy the available connections in the port and leaves an incomplete handshake. The send request will be continued by an attacker until all open ports are saturated with their requests. It has denied the connection to the legitimate users in the network. In the big data field, this type of attack is increased due to political, e-commercial, and personal reasons. The main target of this attack is to harm web-based applications, media, and software industries. The schematic example of an SYN flood attack on the network is shown in Fig. 1.

In 1994, SYN flood attacks were discovered by Bill Cheswick and Steve Bellovin. CERT published an article for mitigating SYN flood attacks [1]. It is very crucial for secure communication in the network. The traditional approaches are mainly focused on manual

recognition and statistical analysis. New techniques are based on data mining, machine learning, and neural networking. Entropy-based lightweight DDOS flood attack detection model has achieved fine anomaly detection accuracy [2]. In a network security system, a software-defined network (SDN) is deployed using programming languages such as java and python with security functionality methods [3-5]. A TCP connection initiated using a three-way handshake technique has led to vulnerability to the attack [6]. In 2018, Kaspersky has revealed that 50% of the cyber attack is based on the TCP SYN attack only [7].

Most of the research work focuses on the detection approaches are based on offline analysis and simulation methods such as patterns during normal and attack states, network traffic characteristics. Due to this limitation, the authors propose a deep learning-based model to predict the SYN flood attack in real-time. The main contribution of this is as follows.

- A novel binary fruit fly optimization algorithm with deep learning is proposed to predict the syn flood attack.
- Train the neural network model for detecting the attack to secure network connection.

This research paper is organized as follows: Section 2 addresses the detection and mitigation solution for SYN flood attacks. Section 3 discusses the data collection and feature selection techniques. The proposed BFFA model implementation details are

\* Corresponding author.

E-mail addresses: [nagaraj450@gmail.com](mailto:nagaraj450@gmail.com) (V. Nagaraju), [director.ece@velsuniv.ac.in](mailto:director.ece@velsuniv.ac.in) (V. Rajendran), [ravi.se@velsuniv.ac.in](mailto:ravi.se@velsuniv.ac.in) (D. Ravikumar).

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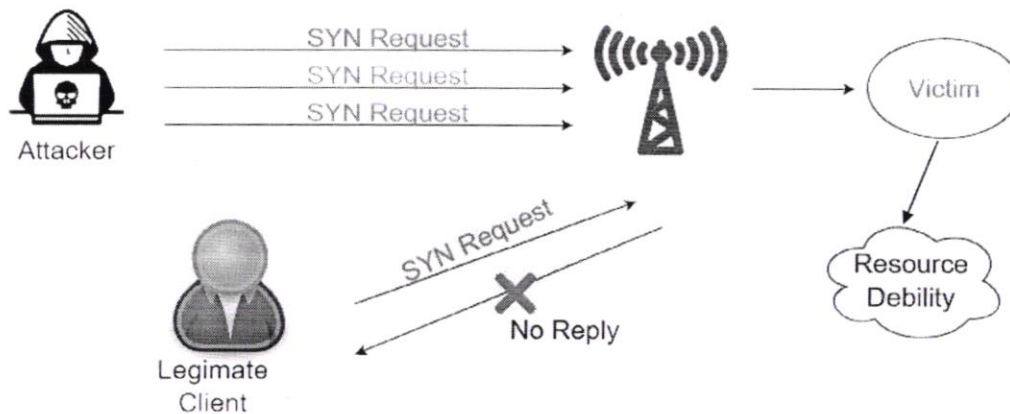


Fig 1. Schematic diagram of SYN flood Attack.

described in section 4. The performance analysis and the results are presented in section 5. Section 6 concludes the model and future work to carry out the reproductively of the model [23–25].

## 2. Related work

Many researchers have produced solutions for DDOS detection using static-based and machine learning-based approaches. The authors have proposed a novel deep learning model combined with the optimization algorithm to detect the SYN flood attack. Research works related to the statistical and machine learning models are discussed as follows:

### 2.1. Statistical analysis

The severities of the attacks are classified as TCP-ACK, Slowloris, and SYN attacks. The authors have determined the confidence interval and distribution of the network data during a normal time (without attack). Any deviation in the mean throughput value indicates the attack. The value of the mean throughput and confidence levels were used to detect the anomaly attack [8]. At early stages, the network attack was detected using the entropy property. It measures the close probability of new incoming packets concerning the total number of events. If the host receives an excess number of incoming packets then the entropy level drops and the randomness of the packet level decreases. The attacks are detected based on the experimental threshold values [9]. Open Flow table contains the copy of the packet number with flow entry. An entropy-based lightweight DDOS attack reduces the flow collection overhead. This model was implemented in software-defined networks and programmable switches [10]. The statistical analysis has overhead in the form of delay and high-speed network traffic.

### 2.2. Machine learning methods

Machine learning algorithms are used to detect and predict DDOS attacks. In SDN, the most common threats are DDOS attacks and intrusion. The authors have built the machine learning model based on the training data set. Machine learning algorithms such as support vector machines, neural networks, and fuzzy logic are applied to mitigate the attacks [11]. The authors of [12] have presented six machine learning approaches to analyze the DDOS attack. They have proved that a support vector machine predicts the attack with good accuracy and a low false-positive rate. An Artificial Neural Network and Naive Bayes models are used to detect the attack [13] in the network. Some of the research works have focused on a combination of two approaches. Traffic flow fea-

tures are extracted using statistical analysis and apply machine learning algorithms to classify the anomaly attacks [14]. Different types of network attacks are detected with the help of data mining and machine learning techniques [18]. An intelligent bee colony algorithm was proposed by [19] for detecting the DDOS attack and traffic reduction algorithm to reduce the network traffic in the system.

## 3. Proposed methodology

The proposed Binary Fruit Fly Algorithm (BFFA) with deep learning model analyses the syn flood attacks and the network traffic. This model comprises data collection, feature extraction, input layer, dense layer, and output layer. Fig. 2, Depicts the architecture of the BFFA model to detect the attacks in the network.

### 3.1. Data collection

The authors have implemented the model on the KDD cup dataset. The KDD cup dataset was created by Stelfo et al., [15] based on the information captured from the DARPA98 IDS evaluation program. Table 1 describes the training and testing split of the two datasets. The BFFA model is trained with a 70%-30% data split.

In the preprocessing phase, the data is cleaned to extract useful information from the dataset. It can consist of normalization and feature extraction. Step to process the data are as follows

Step 1: Network traffic is defined as  $N = [n_1, n_2, \dots, n_n]$  where  $n_i$  is the original features of the input vector.

Step 2:  $T_n$  be a feature vector of transformed features of the dimension.

### 3.2. Feature extraction

This data consists of 4,900,000 single connection vectors with 41 features. The data is classified as normal or attacks. The attacks are categorized as Denial of Service (DOS), Remote to Local attack (R2L), User to Root attack (U2R), and Probing attack. The benchmark dataset is downloaded from the following link [16]. Fig. 3. Illustrates the covariance of certain selected features extracted from the data set. KDD cup features are divided into three groups such as basic features, content features, and traffic features. Basic features can be extracted from the TCP/IP connection and it leads to an implicit delay in detection. Content features are selected from the suspicious behavior in the data. Traffic features are computed for window intervals from the same host and same service. All the important features are extracted from the data based on priority. In KDD cup data, eight important features are identified such as



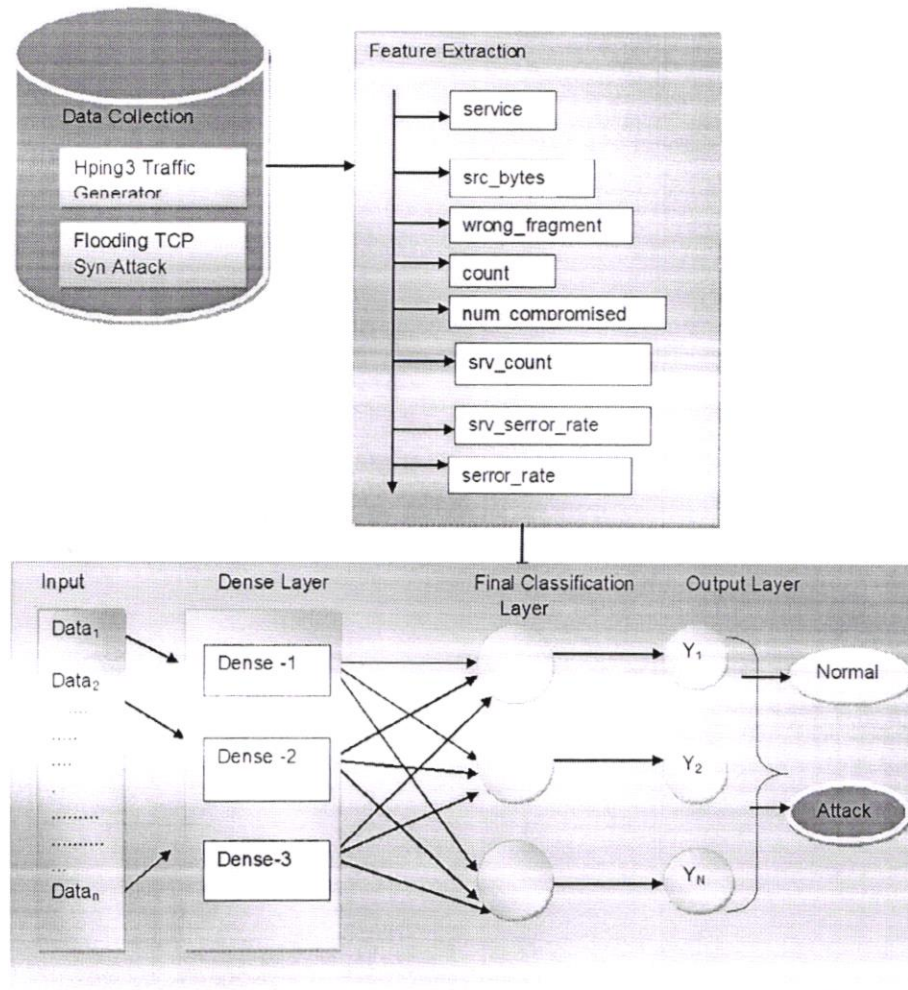


Fig 2. Architecture of the proposed model.

Table 1  
Statics of training and testing data.

Data	Total	Training	Testing
KDDcup	18,230	12,761	5469

server, src\_bytes, count, srv\_count, and error\_rate. Three features of the dataset have zero values. To avoid over fitting the features of wrong\_fragment, num\_compromised and srv\_error\_rate are nullified.

### 3.3. Input layer

This is the first layer of the proposed model which consists of artificial input neurons. It collects the data and sends it to subsequent layers for weight calculation. Each input layer has its weights and multiplies the incoming input data for further process.

### 3.4. Dense layer

The neural network layer is connected deeply in the network. It receives input from the input layer then performs matrix multiplication. The matrix vector contains values that can be trained and

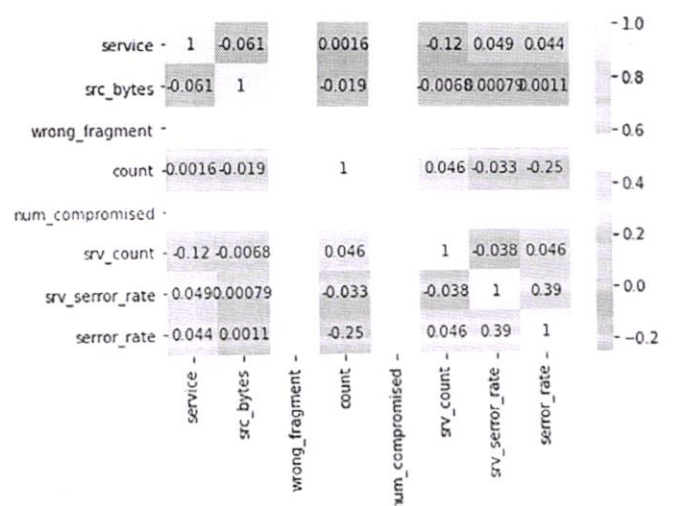


Fig 3. Covariance of selected Feature for KDD99 data.

updated with the help of back propagation. Our model is trained using the parameters such as units, activation, initializes, and input dimensions.



3.5. Output layer

The fully connected output layer has a single neuron and acts as a classifier. The hyper parameters of the activation function and learning rate are set based on the optimization algorithm. The output layer is set the sigmoid activation function and learning rate (0.00174) to implement the models. The model to classify the attacks in the network, into two classes as normal or attack based on the learning process. See (Table 2).

3.6. Proposed BIFFA algorithm

Binary Fruit Fly Algorithm (BFFA) is used to solve discrete optimization problems. It consists of two phases such as smell phase and the visit phase. Our proposed deep learning model is based on the [17] vision function. This function is used for improving the classification results. The BFFA model has the following steps

1. Adjust the parameters.
2. Initialize the fruit flies randomly.
3. Calculate the visit phase value for every fruit fly as
4.  $Visit_i = \text{Function}(v_i)$ .
5. Find the best visit value and fix the layer in that value for the next iterations

[Best Visit] = Max [Visit]

This algorithm is used for initializing the parameters in deep learning models. To train our proposed deep learning experiment to obtain the optimal parameters are shown in Table 3. Our proposed BFFA algorithm performs well for detecting the attacks as compared to other optimized algorithms. Binary fruit fly algorithms can classify the normal and attacks. BFFA algorithm combines the swarm intelligence optimizes technique for setting the parameters in deep learning neural networks. This approach can reduce the learning parameter for designing the network and is optimized for all syn flood datasets.

Table 4 shows the deep learning models input and output layer concerning the parameters. The main components of the BFFA model are described as follows: initialize the hyper parameter, evaluate the solution and find a new solution for tuning the parameters. The dense layer is activated with the relu function. The classifier uses binary cross entropy for detecting the attacks.

4. Experimental results and discussion

The BFFA model is implemented using a python programming language. The packages such as NumPy, sklearn, pickle, tqdm, pan-

Table 2  
Dense layer and parameters.

Parameters	Value
Units	30
Activation	relu
Initializer	uniform
Dimensions	25

Table 3  
Optimal parameters for different algorithms.

Parameter	BBA	TD HLBBA	BFFA
Batch Size	10	10	10
Number of Epoch	20	30	20
Learning Rate	0.0017	0.0017	0.00174
Number of neurons	20	40	30

Table 4  
Proposed BFFA model.

<b>Input:</b> Two datasets as DS, Label C as classes of the attack
<b>Output:</b> Prediction of attacks
<b>Initialize:</b> Train-Test split
Epoch
Hyper parameters for firefly model
<b>Training:</b>
Step 1: model <sub>seq</sub> -> Input and Output layers
Step 2: model <sub>dense</sub> ->(units, activation, kernel_initializers)
Step 3 : model <sub>dense</sub> -> (number of classes, activation, kernel_initializers)
Step 4: model <sub>compile</sub> -> (loss,optimizer, metrics)
Step 5: model <sub>classifier</sub> (BFFA_best_model())

das, sea born and matplotlib are used to implement the model. It is carried out by the two datasets KDD cup. This dataset has 41 features and is grouped into three categories such as content, traffic, and intrinsic features. The model performance is evaluated using accuracy metrics.

$$Accuracy = \frac{TP + TN}{TP + FP + TN + FN} \tag{1}$$

where,

- True-positive (TP) = Number of data correctly predicts an attack.
- False-positive (FP) = Number of data wrongly predicts normal.
- True-negative(TN) = Number of data correctly predicts an attack.
- False-negative (FN) = Number of data wrongly predicts normal.

4.1. Syn network model

This model is implemented using two fully connected dense layers. Dense layer parameters are output shape and activation function. This model has an output array of shapes as 32 with relu activation function. Training-testing split is 70-30 split. Syn network model is compiled with adam optimizer. The classifier uses a binary cross-entropy metric to predict two labels as normal or attack. This model is iterated for 10 epochs and produces 98% detect accuracy for KDD cup data.

4.2. TDLHBA (tuning deep learning using hybrid bat algorithm)

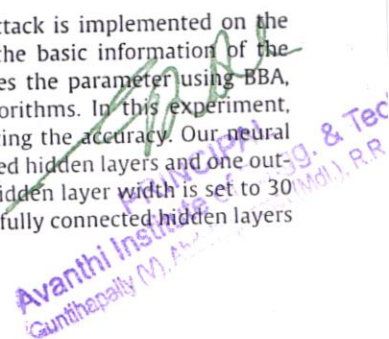
This algorithm combines the swarm intelligence algorithm for setting the parameters in deep learning neural networks. This approach can reduce the manual search of the learning parameters in the network. This approach is optimized for different datasets. This model is implemented on 40 neurons with relu activation function. This model achieves 99% accuracy for the dataset.

4.3. BBA (binary bat Algorithm)

The authors of Deep Dense [20] utilize the BBA model; it combines the Bi-LSTM with a dense layer to predict the attacks. The Bi-LSTM utilizes the 64 filters with tanh activation and L2 kernel regularizer. This model is compiled using the relu activation function.

4.4. DL-BFFA model

The prediction of the syn flood attack is implemented on the KDD cup dataset. Table 1 presents the basic information of the dataset. The learning model initializes the parameter using BBA, TDLHBA, and BFFA optimization algorithms. In this experiment, we used 30% of test data for calculating the accuracy. Our neural network model has two fully connected hidden layers and one output layer with a single neuron. The hidden layer width is set to 30 based on the initialization value. The fully connected hidden layers





are using ReLU nonlinear activation function. The classifier (output layer) is defined as a sigmoid activation function to detect the attacks. The model is compiled with a batch size of 10 and the learning rate is 0.00174 for 20 epochs. Early stopping is applied to stop the training once the improved accuracy is reached.

Table 5 presents the performance evaluation results of all the optimization models. It has been observed that both the Syn network model and TDLHBA achieve good accuracy as compared to the BBA algorithm. It has interfered that our proposed model outperformed the test classifier. This model achieves 99.96% accuracy in detecting the attacks.

The following Fig. 4 shows the detection accuracy for the proposed model. It has been observed that both the training and testing accuracy are increased linearly. Because the model learns the feature well and considers important features for training and testing. The loss of the training and testing phase is shown in Fig. 5.

**Table 5**  
Performance metrics of proposed model.

Model	Loss	Accuracy
Syn Network Model	0.6985	0.9891
TDLHBA	0.0020	0.9901
BBA	0.0016	0.9794
BFFA	0.0011	<b>0.9996</b>

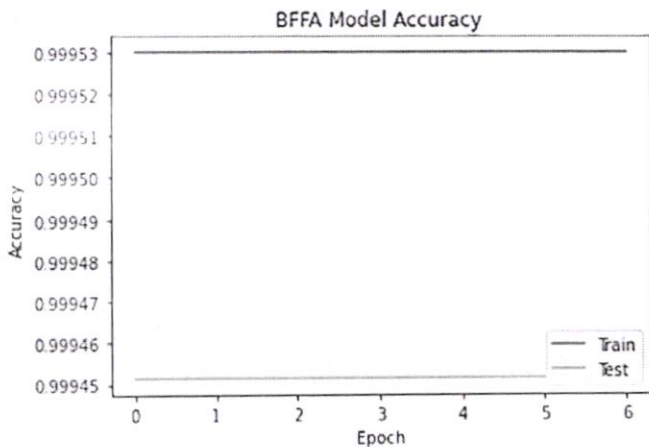


Fig 4. Accuracy of the BFFA Model.

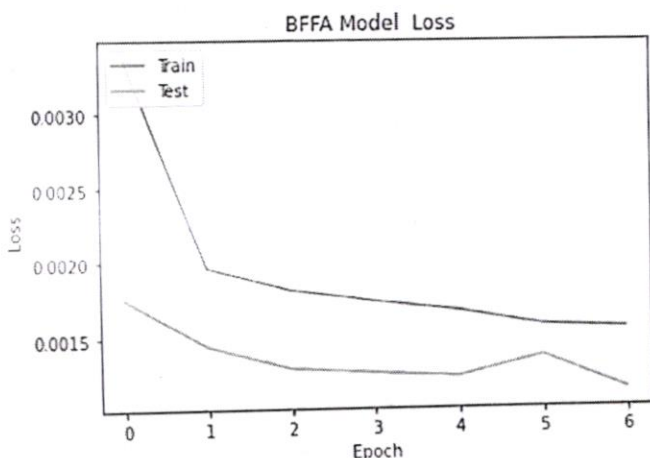


Fig 5. Loss of the BFFA Model.

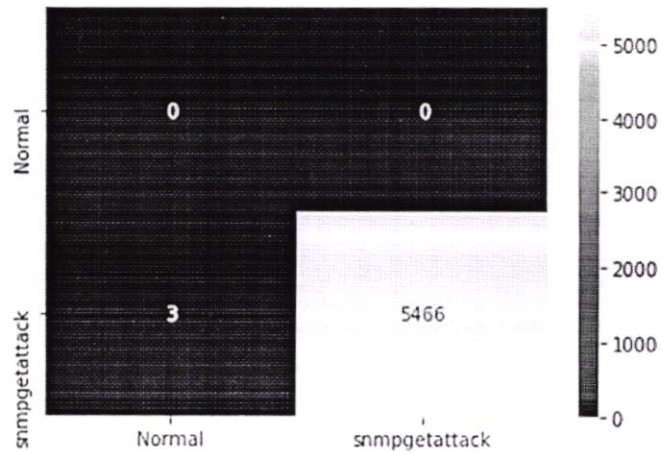


Fig 6. Confusion matrix for BFFA model.

**Table 6**  
Proposed model compared to the existing model.

Model	Loss	Accuracy
BRNN	0.0901	0.9794
BFFA	<b>0.0011</b>	<b>0.9996</b>

**5. Evaluation metrics**

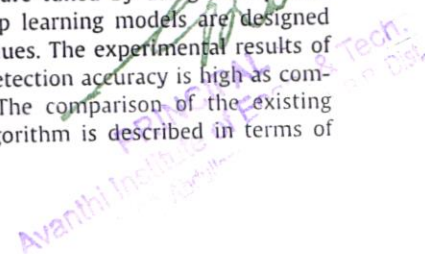
The proposed model is evaluated using a confusion matrix. It is a n\*n matrix where n is the number of the actual classes. This matrix compares the actual class to the predicted class by using the deep learning model. Each column represents the actual value of the class and rows are related to the predicted class of the data. The validation size of the data is 5469. Fig. 6. Show the confusion matrix for the BFFA model. This model correctly predicts the attacks on 5466 data and only three data are wrongly predicted. This metric proves that the proposed model is well designed to predict attacks.

**6. Comparison of the proposed model**

The authors of [20-22] proposed a deep learning model to detect the DDoS attack using a recurrent neural network classifier. This model has achieved an error rate of 2.1% for detecting the attacks. This classifier was used to trace the network attack activities and the sequences of the network traffic. Our proposed BFFA model improves 3.5% detection accuracy as compared to the existing classifier model. The revised feature extraction technique is used to extract important features to avoid over fitting. See (Table 6).

**7. Conclusion**

In DDoS attack detection, the deep learning-based classifier produces better accuracy and less prediction time as compared to other deep learning algorithms. This algorithm can able to handle different kinds of attacks in the network system. In this research work, the authors presented a novel BFFA algorithm by utilizing the swarm intelligence approach for optimal parameter findings. The neural network parameters are tuned by using the optimal metric values. Conventional deep learning models are designed using hand-picked parameter values. The experimental results of the BFFA model show that the detection accuracy is high as compared to the existing models. The comparison of the existing approach with the proposed algorithm is described in terms of



the accuracy with the same dataset. In the future, the authors have a focus on unidentified attacks for preventing cyber security issues in the field of IT applications and the banking sector.

### 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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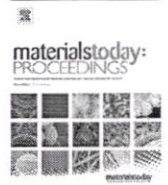
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# Side scan sonar image augmentation for sediment classification using deep learning based transfer learning approach

Gurralla Chandrashekar<sup>a,\*</sup>, Arun Raaza<sup>b</sup>, V. Rajendran<sup>a</sup>, D. Ravikumar<sup>a</sup>

<sup>a</sup>Research Scholar, Department of ECE, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai-600117, Tamilnadu, India

<sup>b</sup>CARD, Department of ECE, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai-600117, Tamilnadu, India

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## ABSTRACT

Object detection in underwater acoustics especially sea floor object has been overwhelming mission chiefly owing to strident environment of sonar images as well as because of visibly existing sonar images. Side Scan Sonar is the primary sensor for Autonomous Underwater Vehicles to perform survey on sea water. Hence, we are using this SSS images for categorizing several objects like sand, mud, clay, graves, ridges and sediments in underwater sea through any size subsequent to training. We applied two-layer CNN architecture to train the model as well as we utilized three pre-trained network models such as VGG-19, ResNet50 and EfficientNet model for evaluating the performance of the model based on training and validation accuracy measures. Moreover, we utilized deep learning based transfer learning approach in which the parameters are tuned for classifying the images into sediments, clay, mud, stones etc. Our experimental outcomes shows that pre-trained EfficientNet model generates better accuracy of 100% after fine tuning the parameter in object recognition along with classification using SSS images.

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## 1. Introduction

For underwater investigation and imagery, SSS expertise has been utilized for over three decades. Archaeology, security and defence, seabed categorization, and ecological investigation are some of the applications for side-scan sonar. Data collecting has become more automated in modern years because to the introduction of autonomous underwater equipment. Convolutional Neural Networks have been extensively utilized in several researchers with categorization and object detection in underwater acoustics in current years. Huo et al. [9] anticipated semi-synthetic data production approach for categorizing sonar images into several objects like mud, clay, mine, rock, etc. Also, they applied pre-trained model namely VGG-19 also fine tuning the data which attains 97.76% accuracy in object classification in underwater. The architecture proposed by [9] is depicted in Fig. 1.

### 1.1. Objectives

The main objective of the proposed work is mentioned as follows:

- To gather Side Scan Sonar dataset taken from underwater acoustics seafloor.
- To perform augmentation technique for construct the categorization models which helps to categorize sonar data into rock, mud, clay, sand and some other related minerals.
- To introduce the pre-trained neural network model such as VGG-19, ResNet50 and also EfficientNet model for evaluating training and validation accuracy
- To detect the metal mine objects such as rock, mud, clay and sand from seafloor images and classification of the image using transfer learning.

### 1.2. Motivation

The major challenge is inadequacy of sufficient Side Scan Sonar data sets required for training the proposed models. Data augmentation is used to build the classification models.

\* Corresponding author.

E-mail addresses: [reddychandu1990@gmail.com](mailto:reddychandu1990@gmail.com) (G. Chandrashekar), [arunraaza@gmail.com](mailto:arunraaza@gmail.com) (A. Raaza), [director.ece@velsuniv.ac.in](mailto:director.ece@velsuniv.ac.in) (V. Rajendran), [ravi.se@velsuniv.ac.in](mailto:ravi.se@velsuniv.ac.in) (D. Ravikumar).

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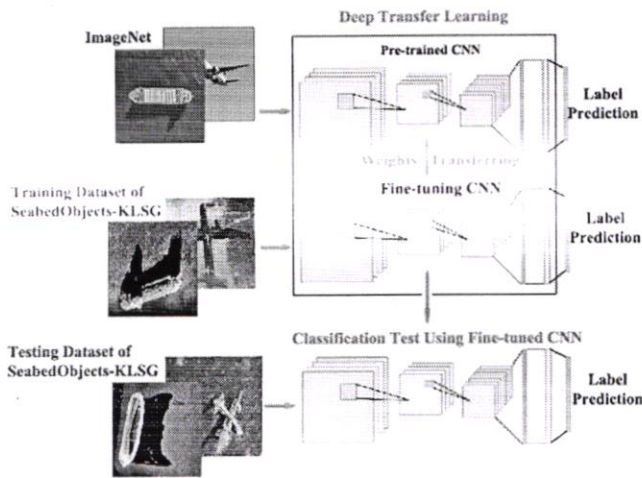


Fig. 1. Architecture introduced for object classification.

**2. Related work**

During 1998, Bull et al. [10] estimated reflection co-efficient from Chirp data and they applied whether it is applicable to archeological studies. Yan Song et al [27] applied deep learning based CNN especially Markov Random Fields for segmenting the SSS images into several objects like sand, clay, mud etc. Qin et al. [18] proposed deep learning based Convolutional Neural Networks as well as CIFAR-10 based grayscale for pre-train the model to accomplish features relocation including enhancement in performance of model. After fine tuning, ResNet approach reached an error rate of 3.46%. Anuja Pharate et al. [2] applied support vector machine and principle component analysis were utilized to categorize SSS images into mud, rock, mine, clay. Object recognition as well as classification in underwater acoustics especially sea floor using Gaussian mixture approach by kannan et al. [12] achieves 99% accuracy, one-dimensional based Convolutional Neural Network model with Jun Yan et al. [11,28], multidimensional based deep learning approach by Tsai et al. [3] Apriori modeling applied by Naveen kumar et al. [17], deep learning based CNN used by Fenglei Han [6], Sejin Lee et al. [22], Einsidler et al. [4,14], depends on physics modeling by Christina Fredrick et al. [7], edge based segmentation approach tried by Priya dharshini et al. [20], active learning method Dura et al. [5], machine learning technique Zhang et al. [33], especially decision tree for SSS matching Sylvie Danielet al. [26] Fuzzy means clustering technique Chang, R et al. [19], transfer learning based YOLOv3 approach by Yulin et al. [21] from side scan sonar images. Feature extraction has done from side scan sonar image for underwater acoustics Nayak et al. [16,21],also unsupervised removal of features from SSS images by Morissette et al. [8], extracting relevant parameters based on deep learning for object classification in underwater completed by Zhu et al. [32]. Image segmentation in underwater acoustics using efficient Convolution network by Meihan Wu et al. [15], based on extreme learning machine developed by Yan Song et al. [24,29]. In addition, classifying objects in underwater acoustics from SSS images by [Jason Rhineland]. Many researchers namely Yujie Chen et al. [30], Lubis et al. [13] reviewed several article regarding underwater object detection from SSS images or dataset using neural network method Shrad-dha et al. [23], watershed segmentation [1] based on markers to specify the regions [33–38].

**3. SSS dataset and methods**

**3.1. Underwater seafloor SSS image dataset**

Authors build a real and synthesis dataset from seafloor sidescan sonar images. The dataset used in this project is built by using data augmentation techniques such as rotation, translation, scaling, and cropping can be employed to increase the size of the available dataset [25].

The details about training and testing samples portion for each objects such as rock, mud, clay, sand, sandwaves and sandridges from underwater SSS images are listed in Table 1. Here, we have taken SS sonar data from sea floor acoustics like rock, mud, clay, sand, waves and ridges with 41 training samples and 10 testing samples which undergoes classification of sediments. Hence, totally 51 samples are utilized for each underwater acoustics objects.

**3.2. Sample SSS data**

Fig. 2 depicts the objects available in underwater acoustics using sonar images.

**3.3. Modules in proposed model**

In proposed work, we have five modules for sediment classification using SSS images. Each module for sediment based classification is described below.

**3.3.1. Module 1: Gathering side scan sonar (SSS) images**

Here, SSS images have been gathered from specified link or some other resources related with underwater sea floor for finding objects and also classification.

**3.3.2. Module 2: Data augmentation**

Data augmentation technique is utilized for enlarging the sonar dataset with the aim of enhancing the performance of model to simplify. It consists of shifting, rotation, translation, scaling and cropping images to transfer the original image pixels into another format named as transformed image (SSS). This can be done using deep learning based Keras library through *ImageDataGenerator* class.

To identify the objects like mines, rocks, mud, clay and other minerals, we illustrate the outline for sonar image as shown like Fig. 3. While we enlarge the sonar image, we need to place outline box furthermore designate modernized consequently. For making boundary for sonar image, *ImgAug* (*ImageAugmentation*) is used. While we perform operations such as rotation, shear, translation and cropping the sonar image, fixing the border line in the specific region of rocks, mud, or clay is also updated consequently.

**i. Rotation**

Rotation technique specifically used to rotate the underwater sonar image by a precise level. Here in figure we can see how the

**Table 1**  
SSS image data description.

Data	Training	Testing	Total
Rock	41	10	51
Mud	41	10	51
Clay	41	10	51
Sand	41	10	51
Sandwaves	41	10	51
Sandridges	41	10	51



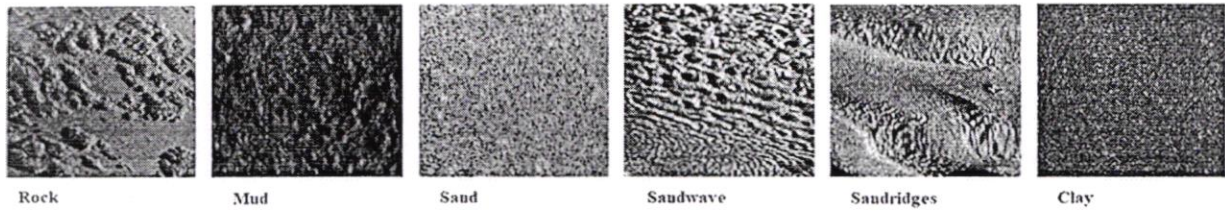


Fig. 2. Sample SSS data.

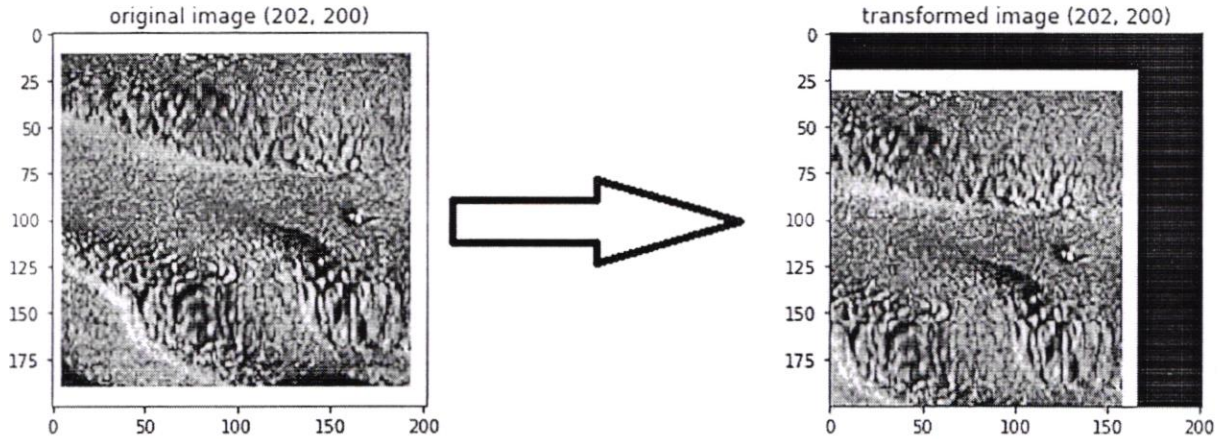


Fig. 3. Rotation approach applied on SSS image.

original sonar image with pixels (202, 200) is malformed into transformed image with similar pixels dimensions of (202, 200). We are revolving the sonar image by 50 to 40 degrees for modifying image quality to enhance the image performance.

Here is the python code for rotation technique that makes the underwater acoustic sonar image alternate the position to a specific degree.

```
Loader_Transform = Transforms. RandomRotation (10)
Imshow ('sandridges.png', LoaderTransform)
```

ii. Translation

Translation defines that SSS image is transformed into either along horizontally means x-axis or along vertically which represents y-axis shown in Fig. 4. Here is the python code for translation technique that makes the underwater acoustic sonar image to

transform into another specified image depends on axes (both x-axis and y-axis).

```
Loader_Transform = Transforms. RandomAffine (0, translate = (0.4, 0.5))
Imshow ('sandridges.jpg', Loader_Transform)
```

iii. Scaling

Scaling can be used for scale the sonar image into either zoom in or zoom out. Now, we are scaling the sonar image into 140% to 140% of the sonar image which represents height and width. By using both x-axis and y-axis, we are scaling the image separately which is depicted in Fig. 5. This transformation modifies the objects those are available in underwater acoustics. By using this operation, the height and width of the sonar image may get reduced or enlarged. We attained this operation by proliferate

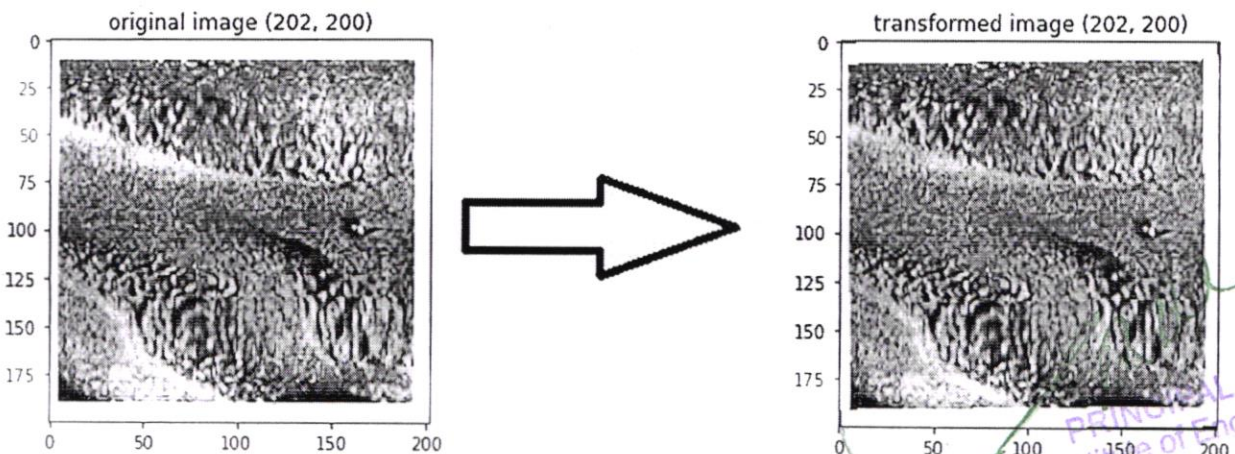


Fig. 4. Side scan sonar image translation.

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 Hyderabad, India



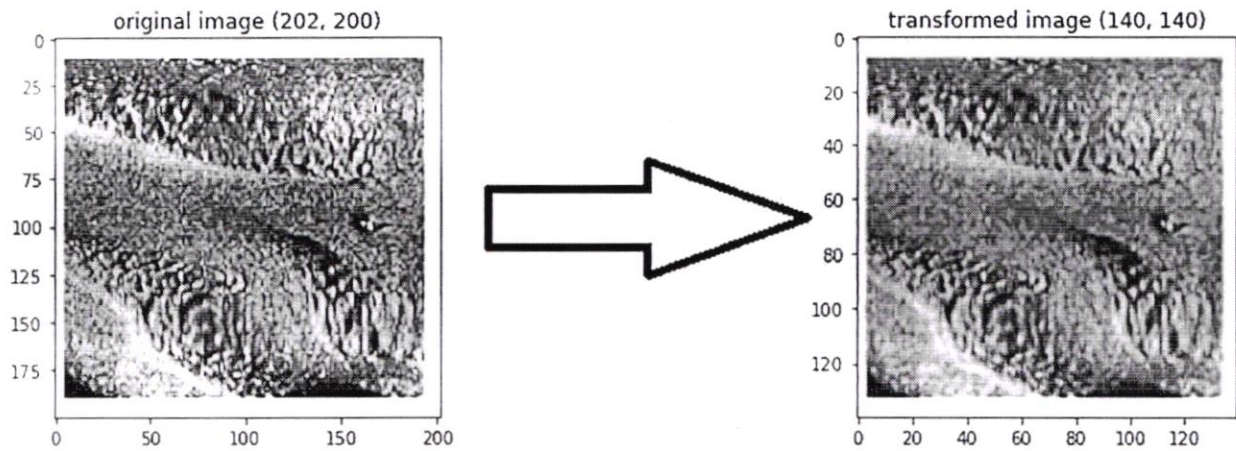


Fig. 5. SSS image scaling approach.

every vertex  $(X, Y)$  with specified scaling factor represented as  $(S_x, S_y)$  to generate the translated co-ordinates as  $(\bar{X}, \bar{Y})$ . Here is the python code for scaling technique that makes the underwater acoustic sonar image into either compressing or expand the size of the image.

```
Loader_Transform = Transforms.Resize ((140, 140))
Imshow ('sanridges.png', Loader_Transform)
```

#### iv. Cropping

In this operation, the original sonar image is cropped by nearly 140%. Here the objects seen in sonar image emerge in dissimilar location with dissimilar ratio. It eliminates both rows as well as columns at the surface of sonar image which is shown in Fig. 6.

By using the following python programming code, cropping operation has done through reducing the columns and also rows in sonar image outside.

```
Loader_Transform = Transforms.CenterCrop (140)
Imshow ('sandridges.png', Loader_Transform)
```

#### 3.3.3. Module 3: Training and testing

**Training the data:** Training the side scan sonar images is necessary important especially categorizing sediments from seafloor which helps to fit the network model. Hence we are applying deep learning based neural network to train the model based on SSS dataset.

**Validating the data:** Validating SSS image dataset indicates that these images are utilized to afford balanced estimation of any model which suits on training sonar images when the model is tuned (hyper parameter tuning). The assessment turned into additionally imbalance as ability on validation sonar images that are integrated into novel modern design.

**Testing the data:** Testing dataset afford balanced assessment of ultimate model suits on training dataset. This part is considered as standard segment in evaluating the model exactly. Testing the images is used only once a model is entirely trained with both training and validation of sonar images. Wholly, testing the images is utilized to estimate challenging network approaches. The splitting sonar images into specified ratio is shown in Fig. 7.

#### 3.3.4. Module 4: Pre-trained models

##### i. VGG-19 model

The framework of VGG-19 model comprises of Convolutional layers (16) with 5 grouping, connected layers (3). Hence, this model has 19 layers along with features entirely. Since VGG Network model is appropriate for transfer learning, VGG-19 representation is utilized in this proposed model which is depicted in Fig. 8.

##### ii. ResNet50 model

We trained the neural network model up to 30 epochs for identifying the sediments in underwater sea and undergoes classifica-

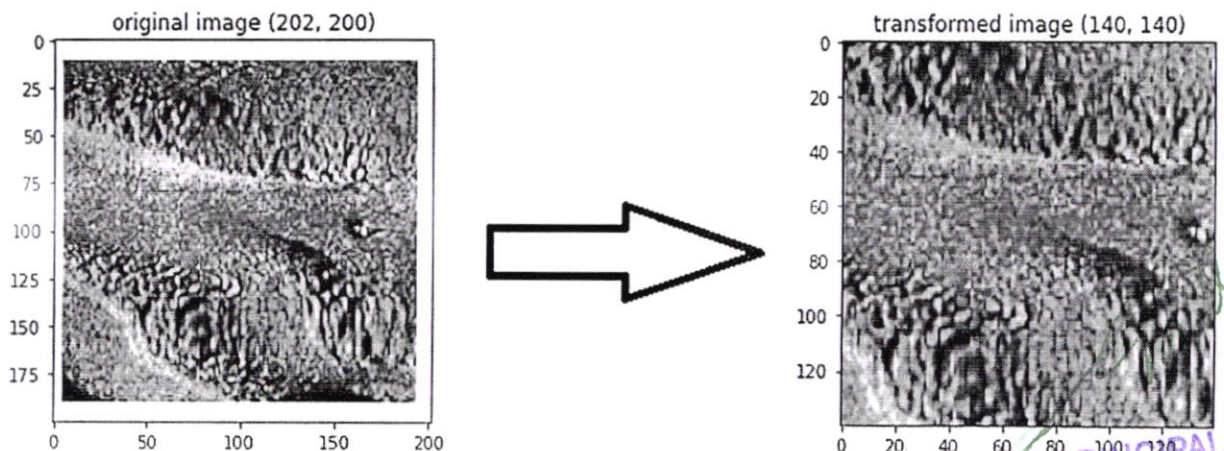


Fig. 6. Image cropping using SSS underwater data.



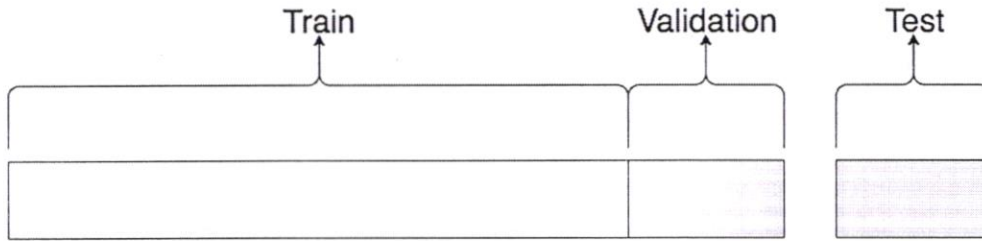


Fig. 7. Splitting sonar data in this ratio.

tion by estimating accuracy, loss, validation accuracy and validation loss for ResNet50 model.

iii. EfficientNet model

The baseline network has a big role in reproduction scaling's success. To enhance performance even more, we created a novel baseline network by using the AutoML MNAS structure to do a neural network framework search that optimizes mutually accuracy as well as efficiency. Our result shows that EfficientNet model generates greater accuracy as 100% with least amount of loss.

3.3.5. Module 5: Proposed fine tuned model

This proposed fine tuning of parameters generates more accuracy to enhance the overall model performance. Also, efficiency of model will be improved. Fig. 9 portrays that comparison has done among fine tuning of network model is with transfer learning and without transfer learning.

4. Proposed CNN architecture and transfer learning approach

Here we are introducing two CNN based architecture for identifying minerals like objects such as mines, rocks, sand, clay, mud, gravels etc in underwater sea acoustics using side scan sonar images. They are two-layer neural network based model as well as deep learning based transfer learning algorithm.

4.1. Two-layer neural network model

This model comprises of original sonar data along with augmented data with Convolutional Neural Network layer with ten epochs. The CNN based two-layer NN architecture is shown in Fig. 10.

**Convolutional Layer:** The Convolutional layer has a number of strains (filters) whose features must be academic. The strains altitude, load are less than that of the input volume. Every strain is convolved with the input volume to produce a neuron-based activation map.

**Pooling layer:** The parameter map magnitudes are reduced by using pooling layers. As a result, the number of attributes to be trained and the amount of processing in the network are both reduced. The features contained in a region of parameter map produced by a convolution layer are summed up by the pooling layer.

**Flatten layer:** Flatten is a function that takes a pooled feature map and turns it into a single column that can be supplied to a fully linked layer. Dense gives the neural network a completely linked layer.

**Dense layer:** A closely linked layer provides learning features from all the amalgamation of the features of the previous layer, but a Convolutional layer relies on reliable features with a small repetitive field. Here, we are using the size of dense layer as ten and the number of epochs used for training the data samples as 20.

**FC layer (Classifier)-** Now our designed CNN based Neural Network model using SI-BBA is suitable for classifying the data samples into phishing attack websites (malignant) and normal (legitimate).

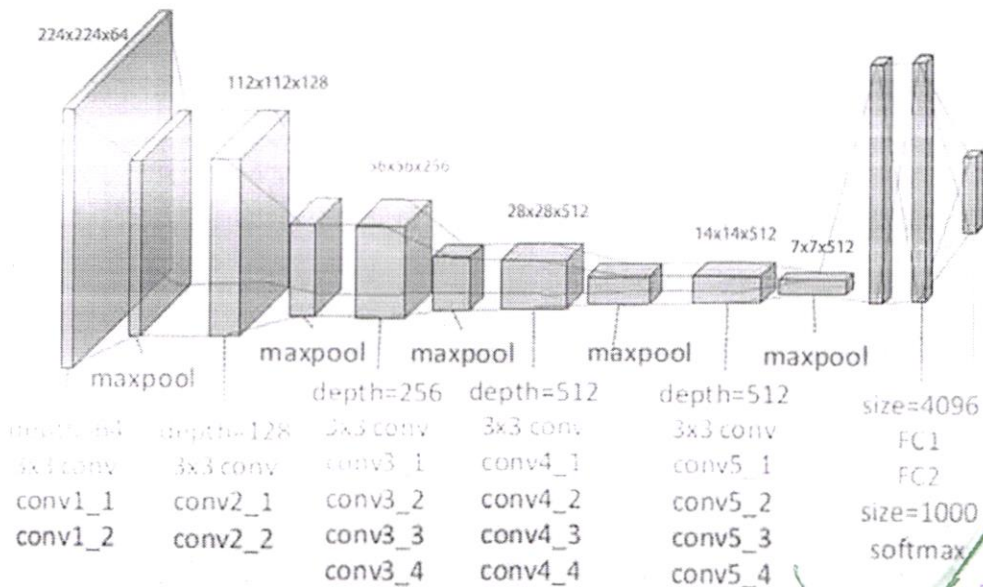


Fig. 8. VGG-19 framework for object classification through layers.

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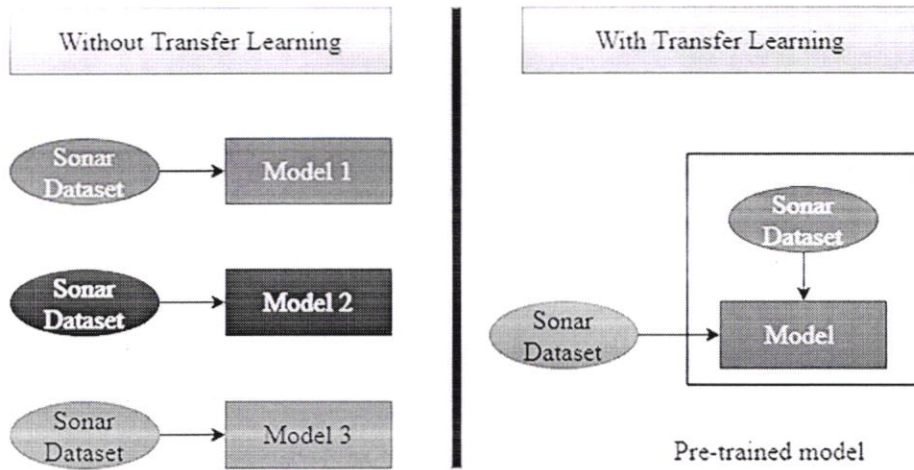


Fig. 9. Comparison among using transfer learning and without TL.

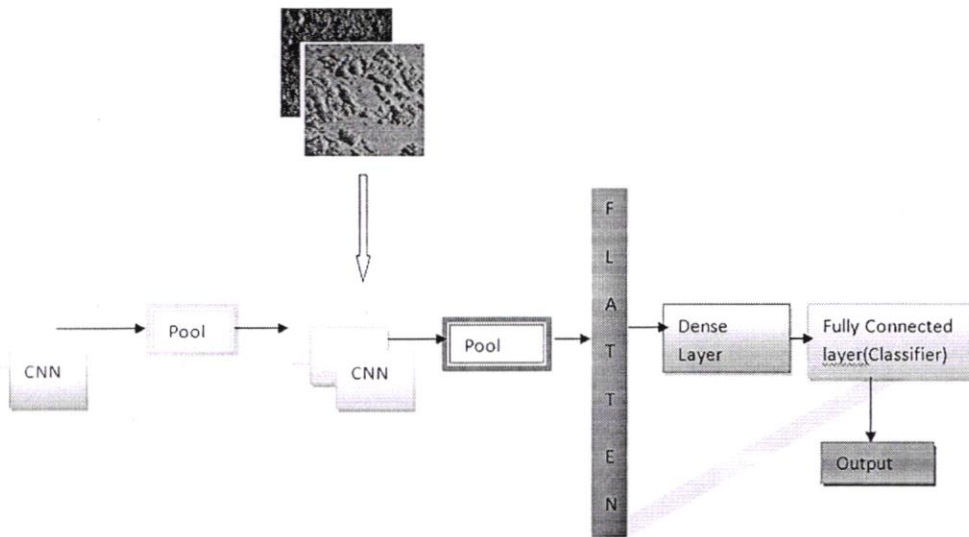


Fig. 10. Two-layer Neural Network model.

**Output layer:** This layer generates the precise output for the given input. The input images are classified into normal and abnormal (Cardiac Amyloidosis) shown in the output section.

4.2. Deep learning based transfer learning approach

The architecture of deep learning based transfer learning scheme is described in Fig. 11 which explains that initially original sonar data have taken, then those datas are augmented, followed by pre-trained the models such as VGG-19, ResNet50, EfficientNet, then introducing fine tuning of classifier to categorize the SSS data

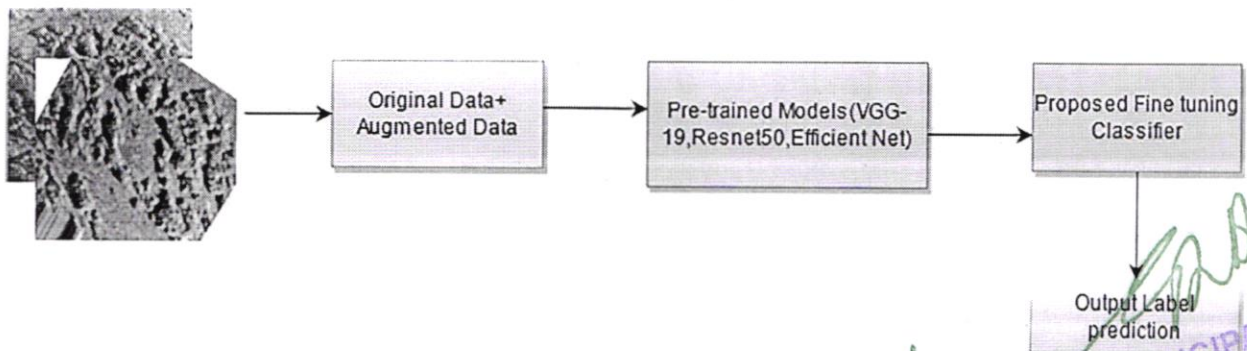


Fig. 11. Deep learning based transfer learning approach.

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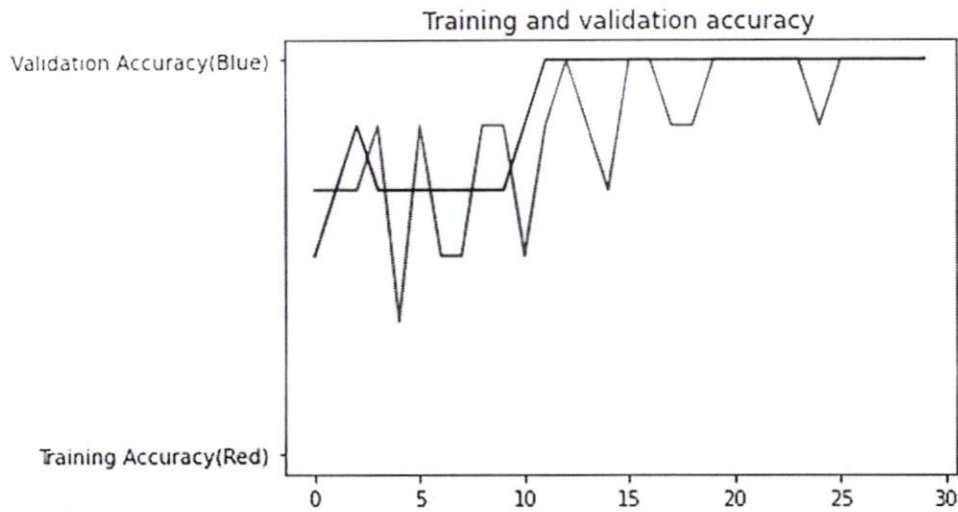


Fig. 12. Training accuracy Vs Validation accuracy.

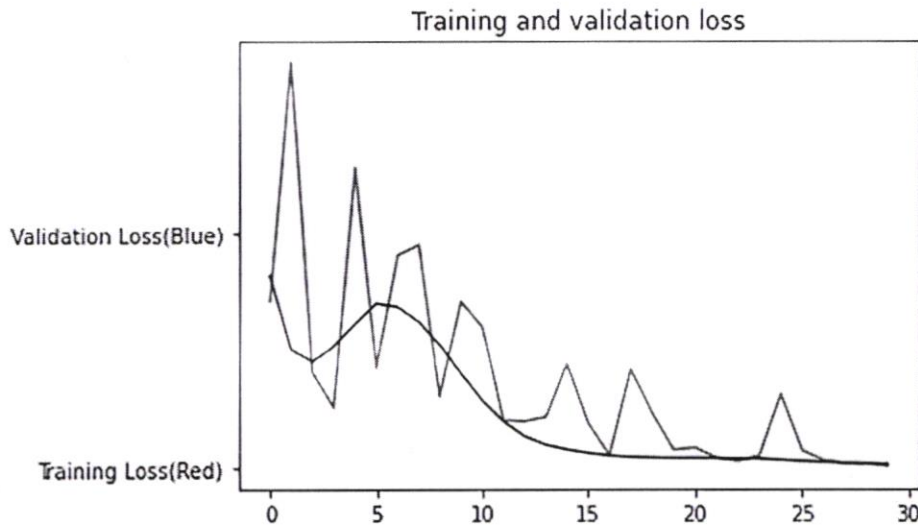


Fig. 13. Training loss Vs Validation loss.

into mine, rock, sediment, sand, mud, clay etc. Finally the output will be predicted via validation phase.

Transfer Learning approach is one of the deep learning based approach wherever we know how to receive the pre-trained network based approach also utilize it as initial stage to find out advanced event. It is usually considerably faster and easier to fine-tune a network with transfer learning than it is to train a network from start with randomly initialized weights. With a smaller, limited number of training photos, we are able to transfer quickly that are previously learned characteristics to a new task and identify new targets. Nowadays transfer learning based deep learning approaches are applied in the domain of medicinal applications such as disease diagnosis, disease classification (normal/abnormal) from images. Hence in this paper we are applying transfer learning

technique for detecting underwater objects as well as classifying the objects into sediments, clay, mud, graves, sand, soil, rock etc.

### 5. Evaluation of metrics

Based on evaluation on metrics such as training accuracy, validation accuracy, training loss and validation loss, we undergo classification of objects in underwater sea using SSS images. The evaluated metric are described below.

**Training accuracy:** Accuracy is defined as metric so as to usually express how the deep learning approach executes diagonally every section. This may helpful while every potions having identical significance. Accuracy is estimated as the ratio among the number of correct predictions to the total number of predictions. Based

Table 2

Metrics evaluation comparison has done before tuning as well as after fine tuning the parameters.

	Training Accuracy (%)	Validation Accuracy (%)	Training Loss	Validation Loss
Before tuning	88.89	97.62	0.457	0.118
After fine-tuning	97.22	98.41	0.486	0.016

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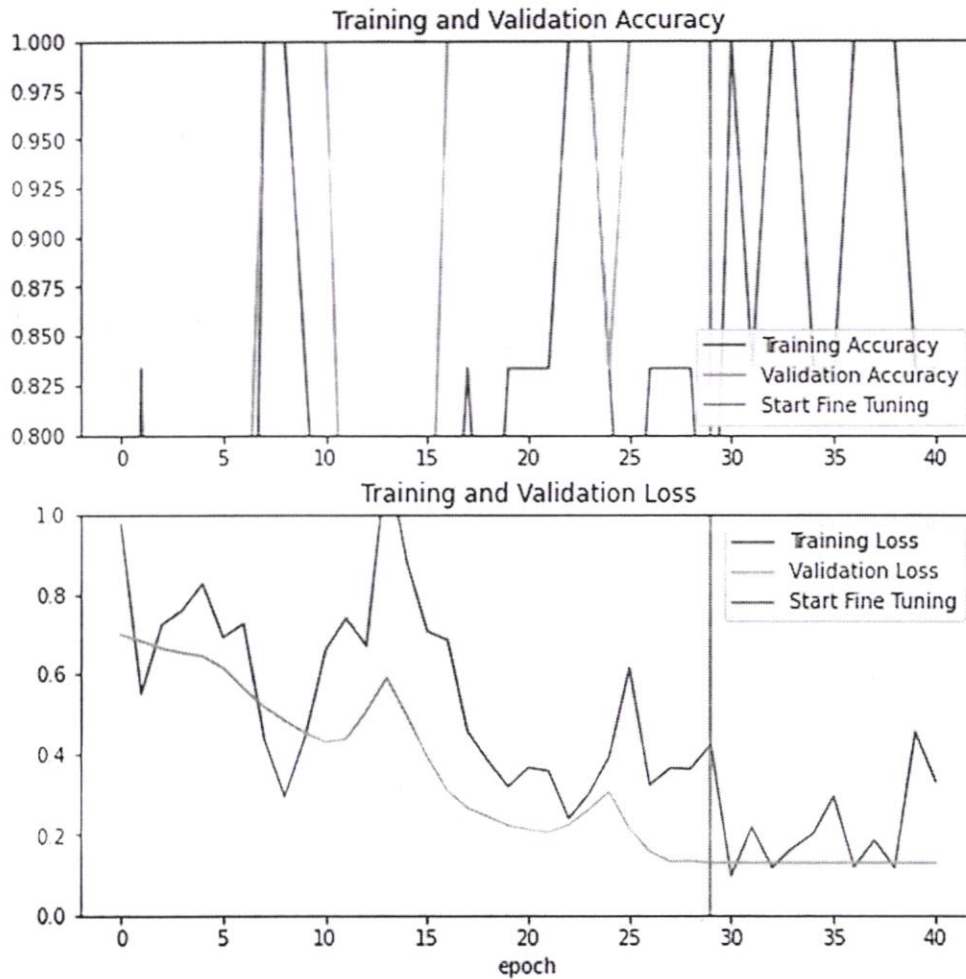


Fig. 14. Training accuracy, loss Vs validation accuracy, loss using VGG-19.

Table 3  
Comparison among before tuning and after fine tuning for accuracy and loss metrics.

	Training Accuracy (%)	Validation Accuracy (%)	Training Loss	Validation Loss
Before tuning	66.66	100	0.423	0.128
After fine-tuning	83.33	100	0.342	0.180

on True positive, true negative, false positive, and False negative metrics we are evaluating the accuracy to find the performance of the model.

**Validation accuracy:** Testing accuracy is otherwise named as validation accuracy. After training the sediment data, the accuracy metric is calculated for evaluating the performance of the model based on this validation.

**Training loss:** Training loss is the inaccuracy on the working out set of sonar data or images

**Validation loss:** The validation loss is calculated following the same epoch's learning phase.

**Epoch:** One epoch is defined as when the complete dataset visited both front and rear through neural network only once. The amount of epoch is a hyper parameter that defines how many times that the learning algorithm can be done through the complete training dataset.

### 6. Experimental outcomes

The explanation behind fine tuned of parameters is that relocating VGG-19 deep learning based approach may execute fine through pre-training VGG-19 model on EfficientNet model which

Table 4  
Comparison among before tuning and after fine tuning for accuracy and loss metrics.

	Training Accuracy (%)	Validation Accuracy (%)	Training Loss	Validation Loss
Before tuning	83.33	100	0.557	0.429
After fine-tuning	100	83.33	4.535	0.439

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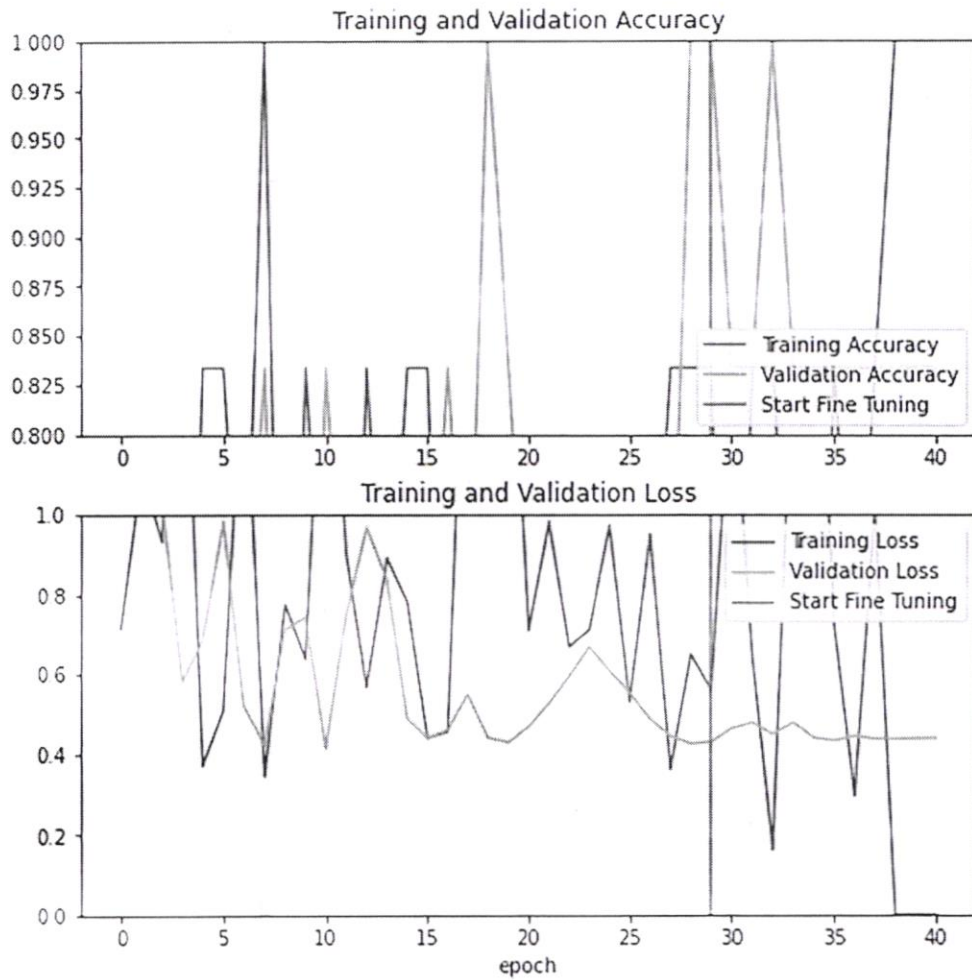


Fig. 15. Training accuracy, loss Vs validation accuracy, loss using ResNet50 model.

**Table 5**  
 Comparison among before tuning and after fine tuning for accuracy and loss metrics using EfficientNet model.

	Training Accuracy (%)	Validation Accuracy	Training Loss	Validation Loss
EfficientNet	100	100	0.081	0.006

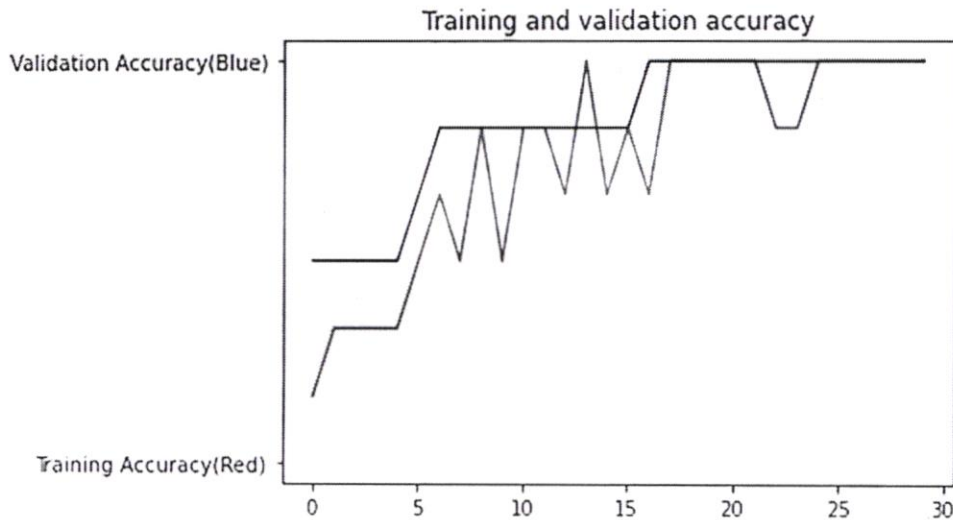


Fig. 16. Training accuracy Vs validation accuracy using EfficientNet model.

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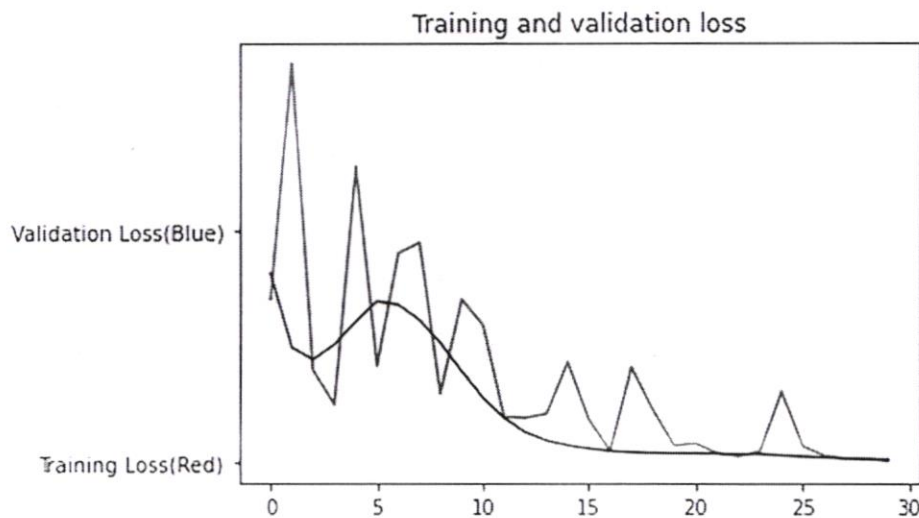


Fig. 17. Training loss Vs validation loss using EfficientNet model.

comprises of plentiful objects, the trained VGG-19 already learnt adequate parameters for detecting several types of underwater acoustics objects. By means of fine tuning the VGG-19 scheme, the object weights are rapidly attuned that is appropriate for SSS images. In this work why we are not using shallow CNN since it is not possibly being utilized to categorize intricate outline that needs little bit deeper model. Hence we are using deep learning based network model with 30 epochs. The accuracy with validation as well as training accuracy is estimated using two-layer CNN model which is depicted in Fig. 12, hence training loss and validation loss graph is shown in Fig. 13 and Table 3 (Table 2).

#### 6.1. Classification using simple 2-layer CNN model

#### 6.2. Pre-trained VGG-19 model

For evaluation, training improvement of 30 epochs of not-deep model for pre-trained VGG-19 model is depicted in figure. We observe that during training phase a non-deep model from scrape fight back for optimal convergence with ten epochs. By tuning the parameters the relocating VGG-19 approach is ability to attain greater performance. Even though pre-trained the deep learning based neural network approach such as VGG-19, ResNet50 on EfficientNet scheme. Subsequently fine tuned those VGG-19, ResNet50 approaches on actual sonar training dataset know how to attain better outcomes when compare to other approaches. If any imbalance happened, then it leads to wrong classification. The pre-trained models training accuracy and validation accuracy is depicted in Fig. 14 and training loss vs validation loss is shown in Fig. 14 as well as Table 3.

#### 6.3. ResNet50

For evaluation, training improvement of 30 epochs of not-deep model for pre-trained ResNet50 model is depicted in Table 4 and Fig. 15. The validation accuracy and training accuracy is estimated by tuning the hyper parameters of side scan sonar images to extract the features also attaining greater performance in object recognition as well as classification.

#### 6.4. EfficientNet

The EfficientNet model is a fine-tuned classifier which is being utilized for sediment classification using side scan sonar images taken from underwater acoustics sea floor. Both training and validation accuracy along with loss are depicted in Table 5, Figs. 16 and 17. Among other pre-trained models, our fine tuned model generates better results based on accuracy measures of 100% in sediment classification. Training accuracy is identified easily by the representation of red colour, validation accuracy represented by red colour.

#### 7. Conclusions

The main target of this mission is to use side scan sonar images from a sub bottom profiler system to identify and segment sedimentary objects such as mines, rocks, clay, and mud that are positioned a few meters beneath the seabed. This will help with many underwater domain applications, especially metal mine detection. Also, we established that some deep learning based network model such as VGG-19, ResNet50 model were pre-trained and then fine tuning on CNN based EfficientNet model generates suitable outcomes based on accuracy measures as 100% in underwater object detection along with classification of objects into mines, rocks, clay, mud, graves, ridges and sediments.

#### 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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## **IS ENGAGEMENT INFLUENCED BY RESILIENCE? MULTIPLE MODERATOR ANALYSIS CENTRIC TO TN PSU TELECOM EMPLOYEES**

**Dr Polumuri Lova Kumar**

Sub-Divisional Engineer, BSNL-A Govt. of India Enterprise, Hyderabad, Telangana.

**Dr. B Nayeema**

Asst. Professor, Avanthi Institute of Engineering and Technology, Hyderabad, Telangana.

**Dr. N.Ramana Reddy**

Assoc. Professor, Avanthi Institute of Engineering and Technology, Hyderabad, Telangana.

### **Abstract:**

Resilience is a significant part of engagement since it permits individuals to recuperate from adverse occasions. Certain individuals are hereditarily inclined to have more significant levels of resilience. Versatile specialists are more fulfilled and connected with at work, and they perform better compared to their less strong partners. The job of resilience as far as developmental persistency, positive emotions predicting employee engagement, and organizational engagement was examined in this research paper. Thus, this underlines the position of resilience in affecting engagement the review was led utilizing Google forms for TN telecom employees of solidarity 364. At first, the analysis found a critical relationship between the two variables, and the model was constructed and validated. Further, the current research investigated the multiple moderations influencing on relationship with the backing of SPSS Process Macros, and based on these discoveries, suggestions, and conclusions are made.

**Keywords:** Resilience, Engagement, Moderator, Similarity of Age Groups, Family, Employee relations, SPSS Process Macros.

### **1. Introduction:**

The difficulties of the previous year have undermined individuals' physical and mental prosperity, both by and by and expertly. In any case, if workers and their organizations can all the more likely recognize where they presently remain as far as their own physical and psychological well-being, they will be better ready to figure out which moves to make to endure and eventually flourish through current and future difficulties. Before we make a plunge, note that we characterize engagement as the enthusiastic perspective that makes individuals accomplish their best work reasonably, and resilience as the limit of a person to withstand, skip back from and work through testing conditions or occasions.

Where highly engaged employees are committed to an organization's motivation, sure in their meaning of greatness, sure about the help of their partners, and invigorated by their company's future. Interestingly, we assigned those employees who were not completely connected as "simply coming to work." Similarly, through the different things that action and foresee resilience, we had the option to recognize profoundly tough representatives who exhibited organization and the capacity to compartmentalize, had a sense of security, and showed trust in their chiefs' capacities to expect the future, impart, and finish responsibilities. Those workers who were not exceptionally strong were assigned as powerless.

From the past, Waterman and Collard (1994) analyze strength in employees vocations, and portrays it as a labor force associated with ceaseless learning, prepared for reexamination, assumes liability for the profession, and is focused on the organization's prosperity" Rudolph and Repenning (2002) described while others use it to depict authoritative framework execution, liberated from normal or novel disaster. Rudolph and Repenning (2002) described while others use it to depict authoritative framework execution, liberated from normal or novel disaster Besides, May et. al., (2003) mark ethically resilient pioneers as "resilience yet emphatic people that follow their standards and virtues, while confronted with pressures from peers."

In the Middle of research few scholars like Well-known models of resilience in current hierarchical investigations start from Nelson and Cooper (2007), who described a few issues in general, as an essential reaction to an inexorably unpredictable and dynamic managerial climate, which makes the work environments really exhausting, hostile, unpleasant, and profoundly





serious (Luthans et. al., 2007), Bakker et al. (2008), who tracked down that the individuals who are occupied with work with full energy, have an uplifting outlook, and add to drives have a significant degree of responsibility. Furthermore, this might forecast their Organizational performance and support managing the management activities. In the interim, Schaufeli et. al., (2009) wear-out examinations explored as employees having excessively weighty responsibility cannot work well. Since employees that assume different parts are bound to encounter pressure. Hence, resilience as a human being limit is expected to keep up with or further develop engagement.

Most Leading Scholar Schaufeli and Bakker (2010) described for a particular employee has a solid commitment towards the organization, described by the raised degree of involvement, in seeking after headways. In the meantime, engagement in scholastics incorporates those purposefully elaborate where sense is fabricated, identifying with the work and establishment, and scholastics isn't just seen as a commitment (Hakanen et. al., 2008), yet additionally as a component that gives a feeling of responsibility, which requires their earnest attempts. at the same time as of late, Amir and Standen (2019) projected another point of view, which is development center related, where individuals consider unfavorable to be as a chance for advancement.

## 2. Literature Review

Quite possibly resilience will be an antecedent of the determined idea, especially as far as its turn of events or power force. For example, the positive emotions parts might provoke the extended commitment and a decline of pressure that might occur intellectually or maybe really, (Fredrickson, 2009), During the meantime, the eagerness fraction, as a part of progress in resilience, may affect responsibility, as driving this overhauls the sensation of commitment to entire limit (Markman et. al., 2005), Besides, the assurance to generate and make the arrangement to become skilled & make (Blatt, 2009), of course burned-through and genuine collapse may furthermore take place.

Besides, from Luthans et. al., (2011) ideas, understanding this idea with regards to the shortfall of unfriendly occasions is gainful to configuration staying away from systems. Thus, Whenever an employee encounters unfavorable or else hazardous conditions, awareness is most essential, and resilience turns out to be a power measured for the employee's comfort. Amir and Standen(2019) explored the resilience capacity of an employee considered as a helpful nature to permit the human being to function. As a result, studies in an organizational context have demonstrated its benefits in terms of performance. Avey et. al., in the year 2011 exploring the association between resilience & severe focus of difficulties. Nonetheless, aftereffects of the earlier period examination demonstrated, its job might be extended to straightforward difficulties of the job.

### 2.1 Resemblance of engagement & resilience

#### 2.1.1 Developmental persistency predicting Engagement

Developmental persistency incorporates capacities fit for giving the impact of energy, where individuals could endure and be invested in the work environment, and along these lines experience Engagement. It is reliable with the idea of enthusiasm from Perttula and Cardon (2011), Employees has a mental condition, which portrays exceptional positive feelings that drive towards doing jobs and a feeling of significance at work. Along these lines, As a result, employees who are passionate about their job tend to perform well as a consequence of additional effort and point in time invested.

Additional potential clarifications of the connection among Developmental persistency and Engagement incorporate the likelihood of commitment according to lifting the degree of focus at work as a method for satisfying duties. Moreover, an expansion in work commitment is seen on schedule. Henceforth, for an individual whose assignment center is additionally known, techniques to outfit their solidarity on finishing the work while working proficiently and gaining from botches should be evaluated.

Developmental persistency's growth component as well drives those who face circumstances of hesitation by the side of employment that demands innovative thoughts. Some odd jobs may be unsafe, plus there may be a be short of familiarity, making the way out is unknown. As a result, such conditions necessitate the factors of assurance for growth, which necessitates the discovery of alternative solutions. As per Sweetman and Luthans (2010), resilience permits workers to challenge individual suspicions and foster improved strength by adjusting to circumstances. Besides, in any event, when the circumstance isn't generally ideal, the worker association relationship is constantly kept up with.

#### 2.1.2 Positive emotion predicting Engagement

If Developmental Persistence and Engagement allow for reinforcement with the organization, Positive emotions act as a buffer in situations where Engagement deteriorates. Positive emotions are fit for filling in as a cushion in raising position





interest, which is as per Sweetmen and Luthans (2010), showing its job in re-energizing assumptions. Moreover, it diminishes withdrawal because of the penchant for altering discernments to the provisional stressor. This is reliable with mental examinations, where positive feelings assist the person with perceiving elective points of view that forestall separation, as a planned way in taking care of issues (Fredrickson and Branigan, 2005), which for this situation involves the prerequisites of an assignment.

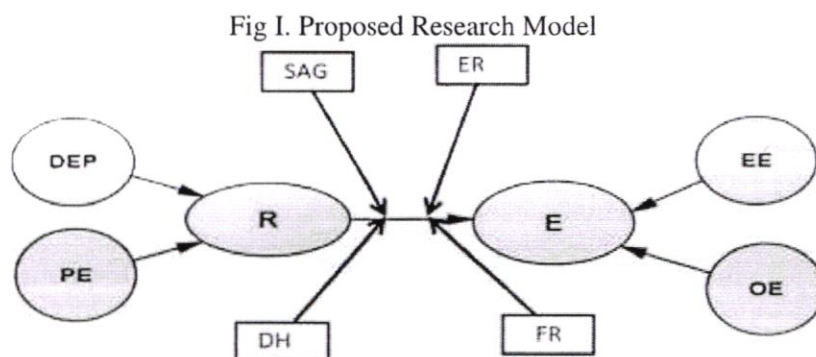
Other important investigations that may clarify the phenomenon of Positive emotions in Engagement remember the optimistic sense for adjusting toward accepted transformations (Cohn et. al., 2009) as result it gives fearlessness in addition to an idealistic viewpoint assists employees with keeping up with the endeavors to hold a decent insight and generosity from the organization. Nonetheless, added correlated examinations by Tugade et. al.,(2004) and announced with the intention of a tough personality will in general know-how Positive emotions through upsetting occasions of partner employees.

Quinn and Quinn's (2009)'s concept of purpose-centeredness may also explain the fact of Positive emotions assist a worker with being reason focused in taking care of issues as well as focused on a definitive reason when stood up to with a diminish in the organization assets.

### 3. Need for the study

Despite Rothbard (2001)'s interest in examining resilience to execution elements, Der Foo et al innovativeness's another essential factor in business, has received less attention. In 2009, Jensen and Luthans published a study, and in 2006, Choi and Lee published a study on the social element. As a result, no clear examination of the relationship between resilience and engagement in the PSU has been made to date.

### 4. Proposed model



**DEP:** Developmental persistency **PE:** Positive Emotions **R:** Resilience  
**E:** Engagement **EE:** Employee Engagement **OE:** Organizational Engagement  
**Moderators:** **SAG:** Same Age Group **ER:** Employee Relations  
**DH:** Duty Hours **FR:** Family Relations

### 5. Objectives of the study

The Engagement logically seems like an enormous supporter of positive personality and ultimate outcomes. Thus experts try to construct the right situation for the high degree of employee engagement. Of course, Resilience is might be unavoidable in the current working environment, notwithstanding, investigate the relationship based on this the established Objective 1 is

**5.1 Objective 1:** Recognize the Resemblance among Engagement and Resilience of TN PSU telecom employees. Concerning Objective the Hypothesis set forth as

**H1a: Resilience and Engagement are strongly correlated each other**

Numerous specialists have not even stretched out past distinguishing relationships or Impact each other. Hence this research further extended to analyze the influence of Moderators

**5.2 Objective 2:** Analyze the Moderator Significant Influence on variables, concerning this Hypothesis developed as

**H2a:** The moderator Similarity of Age Group as Age difference among employees creates a strong impact on Relation.





- H3a:** The Moderator Employee relations as frail worker relations create a strong Impact on Relations.  
**H4a:** The Moderator Duty Hours as Duty at ODD timings more create strong Impact on Relation.  
**H5a:** The Moderator Family Relations as Family Dependency create strong on Relation.

## 6. Research Methodology

### 6.1 Source of Data and Sample

Essential information was gathered from the outlined survey with the assistance of embraced Scale things, the equivalent was disseminated to PSU TN Telecom employees by the use of Google forms. Initially, before they filling the Google forms online, the same was explained in detail via Telephonic calls. At the end the sample size is referred from ROBERT V KREJICE'S table for 7000 Population is 364 is the sample size.

### 6.2 variables of the study

Saks (2006) developed an employee engagement scale of measurement that combines Rothbard's (2001) concept with the dominant functions of work and organizational engagement. Where Amir (2019) uses resilience to measure it, and it is described as having multidimensional components such as developmental persistency and positive emotions.

### 6.3 Proposed Model Validation

#### Reliability & Validity measurement

	Component	
	1	2
Developmental persistency	.833	
Positive Emotions	.893	
Employee Engagement		.769
Organizational Engagement		.894

CONSTRUCT	Cronbach's $\alpha$	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
Engagement	.864	.881
Resilience	.836	Sig .00

Indices	R-->E	Decision
Chi-Square	49.241	Identified as Absolute Model
df	18	
CMIN	2.736	
GFI	0.969	Accepted
CFI	0.987	
TLI	0.98	
RMSEA	0.068	

From Tables, I, II & III it was concluded that

- ✓ EFA factor loading is good to accept
- ✓ The scale was validated as Cronbach's alpha value is .864 & .836
- ✓ The values of AVE are more than Threshold values hence Convergent Valid
- ✓ AVE > MSV hence Construct Valid
- ✓ The model was an Absolute Model.
- ✓ Each Model Indices are good to accept

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**PRINCIPAL**  
 Avanthi Institute  
 Gunthapalle, AP-502324



Finally, The Proposed Model is valid and Reliable hence model is accepted for good to go for further investigation.

**6.4 H1a Analysis**

Table-IV: Correlation among Variables (N=364)

	Mean	SD	1	2	3	4
DEP	3.78	.629				
PE	3.12	.611	.503**			
OE	3.26	.641	.467**	.506**		
EE	3.13	.625	.421**	.433**	.470**	.561**

\*\* Correlation is significant at the 0.01 level (2-tailed).N=364

**Findings**

- Employee Engagement has a strong positive correlation with,
  - ✓ With Developmental persistency  $r(364) = +.421, p < 0.01$ .
  - ✓ With Positive Emotions  $r(364) = +.433, p < 0.01$ .
- Organizational Engagement has a strong positive correlation with,
  - ✓ With Developmental persistency  $r(364) = +.467, p < 0.01$ .
  - ✓ With Positive Emotions  $r(364) = +.506, p < 0.01$ .

As a result, it was determined that Resilience was related to Engagement, and the Null hypothesis was rejected.

**6.5 H2a Similarity of Age Groups Moderator Analysis**

Employees' age differences were separated into two classes, specifically, the age difference is high and the age difference is low. Employees with an age difference of more than ten years are characterized as having a high age difference, while those with an age difference of fewer than ten years are characterized as having a low age difference. As a result, it is recognized that employee age differences were significant and moderated the relationship between resilience and engagement.

Table V. SAG Moderator Analysis

	coeff	se	t	p	LLCI	ULCI
Constant	43.9085	4.6073	9.5301	.0000	34.8478	52.9692
R	-9.9063	3.3555	-2.9523	.0034	-16.5051	-3.3076
SAG	2.2679	1.2462	1.8198	.0006	-.7829	-.1187
Int_1	2.4689	.9421	2.5250	.0000	.5261	4.2316

The Final equation

$$E = 43.9085 - 9.9R + 2.2SAG + 2.4689(R * SAG) \dots \dots \dots (1)$$

Table VI: Similarity Of Age Groups As Moderator Conditional Effects Of The Focal Predictor At Values

SAG	Effect	se	t	p	LLCI	ULCI
2.9167	-2.9680	.8276	-3.5863	.0004	-4.5955	-1.3405
3.6667	-1.1838	.6377	-1.8565	.0002	-2.4379	-.0702
4.2500	.2038	.9384	.2172	.0003	-2.6416	-1.0492

From Table VI it was discovered that TN Telecom PSU employees of a high age difference are creating a strong impact on the relation hence null hypothesis was rejected.

**6.6 H3a Employee Relations Moderator Analysis**

Table VII. Employee Relations Moderator Analysis

	coeff	se	t	p	LLCI	ULCI
Constant	41.5287	5.0582	8.2101	.0000	31.5813	51.4761
R	-10.5402	3.7456	-2.8140	.0052	-17.9062	-3.1742
ER	2.8663	1.3639	2.1016	.0363	.1841	5.5485





Int_1	3.6522	1.0495	2.4405	.0151	.4974	4.6251
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Employee Relations, the moderator, produced measurably large results. The worker relations are classified as strong or weak based on the size of the employee relationship, which moderates the relationship between resilience and engagement.

The Final equation

$$E = 41.52 - 10.54R + 2.86ER + 3.65(R*ER) \dots\dots\dots (2)$$

ER	Effect	se	t	p	LLCI	ULCI
3.0000	-2.8565	.8268	-3.4547	.0006	-4.4825	-1.2305
3.6667	-1.1490	.6404	-1.7942	.0036	-2.4084	-.1104
4.2500	.3450	.9868	.3497	.0028	-2.5956	-1.2857

From Table VIII it was discovered that TN Telecom PSU employees have weak employee relations creating a strong impact on the relation hence null hypothesis was rejected.

**6.7 H4a Employee Relations Moderator Analysis**

Table IX. Employee Relations Moderator Analysis

	coeff	se	t	p	LLCI	ULCI
Constant	41.2222	4.8751	8.4557	.0000	31.6350	50.8094
R	-10.4999	3.6568	-2.8713	.0043	-17.6914	-3.3084
WH	2.9775	1.3223	2.2517	.0049	.3771	5.5779
Int_1	3.5342	1.0289	2.4629	.0142	.5107	4.5578

The Working hours are classified as ODD & Even Hours that the Working Hours are significant and moderator influencing the relation.

The Final equation

$$E = 41.22 - 10.49R + 2.97WH + 3.53(R*WH) \dots\dots\dots (3)$$

WH	Effect	se	t	p	LLCI	ULCI
2.9167	-3.1084	.8626	-3.6034	.0004	-4.8048	-1.4120
3.6667	-1.2077	.6390	-1.8900	.0196	-2.4643	-.0489
4.2500	.2706	.9852	.2747	.0037	-2.6668	-1.2081

From Table X it was acknowledged that the ODD Hours functioning TN Telecom PSU employees creating a strong impact on the relation hence null hypothesis rejected

**6.8 H5a Family Relations Moderator Analysis**

Family Relationships are classified as Strong or Weak, with moderators influencing the relationship.

The Final equation

$$E = 42.55 - 9.23R + 2.62FR + 3.26(R*FR) \dots\dots\dots (4)$$

Table XI. Family Relations Moderator Analysis

	coeff	se	t	p	LLCI	ULCI
Constant	42.5528	4.7829	8.8969	.0000	33.1470	51.9587
R	-9.2362	3.5050	-2.6351	.0088	-16.1290	-2.3433
FR	2.6262	1.2913	2.0337	.0427	.0867	5.1658
Int_1	3.2639	.9829	2.2117	.0276	.2410	4.1068

Table XII: Family Relations moderator Conditional effects of the focal predictor

*Principal*  
Avanishi Institute of Management & Tech.  
Gurgaon, Haryana





FR	Effect	se	t	p	LLCI	ULCI
2.9500	-2.8232	.8313	-3.3961	.0008	-4.4580	-1.1883
3.6667	-1.2652	.6427	-1.9685	.0498	-2.5292	-.0012
4.2500	.0029	.9589	.0030	.0036	-3.8829	-1.8886

From Table XII it was identified that the strong family relations of employees working TN Telecom PSU employees creating a strong impact on the relation hence null hypothesis was rejected.

### 7.0 findings and suggestions

The momentum of the study added an esteem option to the view of engagement by observing the role of resilience and then creating observational evidence. Furthermore, the findings revealed that developmental perseverance, as well as a positive emotion, can influence both work and organizational engagement. Resilience in the Positive Emotions perspective as reformists and administrators might use for engagement purposes. It is essential because employees have to stay aware of work and their commitment, while the organization environment and setting occasionally require the occasion of the change. Furthermore, if an occurrence occurs in which workers consider and have the secret sauce to supervise social resilience, the disadvantage of engagement may have been avoided. The study is completely centric on TN Telecom PSU employees, findings initially started by identifying the Correlation between Engagement and Resilience.

- In addition to that discovered controlling, variables or moderators can strongly impact the relationship.
- The principal moderator explains the connection in the resemblance between age groups. The TN Telecom PSU employees of a set whose age distinction is over 10 years are more accessible to Resilience as well as members delivering an adverse outcome with engagement. As taking this end we recommended in the TN BSNL organization that when employees groups with various age bunches employees but employees those are having a similar age set can balance their pressure with comparative different age groups which shows a more positive relationship with Engagement. While these different age groups are uninvolved to keep up with their feelings of anxiety with age distinction among employees cooperating will make an additional regrettable rapport with Engagement.
- One more moderator of this research is Employee relations, for any administration, the relations within employees are vital. In this research, it was distinguished that frail relations among employees producing more incidental effects. Subsequently, we propose that the administration can lead sporting projects to foster the relations transport among employees to diminish the negative impact on Engagement.
- Working hours are the next moderator or of the study, it was recognized that Night Hours' obligation is making more adverse feelings among employees. So while setting up the obligation outline pivot technique ought to be carried out this might diminish the effect of a smidgen.
- Family relations were the last Moderator of this research, Even however telecom employees are committed to their work due to introduce run-of-the-mill circumstances, family relations might influence them. This review distinguished who are having solid family relations leads to a negative relationship with engagement. Hence the Management needs certainty among employees that they are with them and permit some an ideal opportunity to their families because their families are likewise vital.

### 8. conclusion

This review detailed forerunners and components that impact Engagement and resilience that seem to have been neglected, especially with regards to TN Telecom employees. This examination, therefore, inspects the relationship with resilience and is comprised of developmental persistency, positive emotions, and variables of Employee and organizational engagement. Even though the integrity of fit assessment revealed a nearly adequate fit, the relationship demonstrates a significant relationship between the two builds. Organizations benefit from developmental perseverance and engagement to development to keep employees interested in their work and, as a result, to maintain fervor and focus on random jobs. Positive emotions, on the other hand, supports upkeep by high respect implied for organization, particularly while the administrations are at anticipated point. As a result, management and managers should consider implementing resilience intervention programmers to supplement existing practices to conserve and improve academic engagement.

### 9. Limitations and scope for further research

*(Handwritten signature and stamp)*  
 Avani Kulkarni  
 Assistant Professor & Tutor  
 Department of Management Studies  
 Institute of Technology, Mumbai





The study's participants, who were all TN Telecom employees, had the basic limitation. Regardless, the conditions of other organizations may differ, which may cause variation in the results, with resulting suggestions for the nature of the strength and commitment questionnaire.

Engagement research all around means the level of engagement on an errand, which fuses guideline endeavors that might differ from one another. Despite, it is serviceable for a representative to participate in one task anyway not in the others, for example, a specialist may be more drawn in with upkeep works and not in office works. As needs are, as Britt et al. (2007) propose, the setting of works, which can be more unequivocal once in a while, can incite changing levels of engagement. It is an inspiring street to investigate division, particularly in circumstances where resilience and its focuses are very likely going to expect a substitute part. To the extent technique, strength, or engagement research has inconsistently been coordinated using a longitudinal strategy, which is recommended for growing the extent of the investigation.

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## In covid-19 lockdown who are engaged?

### Moderation analysis of stress on government hospital nurses engagement

Dr. B. Nayeema<sup>a</sup>, M S Kishan Varma<sup>b</sup>, Dr. Polumuri Lova Kumar<sup>c</sup>

<sup>a</sup>Assistant Professor, Avanathi Institute Of Engineering And Technology, Hyderabad.

<sup>b</sup>Vignana's Foundation for Science Technology and Research Deemed to be University, Vadlamudi, Guntur, AP.

<sup>c</sup>Junior Telecom Officer, BSNL, AP

<sup>a</sup>bnayeema@gmail.com, <sup>b</sup>mskishanvarma@gmail.com, <sup>c</sup>lovakumarhrm@gmail.com

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**Abstract:** Many Researchers explored the relationship of Occupational stress upon Employee Engagement but most of the findings are exploring the relationship is very weak and statically a negative linear correlation. But very few authors argued that stress levels are accepted up to some level and the relation was not linear, likewise they are arguing the level of acceptance of stress may vary from person to person, but it will help to improve sincerity and dedication in the work area. Apart from this, in the Present COVID Scenario workload of staff nurses are very high and where it needs more integrity and dedication to the Job. So this research paper focuses on the nurses with whom and when they affect the relationship between employee Engagement and Occupational Stress.

The paper initially examined the relationship between employee Engagement and Occupational Stress in public sector Hospitals, Andhra Pradesh. Where occupational stress was measured through Five dimensions namely Job Responsibility, Quality Check, Job-Non Job Conflict, Role Conflict, and Workload in the same way Employee Engagement measured with Vigor, Dedication, and Absorption. Further, the present study investigated multiple moderation influence on the relationship with the help of SPSS Process Macros

**Keywords:** Employee Engagement, Occupational Stress, Moderator, Similarity of Age Groups

## 1. Introduction

Organization is the framework of work and job reporting relationships that decide how an employee uses various resources to acquire organizational goals. Organizational framework can be a supply of occupational stress, specifically the place of the sample of jobs, roles, rules, and regulations, constrain the individual's vary of alternatives in how to do the job. The thing is occupational stress is inescapable in organizations nowadays. It is an individual encounter coming because of various accepts of job content, work association, and the workplace anywhere an individual responds inwardly, intellectually, typically, and mentally. Over the top degrees of word related occupational stress cause weariness, uneasiness, sadness, and social removal and separate workers from work. Employee engagement is the person's contribution and fulfillment with just as excited for work. Engagement happens when people are genuinely associated with others and subjectively cautious. A drew in Employee is seen as focused on her/his organization objectives and qualities spurred to add to its prosperity and can upgrade their feeling of prosperity.

Occupational Stress is an objectionable experience that has a harmful result on the physical and emotional condition of a person which may lead to a lack of engagement. So this Research Paper originated from establishing relations among Occupational Stress and Employee Engagement and identifying various Moderators that influencing relations to decrease stress and increase Engagement of Nurses in COVID -19 times.

## 2. Empirical Evidence Of The Model From Literature

One's activity requests and occupation stress impact her/his employee engagement (Moura et al., 2014). Employment requests, for example, high work pressure, enthusiastic requests, and job pressure may prompt low occupation fulfillment, hindered wellbeing, and finally to disengagement. Occupation stress, for example, self-sufficiency, social help, and criticism may induce a persuasive procedure, prompting work-related learning, work fulfillment, hierarchical responsibility, and employee engagement (Moura et al., 2014). Be that as it may, it was prior referenced that activity requests, work assets, and individual variables (for example seen individual condition fit, capacity to adjust work and family requests) as pointers of word correlated pressure. Along these lines, a hypothetical connection between word associated pressure and employee engagement can be built up.

In addition, the writer recommends that beyond the maximum levels of pressure related to the words experienced by employees limit their subjective and passionate accessibility to work (e.g. Ongori and Agolla, 2008; Velnampy and Aravinthan, 2013). Enthusiastic and subjective accessibility to work is the key to his work



commitment (Kahn, 1990). In this way, it is proposed that word pressure has a negative relationship with employee engagement to such an extent that more significant levels of word pressure on an employee are likely to lead to a lower level of his or her resulting work commitment (Moura et al., 2014).

Therefore, the development of writing in employee burnout proposes that the variables that affect employee involvement are negatively identified with employee burnout (Karunanithy and Ponnampalam, 2013; Ongori and Agolla, 2008). For example, Schaufeli and Bakker (2004), focusing on burnout and its positive commitment to the antipodes, said that: (a) burnout and involvement are negatively related, (b) burnout is mainly anticipated by job requests but also by the absence of occupational activities, while the commitment is foreseen only by accessible occupational activities; (c) burnout intervenes in the connection between job requests and medical problems, although the commitment interconnects the connection between work activities and the turnover target. Since burnout results from unnecessary degrees of stress, this wave of writing also proposes a negative connection between the pressure on words and the commitment of employees.

According to Nishanthini Simon, Upamali Asanka Amarakoon (2015) identifies an acceptable level of stress to improve an individual's performance. He also stated that an employee involved has declared himself committed to his organization's goals and values, motivated to contribute to his success and that it can improve their sense of well-being. Consequently, it suggests that maintaining an optimal level of professional stress can result in a higher level of employee engagement. As per P.Lovakumar and Dr.V.Tulasi Das (2016) Suggested that Innovative HR Practices for better engagement they are help reduce the Occupational Stress among the telecom employees. They are proposed the Cross-fit centers and paid vacations helps to relief from stress and refreshed themselves leads to better engagement among employees. Kumar & Das (2019) explained that intra communications is the major conflict between employees which further creates disturbances leads to stress upon them. So by increasing communication between superior and subordinates and also at different age groups will improve the stress free environment, resulting increased engagement levels.

### **3. Research Gap**

Jennings et.al, (2007) defined that stress may affect not only the hospital image but also the nurse personnel and professional life of Nurses. It also showed that there is reduce in the efficiency of the nurse. Occupational Stress is an objectionable experience that has a harmful result on the physical and emotional condition of a person which may lead to a lack of engagement. So this Research Paper originated from establishing relations among Occupational Stress and Employee Engagement and identifying various Moderators that influencing relations to decrease stress and increase Engagement of Nurses in COVID -19 times.

### **4. Objectives Of The Study**

Employee engagement is progressively recognized as a huge contributor to positive individual-level and authoritative level results. Consequently, on one hand, specialists around the globe endeavor to make the correct condition for more significant levels of employee engagement. Then again, Occupational stress is unavoidable in the present workplace, however, look into the relationship between them with Objective 1 is established

**Objective 1:** Identify the Relation between Employee Engagement and Occupational Stress in Govt. Hospitals of Andhra Pradesh State. Based on this Hypothesis formed as

**H1a:** There exists a strong correlation between Occupational Stress and Employee Engagement.

Many of researchers not extended beyond identifying relationships or Impact one another. So this study further extends the research by the use of moderator.

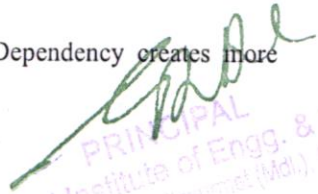
**Objective 2:** Identifying Significant Moderator Influence on the relation, Based on this Hypothesis formed as

**H2a:** Similarity of Age Group as Moderator and the effect is more for Difference in Age difference in group more creates more Negative Influence on the Relation.

**H3a:** Employee relations as Moderator and the effect is more for weak employee relations in the group more creates more Negative Influence on the Relation.

**H4a:** Duty Hours as Moderator and the effect is more for Duty at ODD timings more creates more Negative Influence on the Relation.

**H5a:** Family Relations as Moderator and the effect is more for more Family Dependency creates more Negative Influence on the Relation.

  
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Gunthapally, A. Abdul Kariem (M.D.), R.P. Dist.



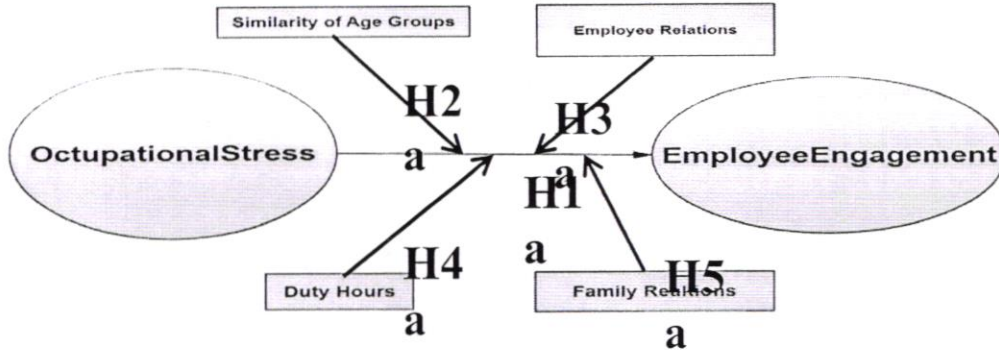


Fig 1 Hypothesized Model

**5. Research Methodology**

**Source of Data and Sample**

For this research, Data Was Collected in Complete Lock Downtime with great care and sincere efforts. Primary data was collected from the framed questionnaire with the help of adopted Scale items, the same was distributed to staff nurses with the help of goggle forms. Before submitting forms we are clearly explained the Questionnaire via Phone calls. The sample size was determined by Robert V Krejice (1970) as 364 out of 7000 Population.

**Variables of the study**

The Occupational Stress Scale (OSS), developed by House, McMichael, Wells, Kaplan, and Landerman (1979), measures how often employees are upset by stressful situations. The measure contains five subscales that assess the degree of job stress due to job responsibilities, quality concerns, role conflict, job versus non-job conflict and workload (Fields, 2002). All things were rated on a Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Employee engagement was calculated with an adapted version of the Utrecht Work Engagement Scale (Schaufeli et al., 2006). The UWES assesses three underlying dimensions of employee engagement: STRENGTH, DEDICATION, and ABSORPTION. All things were rated on a Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. All Moderators are considered as Categorical Variables in which can measure high or low and Strong or Weak.

**6. Demographic Data Analysis**

An analysis of the table shows that, out of 364 samples from public sector hospitals, 20 % of the sample respondents belong to the age group under 25 years, 43.1% of respondents belong to the second age group, i.e. 26 to 40 years, and 28.9% of respondents belong to the third age group, i.e. 41 to 55 years. 8 % of respondents belong to the fourth group of ages, namely 56 years and older.

**Data Analysis**

**H1a TESTING and FINDINGS**

**Reliability and Validity Assessment**

Table 1 : Factor Loadings		
	Component	
	1	2
JOB RESPONSIBILITY	.833	
QUALITY CHECK	.893	
ROLE OF CONFLICT	.881	
JOB VS NON JOB CONFLICT	.859	
WORKLOAD	.812	

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<b>VIGOR</b>		.769
<b>DEDICATION</b>		.894
<b>ABSORPTION</b>		.886
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		


The exploratory factor analysis was conducted and identified all factor loadings are good to accept shown in Table 2 and Scale reliability also validated with the help of Cronbach's Alpha and found that it is good to go shown in table 3. After that Measurement was constructed with two constructs and with their sub-items. From table 4 values it was concluded that all construct loadings are in the acceptable range and the AVE value is also more than the threshold level hence measurement model was convergent validated. Finally, the Divergent validated by comparing AVE and MSV values and they satisfying criteria by AVE is more than MSV. So we concluded the Measurement Model was Construct Validated.

Variable	Cronbach's Alpha	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
Employee Engagement	.864	.881
Occupational Stress	.836	Sig .00

			Estimate	AVE	MSV	Composite Reliability
<b>ABSORPTION</b>	<---	EE	0.87	0.70	0.31	0.76
<b>DEDICATION</b>	<---	EE	0.95			
<b>VIGOR</b>	<---	EE	0.67			
<b>Work load</b>	<---	OS	0.79	0.74		
<b>Job and Non Job Conflict</b>	<---	OS	0.87			
<b>Role of Conflict</b>	<---	OS	0.89			
<b>Quality Concern</b>	<---	OS	0.90			
<b>Job Responsibility</b>	<---	OS	0.86			

**Measurement Model Identification and Testing Model Fit**

The output of the measurement model of the path model between professional stress and employee involvement is shown in Figure 2. The beta coefficient of the path model between professional stress and employee involvement was equal to -0.561.

  
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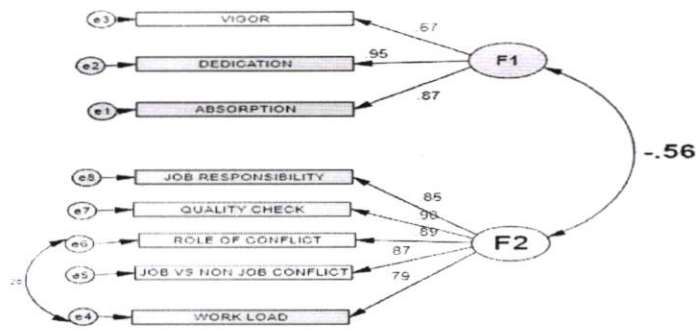


Fig 2. Measurement Model

Model Fit Indices

Indices	OS-->EE	Decision
Chi-Square	49.241	Identified as Absolute Model
df	18	
CMIN	2.736	
GFI	0.969	Accepted
CFI	0.987	
TLI	0.98	
RMSEA	0.068	

The Model was identified as the Absolute model and all Model Indecencies are above the threshold level of acceptance as shown in Table 5. So the statistical results of the Structural Equation Model (SEM) was good to go.

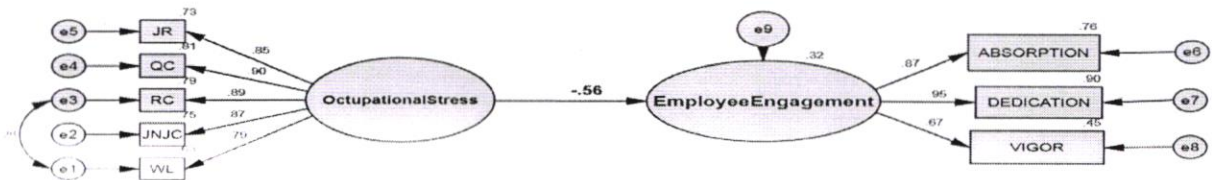


Fig 3 Relation between Occupational Stress and Employee Engagement

Employee Engagement and Occupational Stress has a strong negative correlation among them,  $r(364) = -.560, p < 0.01$ . Therefore it was concluded that there exists a Negative relationship between Employee Engagement and Occupational Stress, relationship value supporting the confirmed hypothesis H1a.

H2a TESTING and FINDINGS

	Coeff	se	t	p	LLCI	ULCI
Constant	50.41	0.44	111.59	0.00	49.54	51.27
OS	-1.41	0.62	-2.27	0.02	-2.63	-0.19
AD	4.97	0.62	8.00	0.00	3.75	6.19
Int_1	2.38	0.94	2.53	0.01	0.53	4.23

The age Differences among employees ages working together was divided into two categories, namely age difference is high, and low. The employees working together with age difference more than 10 years if defined as high, less than 10years is defined as low, hence it is identified that employee age differences were significant and moderates relation of Occupational Stress and Employee Engagement.

The Final equation

$$EE = 50.407 - 1.411OS + 4.966AD + 2.379(OS * AD) \dots \dots \dots (1)$$

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**Table 6 : Conditional effects of the focal predictor at values of the moderator(s):(Similarity of age Groups)**

AD	Effect	se	t	p	LLCI	ULCI
-.708	-3.095	.862	-3.591	.000	-4.790	-1.400
.000	-1.411	.622	-2.269	.024	-2.634	-.188
.708	.273	.959	.285	.776	-1.613	2.159

From Table 6 it is identified that Nurses whose group members with a high age difference are significant and which causing the negative relation among the constructs.

**H3a TESTING and FINDINGS**

**Table 7: Moderator Summary- Employee Relations**

	Coeff	se	t	p	LLCI	ULCI
<b>Constant</b>	45.41	0.34	114.14	0.00	44.54	46.28
<b>OS</b>	-1.20	0.63	-2.06	0.04	-2.53	-0.06
<b>ER</b>	5.77	0.72	8.03	0.00	4.36	7.18
<b>Int_1</b>	2.56	1.05	2.44	0.02	0.50	4.63

The moderator Employee Relations showed statistically significant results. The employee relations are categorized as Strong and weak based that the employee relation was significant and moderates the relation of Occupational Stress and Employee Engagement.

The Final equation

$$EE = 45.41 - 1.20OS + 5.77ER + 2.56(OS * ER) \dots \dots \dots (2)$$

**Table 8 : Conditional effects of the focal predictor at values of the moderator(s): Employee relations**

ER	Effect	se	t	p	LLCI	ULCI
-.615	-2.871	.831	-3.456	.001	-4.504	-1.237
.000	-1.295	.629	-2.060	.040	-2.531	-.059
.615	.281	.966	.290	.772	-1.620	2.181

From Table 8 it is identified that Nurses having weak employee relations are significant and which causing the negative relation among the constructs.

**H4a TESTING and FINDINGS**

**Table 9: Moderator Summary- Working Hours**

	Coeff	se	t	p	LLCI	ULCI
<b>Constant</b>	50.38	0.44	115.08	0.00	49.52	51.24
<b>OS</b>	-1.38	0.62	-2.20	0.03	-2.60	-0.15
<b>WH</b>	5.85	0.71	8.28	0.00	4.46	7.24
<b>Int_1</b>	2.53	1.03	2.46	0.01	0.51	4.56

The Working hours are categorized as ODD Hours (Night Shifts) and Even Hours (Day Shifts) on that the Working Hours was significant and seen that there is a moderate relation of Occupational Stress and Employee Engagement.

The Final equation

$$EE = 45.41 - 1.20OS + 5.77ER + 2.56(OS * WH) \dots \dots \dots (3)$$

**Table 10 : Conditional effects of the focal predictor at values of the moderator(s): Working Hours**

WH	Effect	se	t	p	LLCI	ULCI
-.621	-2.949	.819	-3.602	.000	-4.559	-1.339
.000	-1.376	.624	-2.204	.028	-2.604	-.148
.621	.197	.962	.204	.838	-1.695	2.088

From Table 10 it was identified that the Nurses who are working in odd hours shows significant and which causing the negative relation among the constructs.

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**H5a TESTING and FINDINGS**

	Coeff	se	t	p	LLCI	ULCI
<b>Constant</b>	50.38	0.44	113.60	0.00	49.51	51.25
<b>OS</b>	-1.42	0.63	-2.26	0.02	-2.66	-0.19
<b>FR</b>	5.09	0.66	7.70	0.00	3.79	6.39
<b>Int_1</b>	2.17	0.98	2.21	0.03	0.24	4.11

Family Relations are categorized as Strong Family Relations and Weak Family Relations on that that Family relations were significant and moderate relation of Occupational Stress and Employee Engagement.

The Final equation

$$EE = 50.38 - 1.42OS + 5.09ER + 2.17(OS * FR) \dots \dots \dots (4)$$

FR	Effect	se	t	p	LLCI	ULCI
-.670	-2.880	.848	-3.394	.001	-4.548	-1.211
.000	-1.423	.629	-2.261	.024	-2.661	-.186
.670	.033	.969	.034	.973	-1.873	1.939

From Table 12 it is identified that Nurses who are having strong family relations are significant and which causing a negative relation among the constructs.

**Moderators Contribution**

Moderator (OS * W)	R-sq	F	df1	df3	P
<b>Similarity of Age Groups</b>	0.14	6.38	1.00	360.00	0.01
<b>Employee Relations</b>	0.13	5.96	1.00	360.00	0.02
<b>Working Hours</b>	0.13	6.07	1.00	360.00	0.01
<b>Family Dependency</b>	0.11	4.89	1.00	360.00	0.03

**7. Findings And Suggestions**

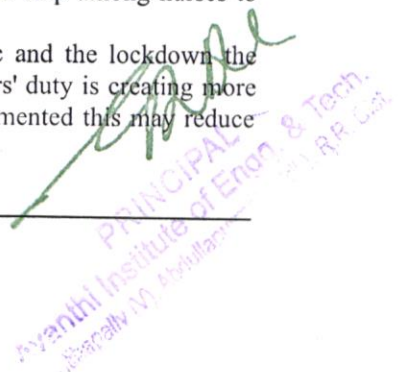
➤ The study completely centric on COVID Lock downtime among the nurses in Government Hospitals and findings begins with identifying the Significant Strong Negative Correlation between Employee engagement and Occupational Stress.

➤ Further researcher identified the significant Moderators who are effecting the relation. By identifying this we can control the negative relation among constructs.

➤ The first moderator signifies the relation in the similarity of age groups. The Nurses in this group whose age differences are more than 10 years are more exposed to stress and participants producing a negative effect with engagement. As taking this conclusion we suggested in hospitals that when nurses working together with different age groups people, nurses who are having the same age group can balance their stress with similar age groups through interaction and communication which indicates a less negative relationship with Employee engagement. Whereas this similar group is passive to maintain their stress levels with age difference among nurses working together will create a more negative relationship with Employee engagement.

➤ Another moderator of this study is Employee relations, for any management the relationship among very important. In this study, it was identified that due to weak relations among nurses generating more stress. Hence we suggest that management can conduct recreational programs to develop the relationship among nurses to decrease the negative influence on Engagement.

➤ Next Moderator of this Study is working hours, due to coronavirus pandemic and the lockdown the working conditions are changed completely and in this, it was identified that Night Hours' duty is creating more stress among nurses. So while preparing the duty chart rotation method should be implemented this may reduce stress little bit..





➤ Final Moderator of this study was Family relations, Even though Nurses are dedicated to their job because of present typical situations, family relations may affect them. This study identified those are having strong family relations are contributing to a significant negative relationship with engagement. So Management has to create confidence among nurses that they are with them and lot some time to their families, bz their families are also very important.

## 8. Conclusion

The impact of the coronavirus pandemic and the lockdown it triggered is visible in India and the healthcare sector is at the epicenter of this. In the modern scenario trigger, stress management is a common phenomenon in a professional corridor. Many researchers proved that stress can be better understood with the help of Moderators i.e. who are contributing negative relationships among Occupational Stress and Employee engagement are analyzed with four moderators. Four Moderators are influencing the relation significantly. Similarity of Age Groups explained the relation with 14%, Employee Relations and Working Hours explained the relation equally of 13% and finally Family Relations with 11% contribution. All moderators explained more than 50% of the relation. So in this Epidemic situation nurses under heavy pressure cannot be engaged. With the help of this moderator, management can take care of forming groups concerning age, assessing relations among nurses can reduce the negative impact. Further duty chart preparations take care of choosing nurses' priorities for odd hours working. Finally, family care from management may decrease the stress on nurses' leads to better Engagement. Nurse resilience could be an opportunity for the global trend of active aging and interventions to support other nurses in organizations would be helpful. It is suggested to create a healthy and reasonable working environment through politics.

## 9. Limitations And Future Scope

Even though the outcomes of the research were acceptable, definite research limitations are there

- This research is centric to COVID Lockdown time obviously all nurses are under more pressure so meantime the findings may alter.
- Moderators together was explained 51 percent of the relationship only so in further research remaining percent may be explained with the help of other moderators.
- This research limited to Demographic Location Andhra Pradesh state Government hospital Nurses only. Further, it may extend to Whole India.
- Identifying a mediator among Employee Engagement and Occupational Stress may further give a better understanding of the relationship.

After that effect of Employee Engagement is not confined to relationship Occupational Stress alone. Hence the researchers in the field of shall focus on minimizing the negative effects of Occupational Stress on Employee Engagement

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*Principal*  
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Vijayapally (V), Abadipally (M), R.R. Dist



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# CONVERSION OF PLASTIC WASTE INTO FUEL

\*Dr Ramesh Babu Yeluri<sup>1</sup>, Mallikanti Venkateswarlu<sup>2</sup>, G.Vinod Kumar<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Mechanical Engineering, Avanthi Institute of Engineering and Technology, Hyderabad,

<sup>2</sup>Assistant Professor, Department of Mechanical Engineering, Avanthi Institute of Engineering and Technology, Hyderabad

<sup>3</sup>Research Scholar, Department of Mechanical Engineering, Kakatiya Institute of Technology and Science, Warangal

**Abstract:** The waste plastic is generated in India 15000 tons per day (as per government survey) the waste plastic affects the humans, animals, birds' earth and environment. For dissolving (breakdown) plastic may require around 500 years in the earth. Every year 65% waste plastic is land filled or in the natural environment (River system and ocean). The technology is used to dissolve these all type waste plastic is pyrolysis. Over 100 million tons of plastics are produced annually worldwide, and the used products have become a common feature at over flowing bins and landfills. Though work has been done to make futuristic biodegradable plastics, there have not been many conclusive steps towards cleaning up the existing problem. Here, the process of converting waste plastic into value added fuels is explained as a viable solution for recycling of plastics. In this work an attempt has been made to investigate the conversion of household waste plastic into liquid fuel by using pyrolysis process, a pyrolysis unit is designed, fabricated and evaluated for various kinds of plastic wastes, properties of liquid fuels obtained are determined. Pyrolysis runs without oxygen and in high temperature of about 300°C which is why a reactor was fabricated to provide the required temperature for the reaction. Converting waste plastics into fuel hold great promise for both the environmental and economic scenarios. Thus, the process of converting plastics to fuel has now turned the problems into an opportunity to make wealth from waste.

**Keywords:** We would like to encourage you to list your keywords in this section

## 1. INTRODUCTION

In chemistry, plastics are large molecules, called polymers, composed of repeated segments, called monomers, with carbon backbones. A polymer is simply a very large molecule made up of many smaller units joined together, generally end to end, to create a long chain. The smallest building block of a polymer is called a monomer. Polymers are divided into two distinct groups: thermoplastics (moldable) and thermo sets (not). The word "plastics" generally applies to the synthetic products of chemistry. More than 15,000 tones of plastic waste are generated in India everyday, of which 6,000 tones remain uncollected and littered, the government today said. However, as per the CPCB report in 2014-15, 51.4 million tones of solid waste were generated in the country, of which 91 percent was collected, and 27 percent was treated and remaining 73 percent disposed of at dump sites. "Central Pollution Control Board has estimated the generation of 15,342 tones of plastic waste in the country, out of which, 9,205 tones were reported to be recycled and leaving 6,137 tones uncollected and littered". The technology is used to dissolve these all type waste plastic is pyrolysis. The pyrolysis is the heating substance in the absence of oxygen. In this study 4300 Celsius temperature need. The all type of waste plastic is converting to fuel. It works like Petrol, diesel, kerosene and LPG. By implementing this concept can be reduced 80-90% of waste plastic and can be provide 60% oil for diesel vehicles. The fuel does not emit sulfur dioxide.(SO<sub>2</sub>). It increases machine efficiency. The 5% residue is obtained which is carbon block.

## 2. MATERIALS AND METHODS

Since the dawn of history, humankind has endeavoured to develop materials offering benefits not found in natural materials. The development of plastics started with the use of natural materials that had intrinsic plastic properties, such as shellac and chewing gum. The next step in the evolution of plastics involved the chemical modification of natural



materials such as rubber, nitrocellulose, collagen and galalite. Finally, the wide range of completely Synthetic materials that we would recognize as modern plastics started to be developed around 100 years ago. One of the earliest examples was invented by Alexander Parkes in 1855, who named his invention Parke sine. We know it today as celluloid. Polyvinyl chloride (PVC) was first polymerized between 1838-1872. A key breakthrough came in 1907, when Belgian-American chemist Leo Baekeland created Bakelite, the first real synthetic, mass-produced plastic.

Plastic is a high molecular weight material that was invented by Alexander Parkes in 1862. Plastics are also called polymers.

Table 1. Types of plastics

TYPE 1	Recyclable	Polythelene Terephthalate	Beverages
TYPE 2	Recyclable	High density polyethylene	Milk, detergent, oil, bottles, toys, containers used outside parts and plastic bags
TYPE 3	Recyclable (uncommon)	Polyvinyl chloride	Food wrap, vegetable oil, bottles, automotive parts
TYPE 4	Recyclable	Low density polyethylene	Plastic bags, shrink wraps, most bottles, garment bags
TYPE 5	Recyclable	Poly-propylene	Refrigerant containers, some bags, most bottle tops, some carpets

### 3. MATERIALS AND METHODS

Municipal plastic wastes (MPW) normally remain a part of municipal solid wastes as they are discarded and collected a household plastic wastes. The various sources of MPW plastics includes domestic items like food containers, milk covers, water bottles, packaging foam, disposable cups, plates, cutlery, CD and cassette boxes. Fridge liners, vending cups, electronic equipment cases, drainage pipe, carbonated drinks bottles, plumbing pipes and guttering, flooring. In this work pyrolysis method is used to convert household plastic wastes like food containers, milk covers, water bottles, packaging foam, and waste cooking oil cover. Nearly 15 tones of plastic cover is wasted in single village. By estimating 5000 tonnes to 6000 tones of plastic will be wasted from household sources in the state. Waste plastics have been shredded then washed before pyrolysis. From above factors from municipal plastic waste have been used as raw materials. Waste plastics have been washed before pyrolysis. In this work plastic water bottles and coca cola cool dink bottles and other bottles are selected as feed stocks to convert waste plastic into useful liquid fuel compounds.



Figure 1. Plastic waste

### 4. PYROLYSIS

Pyrolysis is generally defined as the controlled heating of a material in the absence of oxygen. In plastics Pyrolysis, the macromolecular structures of polymers are broken down into smaller molecules or oligomers and sometimes monomer units. Further degradation



of these subsequent molecules depends on a number of different conditions including (and not limited to) temperature, residence time, presence of catalysts and other process conditions. The Pyrolysis reaction can be carried out with or without the presence of catalyst accordingly, the reaction will be thermal and catalytic Pyrolysis. Since majority of plastic used are polyolefin, so extensive research has been done on this polymer which is summarized as below.

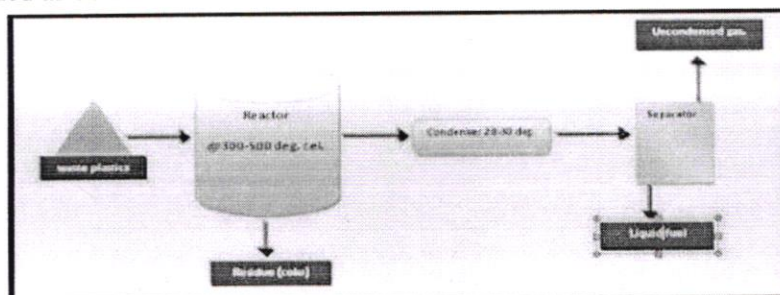


Figure 2. Concept of pyrolysis process

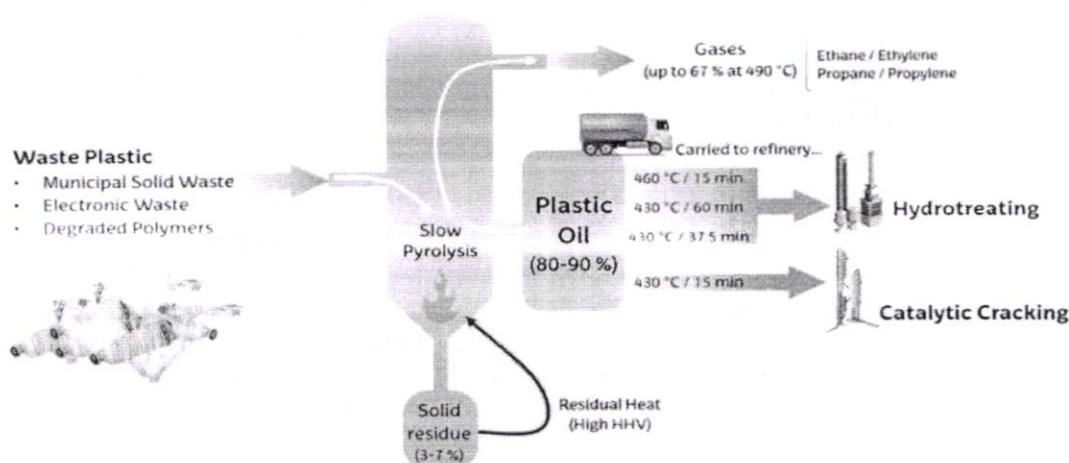


Figure 3. Process of pyrolysis process

#### 4. WORKING PRINCIPLE OF PYROLSIS

The waste plastics involve the thermal decomposition in the absence of oxygen air. During the pyrolysis, the polymer materials are heated to high temperatures and thus, their macromolecules are broken into smaller molecules, resulting in the formation of wide range hydrocarbons. The thermal pyrolysis proceeds according to the radical chain reactions with hydrogen transfer steps and the gradual breakdown of the main chain. The mechanism involves the stages of initiation, propagation and / or free radical transfer followed by chain scission and termination. The products obtained from the pyrolysis can be divided into non-condensable gas fraction, liquid fraction and solid waste. From the liquid fraction can be recovered hydrocarbons in the gasoline range (C4-C12), diesel (C12-C23), kerosene (C10-C18) and motor oil (C23-C40).

The plastic oil can be widely used as fuel oil in many industries and can also be refined to diesel oil. The carbon black can be used for making construction bricks with clay or used as fuel. By the extra gas recycling system, the combustible gas will be recycled to heat the reactor as fuel, which will save energy for the whole recycling process of plastic.

Production of fuel from waste plastic involves pyrolysis process. In this process, plastic is rapidly heated to 250o-350°C in a reactor in the absence of oxygen. The temperature required depends on the types of plastics used. Once the melting point is reached, the plastics melts and the vapour rise up and is collected in the condensing unit. Water is used to condense the vapour. The condensed vapour is collected above the water due to the density difference of the oil and water. Finally, the oil is poured out of the condensing unit through the tap provided. The pyrolysis of plastic gives out the mixture of fuel, gases



and solid char. Variation of the pyrolysis process, type of plastic used and the temperature will produce the varying percentage of these three products. Various technologies and methodologies can be used for the pyrolysis process such as batch reactor, semi batch reactor, fluidized bed reactor, fixed bed reactor etc. The process can be performed with or without the use of catalyst. The different types of catalyst that can be used for plastic pyrolysis are zeolite, alumina ( $\text{Al}_2\text{O}_3$ ), silica ( $\text{SiO}_2$ ), etc.

## 5. RESIDENCE TIME

The definition of residence time differs in various studies. In fast pyrolysis or continuous pyrolysis process, it refers to the contact time of the plastic on the hot surface throughout the reactor. However in slow pyrolysis and batch process, the residence time means the duration from the time when feedstock plastic start to be heated to the time when the products are removed. Longer residence time favours a further conversion of the primary products thus yielding more thermal stable products such as light molecular weight hydrocarbons; non- condensable petroleum gases. In a slow pyrolysis, long residence time encourages the carbonization process and produces more tar and char in the products. The pyrolysis Conditions, residence time and target products are given in Table.

Table 2. Pyrolysis processes and target products

Process	Heating Rate	Residence Time	Temperature E( $^{\circ}\text{C}$ )	Target Products
Slow carbonization	Very low	Days	450-600	Charcoal
Slow pyrolysis	10-100K/min	10-60 min	450-600	Gas, oil, char
Fast pyrolysis	Up to 1000K/s	0.5-5 s	550-650	Gas, oil, (char)
Flash pyrolysis	Up to 10000K/s	<1 s	450-900	Gas, oil, (char)

Except for the batch pyrolysis reactor in a closed system, residence time is difficult to be controlled directly but can be adjusted by altering other operation parameters such as feeding rate, carrier gas flow rate and product discharge rate. Residence time was, then, calculated for these controllable operation parameters. Secondary pyrolysis cracking occurs when residence time is long enough, which enhances the yield of gaseous product. (Figure4.1) Higher value of  $V/m$  represents longer residence time in Figure (4). The Y axis is the conversion of HDPE to gaseous product. There is a significant effect on the conversion when the residence time varies in a certain range during the non-catalyst thermal reaction.

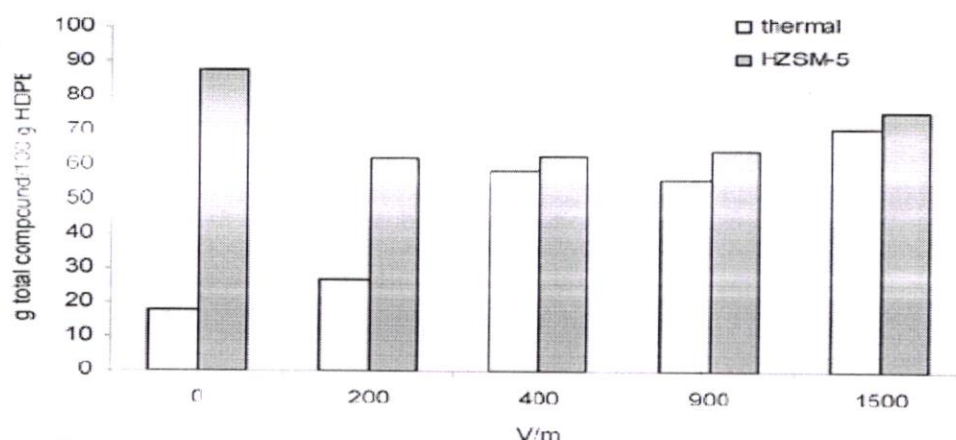


Figure 4. Influence of residence time on the production of gaseous product (from HDPE thermal and catalytic cracking)

## 5. PYROLYSIS PROCESS

Fig.5 shows, the experimental setup of pyrolysis process. The apparatus was designed to operate at high temperatures and atmospheric pressure. The heart of the experimental apparatus was a vertical tubular reactor. A feeder was attached to the reactor's upper end; this enabled controlled amounts of plastic pellets to be added before or during operation. At the bottom of the reactor attached a furnace for the purpose of heating the reactor. Biomass and charcoal with blower is used as a heating source to heat the reactor. Due to increasing reactor temperature the plastic starts to evaporate, these Vapors leaving the reactor and passed into a condenser, condenser maintained at atmospheric temperature. The cyclone separator is provided at the end of condenser to separate the gaseous and plastic liquid fuel compounds. The gas is reused to heat the pyrolysis unit and another end of cyclone separator is connected to a flask in which the liquid hydrocarbon product was collected. Temperatures and pressure were monitored continuously by using thermocouples and pressure gauge.

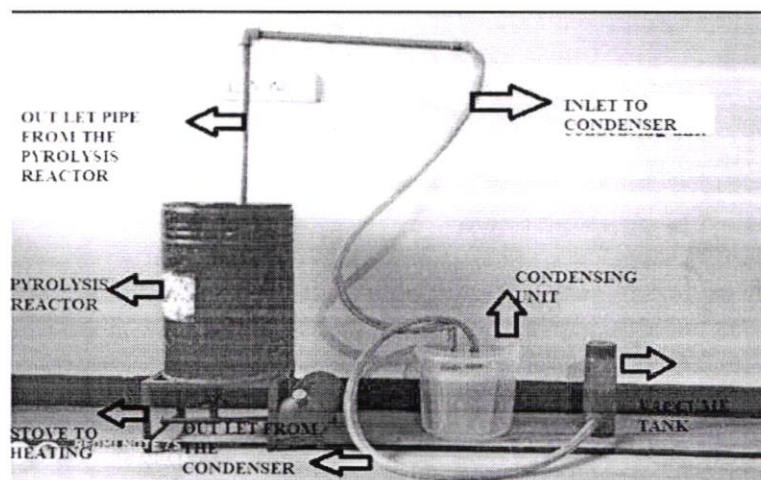


Figure 4. Setup of pyrolysis unit

## 5. STEPS INVOLVED IN PROCESS

- **Feeding-** Feed the feedstock's to reactor through feeder and closes the feeder inlet.
- **Heating-** To increase the temperature of reactor, heat the product of reactor inside by using heating source.
- **Condensing-** The plastic get evaporated at high temperature, this vapor is condensed to atmospheric temperature by using straight and spiral tube condensers.
- **Liquid collection-** Out coming product from the condenser is collected at liquid collector. At the end of condenser provide a cyclone separator to separate the plastic liquid fuel and non-condensable gases. These non-condensable gases are reuses to heat the pyrolysis unit.
- **Water wash, Purification and pH test-** This involves many purification processes. In this method we take equal proportion of plastic fuel and water in a container and shake well, allow it for 5-7 hours to settle down. Now water along with some crystals is collected at bottom and pure plastic fuel is collected at the top container.
- **Purification-** Purify the plastic fuel by using filter papers and filters.
- **pH Test-** After purification measures the pH value of plastic fuel by using pH meter. If the pH is less than 7, the fuel is acidic in nature. It is needed to wash with water many times to bring pH value of oil to 7.



## 6. PLASTIC PYROLYSIS OIL

Pyrolysis is a thermo chemical decomposition of organic material at elevated temperatures in the absence of oxygen (or any halogen). It involves the simultaneous change of chemical composition and physical phase, and is irreversible. The word is coined from the Greek-derived Elements pyro "fire" and lysis "separating".

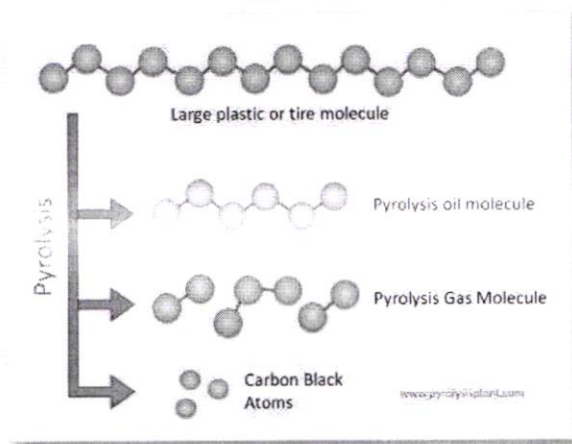


Figure 4. Breaking of Hydrocarbon chain in Pyrolysis Process

Pyrolysis differs from other high-temperature processes like combustion and hydrolysis in that it usually does not involve reactions with oxygen, water, or any other reagents. In practice, it is not possible to achieve a completely oxygen-free atmosphere. Because some oxygen is present in any pyrolysis system, a small amount of oxidation occurs. Bio-oil is produced via pyrolysis, a process in which biomass is rapidly heated to 450–500°C in an oxygen-free environment and then quenched, yielding a mix of liquid fuel (pyrolysis oil), gases, and solid char. Variations in the pyrolysis method, biomass characteristics, and reaction specifications will produce varying percentages of these three products. Several technologies and methodologies can be used for pyrolysis, including circulating fluid beds, entrained flow reactors, multiple hearth reactors, or vortex reactors. The process can be performed with or without a catalyst or reductant. The original biomass feedstock and processing conditions affect the chemical properties of the pyrolysis oil, but it typically contains a significant amount of water (15%–30% by weight), has a higher density than conventional fuel oils, and exhibits a lower pH (2–4). The heating value of pyrolysis oil is approximately half that of conventional fuel oils, due in part to its high water and oxygen content, which can make it unstable until it undergoes further processing. Bio-oil can be hydro-treated to remove the oxygen and produce a liquid feedstock resembling crude oil which can be further hydro-treated and cracked to create renewable Hydrocarbon fuels and chemicals.

Hydro-treating stabilizes the bio-oil preventing molecule-to-molecule and molecule-to-surface reactions and eventually produces a finished blend-stock for fuels. Bio-oil can be deoxygenated from its high initial oxygen content of 35-45 percent by weight (wt %) on a dry basis all the way down to 0.2 wt%. DongleiWu produced experimental setup for low temperature conversion of plastic waste into light hydrocarbons. For this purpose 1 litre volume, energy efficient batch reactor was manufactured locally and tested for pyrolysis of waste plastic. The feedstock for reactor was 50 g waste polyethylene. The average yield of the pyrolytic oil, wax, pyroga and char from pyrolysis of PW were 48.6, 40.7, 10.1 and 0.6%, respectively, at 275 °C with non-catalytic process. Using catalyst the average yields of pyrolytic oil, pyroga .

## 7. RESULTS AND DISCUSSION

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**Density:** Density of fuel at different temperatures was measured by a standard 25 ml marked flask. Weight of the fixed volume of fuel (25 ml) was measured at different temperatures by an electronic balance which measures up to 0.0001 gm. The density values are reported in kg/m<sup>3</sup>.

**Calorific value:**

**Determination of calorific value:** The calorific value of a fuel is the quantity of heat produced by its combustion at constant pressure and under normal conditions. Calorific value determined by using bomb calorimeter.

**Procedure:**

1. Weight the empty crucible.
2. Take approximately 0.5gm of liquid fuel in a crucible & reweight.
3. Place the crucible in its support and coil a small loop of the nicrome wire between the two conductors and a piece of thread is dipped into the fuel screw the cap firmly on to the body of the bomb and charge with oxygen until a pressure of 25 bar is obtained.
4. Lower the bomb into the calorimeter and connect the firing wire. Pour about 2.25 liters of water into the calorimeter so as to completely cover the bomb, fit a thermometer and stirrer. Press fire button to start the ignition, temperature of water starts to rise, note down the temperature of water for every 10 seconds.
5. Until the transfer of heat from bomb has ceased has indicated by fall in temperature reading.
6. Take down the maximum temperature for the calculation of calorific value by using below relationship.

**Viscosity:** is an important property fuel and it is fluid's resistance to the flow (shear stress) at a given temperature. Fuel viscosity is specified in the standard for diesel fuel within a fairly narrow range. Hydrocarbon fuels in the diesel boiling range easily meet this viscosity requirement. The viscosity range for typical fuels overlaps the diesel fuel range with some fuels having viscosities above the limit. If fuel viscosity is extremely excessive, there will be a degradation of the spray in the cylinder causing poor atomization, contamination of the lubricating oil, and the production of black smoke. Kinematic viscosity takes into account the fluid density and centistokes is the engineering unit used to express the kinematic viscosity.

**Procedure for calculation of viscosity:**

- Instrument is leveled with the help of leveling screws.
- The kouhlausch flask of 50 ml capacity is placed below the jet.
- Oil and water are kept stirred their respective temperature are noted.
- Valve ball is turned from agate jet oil is allowed to flow into the flask.
- Flow time for 50 ml of oil is noted with the help of stop watch.
- Calculate the kinematic viscosity by using below relation.

$$\text{Kinematic viscosity (V)} = (0.22 * T_{135}/T) * 10^{-6}$$

Where T – time in sec T=30 sec

$$V = (0.22 * 30 - 135/30) * 10^{-6} \text{ M /sec}$$

$$V = 2.1 \text{ cst}$$

**Fire point test:**

**Procedure:** Measured plastic liquid fuel is poured up to the mark indicated in the flash point Apparatus. Then the oil is heated and stirred at regular interval. The external fire is introduced at the regular period till flash is observed. Once the flash is observed the

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temperature is recorded. Recorded temperature at the time of the fire starts to see continuously is the fire point of the plastic liquid fuel.

**Table 3. Comparison of Properties Of the Waste plastic fuel and Diesel Fuel**

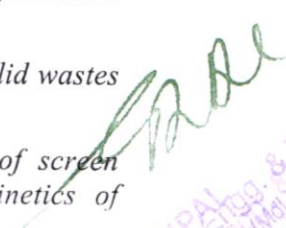
S.No	Properties	Plastic Fuel	Diesel fuel
1.	Density(kg/m)	821	812
2.	Calorific Value(kJ/kg)	45,050	42,000
3.	Kinematic Viscosity	2.1	3.05
4.	Flash Point (°)	-	66
5.	Fire Point (°)	38	74

## 7. CONCLUSIONS

Plastic bears a major threat to the current scenario and the environment. Millions of tonnes of plastics are produced on the daily basis and only few percentage of the waste plastic is being successfully recycled. Since, plastic takes long years to decompose; some alternative to plastic should be developed. According to the current statistics, there is continuous rise of consumption and thus cost of petroleum oil, International Energy Outlook 2008 reports the world consumption of petroleum oil as 84 million barrels per day. The conversion of waste plastics to liquid hydrocarbon fuel was carried out in thermal pyrolysis unit. This method is superior in all respects (ecological and economical). By adopting this technology, efficiently convert weight of waste plastics into 75% of useful liquid hydrocarbon fuels without emitting any pollutants. It would also take care of hazardous plastic waste and reduce the import of crude oil. Depletion of non-renewable source of energy such as fossil fuels at this stage demands the improvements of this technique. Based on the properties of the Plastic fuel and Diesel fuel the all properties are nearer hence concluded that Waste plastic fuel represents a good alternative fuel for diesel engine and therefore it can be used for diesel engine vehicles for the transportation purpose.

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 Avanti Institute of Engg. & Tech.  
 Guntur - 522 002 (V), Andhra Pradesh (India), R.R. Dist.





# RDNN for classification and prediction of Rock/Mine in underwater acoustics

Jetty Bangaru Siddhartha<sup>a,\*</sup>, T. Jaya<sup>a</sup>, V. Rajendran<sup>a</sup>

<sup>a</sup> Department of ECE, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai-600117, Tamilnadu, India

## ARTICLE INFO

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## ABSTRACT

The detection of minerals (mines) or rocks would have been extremely difficult without the expansion of the Sound Navigation Ranging methodology, which uses specific parameters to determine if a barrier or a surface is a mine or rock. Hence, this proposed work is concerned with the progression of distinctive among metal cylinder which is named as mines and cylindrical shape material which is named as rocks using deep learning based algorithms. Moreover, this work introduced novel technique as Rock or mine Detection Neural Network for performing rock/mine prediction and classification in underwater acoustics. The proposed RDNN method outperforms the outcomes by attaining high accuracy as 92.85% mean accuracy that makes better model performance.

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## 1. Introduction

One of the major difficult task in sonar targets are classification of substantial properties in underwater acoustics sonar objects such as mine like objects, rocks etc. By Jetty [1] applied various machine learning algorithms for identifying rocks/mines and distinguishing the same from underground data of unmanned vehicle. Here the neural networks are trained to distinguish the sonar based datasets into metal like mine, or rocks of comparable size. Khatik et al. [2] proposed generic rock mass rating for categorizing rocks using artificial neural network. Venkataraman Padmaja et al.

Machine learning techniques such as KNN, decision tree, and gradient booster, as well as SVM techniques, were used to separate the objects, such as rock or mine, in order to obtain high resolution images. Using a feature set and a Gradient Boosting classifier, this model achieves an accuracy of roughly 90%. Fig. 1 demonstrates finding abnormalities such as rocks which is classified from mine like objects in underwater acoustics system.

But, this paper focused on performing extra investigation in sonar dataset for detection and distinguishing the rocks or mines like materials in underwater acoustics using deep learning based neural network approach [3, 33]. Moreover, comparison of net-

work distinguishing performance of existing deep learning models along with our proposed neural network based layers by evaluating accuracy and loss measures as metrics evaluation.

## 2. Related work

Ravi et al. [9] introduced Online Multiple Kernel Learning (OMKL) is a combination of neural networks and online learning that tries to build a kernel-based prediction function from a pool of predefined kernels. Here, SVM and NN algorithms were applied to distinguish sonar data. Hassan et al. [4] utilize PCA and standalone architecture to integrate Back Propagation Neural Network for the categorization of two datasets (sonar and ionosphere datasets) in bagging ensemble architecture. Lee et al. [20] Due to the high density of fine floats or aquatic microorganisms, water bodies frequently show a serious reduction in visibility. Shin et al. [21] Because optical images have limitations, imaging sonar has become a generally accepted option for obtaining accurate measurements regardless of the turbidity of the water. Sejin Lee et al. [22] introduced image synthesizing method to capture sonar images using underwater simulator. Fenglei Han et al. [23] focused on real time underwater object detection and as well as classification using deep learning based CNN approach to attain underwater working operation. Simon Fong et al. [6] applied incremental data stream mining methodology with conflict analysis approach on underwater sonar signal detection to examine the efficiency. Chen-

\* Corresponding author.

E-mail addresses: [siddhartha.bangaru@gmail.com](mailto:siddhartha.bangaru@gmail.com) (J.B. Siddhartha), [jaya.se@velsuniv.ac.in](mailto:jaya.se@velsuniv.ac.in) (T. Jaya), [director.ece@velsuniv.ac.in](mailto:director.ece@velsuniv.ac.in) (V. Rajendran).

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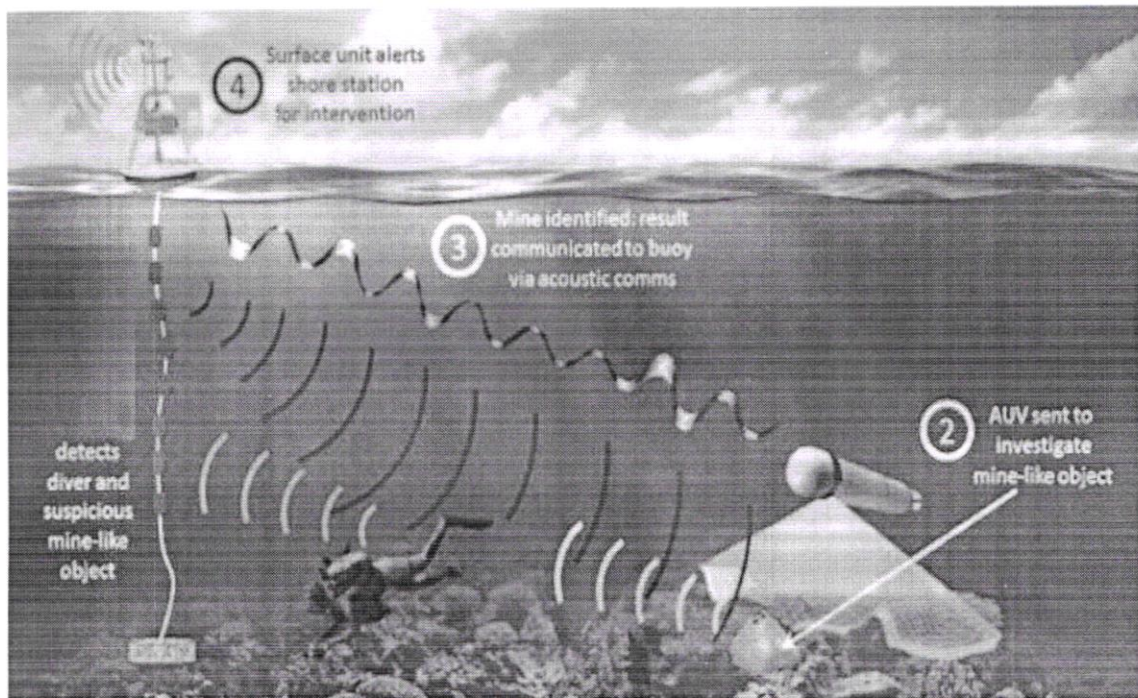


Fig. 1. Abnormality detection in underwater acoustics.

gyu Xie et al. [16] focused on predicting the rock size while blasting mine with greater accuracy and attained high consistency using artificial intelligence approach. Babaeian et al. [24] utilized regression model for finding the rock size as well as explained its dominance. Ding et al. [25] applied stochastic gradient boosting algorithm to categorize the stability of pillar in underwater mines. Ebrahimi et al. [26] developed Artificial Neural Network and Bee colony algorithm to offer suitable rock destruction for achieving higher accuracy using RMSE metric evaluation. Zhang et al. [27] presented an ANN based detection algorithm for an UAV (Unmanned Aerial Vehicle) based on slope and skewness of received signals in terms of error rate. Hao Yue et al. [18], Guojian Cheng et al. [17] underwater acoustics sonar targets were classified using deep learning based CNN approach attains 94.8% accuracy. G. Huo et al. [28] integration of both semi-synthetic data generation as well as deep learning based transfer learning approach provides more accuracy in categorizing underwater objects. Jongkwon Choi et al. [12] utilized machine learning algorithms such as random forest, CNN, SVM, feed forward neural network for categorizing surface or underwater acoustics in ocean via low frequency acoustic data. Nikitha et al. [29] and Harvinder Singh et al. [11] developed machine learning algorithms for distinguishing rocks or mines in underwater using highly spatial dataset. Mukherjee et al. [10] introduced pattern analysis algorithm which constructs both symbolic dynamic and finite automata theory for finding mine like objects in underwater acoustics surroundings. Bradley Efron et al. [19] explained how the LAR model were derived the properties that constrains the sum of the absolute regression coefficients. Abhishek et al. [30] utilized Fast Region CNN approach to categorize the underwater objects as rocks or mines. Ritwick Ghosh et al. [7] determined that machine learning techniques and neural network algorithms by Abdul-Qader et al. [13] support vector machine algorithm by Jade et al. [9], deep learning based network [18] attained better outcomes in classifying rocks or mines using sonar dataset. Dhiraj Neupane et al. [31] and Bouzerdoum et al. [14] studied deep learning based approaches and machine learning algorithms by Dahee Jung et al. [15] for detecting sonar mine objects using sonar images.

### 3. Proposed workflow

The proposed workflow describes the classification of rock or mine in underwater acoustics through sonar technology.

Step 1: Gathering dataset from the specified repository especially SONAR dataset.

Step 2: Loading the dataset for training phase.

Step 3: Apply feature extraction technique to extract the relevant features related with sonar dataset.

Step 4: Create RDNN algorithm for predicting and categorizing the sonar dataset as normal (mine) and abnormal (rock) in underwater acoustics.

Step 5: Compute the central measures tendency for mean and standard deviation.

Step 6: Splitting the dataset as training and testing with 70%, 30% respectively

Step 7: Calculate metrics such as accuracy, loss, accuracy based on validation and validation loss for evaluating the overall performance of the model.

### 4. Dataset explanation

The dataset which were utilized in this work have been taken from the resource namely UCI machine learning repository described in Table 1. This high generalization has been attained on the Neural Network based approach. To achieve greater accuracy for performance enhancement, the implementation was done in Python version 3.7 environments. The resource link is mentioned as <https://datahub.io/machine-learning/sonar#resource-sonar> [34-35].

Table 1  
Sonar dataset used in this proposed work.

Total	Mine	Rock
208	111	97







4.3. Data correlation

The statistics of data is implemented using heatmap. The heat map is a two-dimensional representation of the data. In the graph, the data values are represented by colors. The purpose of a heat map is to create a colorful visual summary of data. For each value to be plotted, a heat map has values indicating several shades of the same color. The darker hues of the chart usually correspond to higher values than the lighter colors. A completely different color can likewise be utilized for a significantly different value. By using matplotlib, the output of heat map will displayed as shown in Fig. 3.

4.4. Feature selection

Feature selection is a much more straightforward task that is given a list of prospective features, choose a few and eliminate the rest. Feature selection is used to avoid redundancy and/or irrel-

evancy in features, as well as to limit the number of features available to avoid over-fitting.

4.4.1. Least Angle Regression(LAR)

A novel model selection approach called Least Angle Regression is a helpful and less greedy alternative of previous forward selection methods shown in Fig. 4. It is fast and very efficient method for fitting a Lasso regularized regression model without using hyper parameters. This regression provides the following

- i. An alternating way to train Lasso regularized linear regression approach which adds penalty to loss function during training phase.
- ii. The prediction of rock or mine can be done by evaluating LAR regression model.
- iii. The configuration of LARS regression model for a novel sonar mine rock detection automatically through k-fold validation technique.

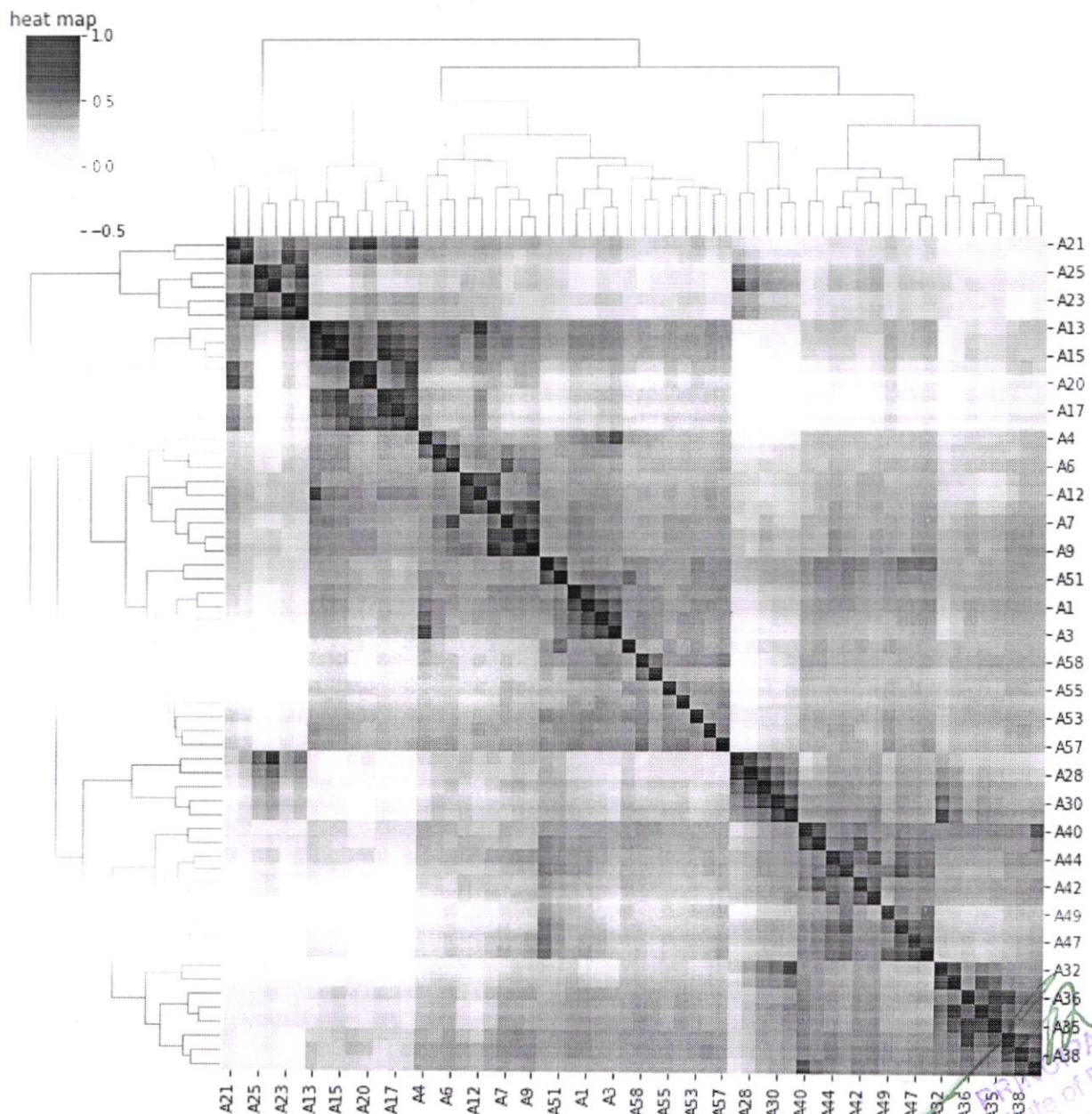


Fig. 3. Histogram for visualizing data using Heat map.

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B. Metrics Estimation

The metrics such as accuracy, loss, validation loss and validation accuracy were estimated for identifying underwater acoustics objects and classifying the sonar data as rock or mine.

- i. **Accuracy:** Accuracy is defined as the number of correctly classified data from total number of input sonar abnormal data which makes greater enhancement in predicting NN model performance in mine like objects detection. The formula used to measure accuracy is shown in Eq. (1).

$$\text{Accuracy} = \frac{TP + TN}{TP + FP + TN + FN} \quad (1)$$

- ii. **Epoch:** An epoch is a unit of time used to train a neural network with all of the training data for a single cycle. We use all of the data exactly once in an epoch. A forward and backward pass are combined to make one pass: An epoch is made up of one or more batches in which we train the neural network using a portion of the dataset.
- iii. **Validation Accuracy:** The validation accuracy is predicted by contrasting the index of the highest scoring class in y label prediction vector and the index of the actual class in the y label true vector. It returns 0 or 1. The accuracy is predicted by correctly classified data among all input sonar abnormal datasets.
- iv. **Loss:** The loss functions are supportive to train RDNN especially Adam optimizer model. Based on actual input and predicted input datas the losses will be estimated (i. e) distinguish among output data and target datas from sonar abnormal datasets. We introduced loss function ( $L_{\text{segm}}$ ) which is the integration of weighted loss ( $L_w$ ) IoU and also weighted binary cross entropy  $L_w$  BCE loss for every segmentation of sonar data. The formula for loss functions as shown in Eq. (2).

$$L_{\text{segm}} = L_w \text{IoU} + \lambda L_w \text{BCE} \quad (2)$$

where  $\lambda$  represents weight of abnormal data.

- v. **Validation Loss:** The loss function is validated by distinguishing among sonar mine or rock from underwater acoustics sonar data for segmenting sonar data into normal data as mine abnormal data as rock exactly.

7. Experimental outcomes

The layers utilized for sonar abnormal dataset using deep learning neural network based Rock/mine detection and classification. The layers maintained by models, the size of layers, input shape, activation layer and which optimizers are utilized by various existing models and comparing with proposed approach depicted in Table 3.

7.1. Accuracy comparison

The mean accuracy are evaluated to estimate the performance of RDNN model in predicting and distinguishing rock or mine in underwater acoustics using sonar dataset. Fig. 6 demonstrates validation accuracy as 85.7% accuracy as 100% loss as 0.04 validation loss as 0.35 in prediction and distinguishing underwater objects like mine or rocks using sonar dataset using k-fold cross validation with 50 epochs for model 1.

Fig. 7 demonstrates validation accuracy of 90.48% accuracy as 98.2% loss as 0.13 validation loss as 0.287 in prediction and distinguishing underwater objects like mine or rocks using sonar dataset using k-fold cross validation with 50 epochs for model 2.

Fig. 8 demonstrates validation accuracy as 85.7% accuracy as 100% loss as 0.13 validation loss as 0.518 in prediction and distinguishing underwater objects like mine or rocks using sonar dataset using k-fold cross validation with 50 epochs for model 3.

Fig. 9 demonstrates validation accuracy as 92.8% accuracy as 100% loss as 0.33 validation loss as 0.39 in prediction and distinguishing underwater objects like mine or rocks using sonar dataset for novel proposed RDNN model using 50 epochs.

7.2. Overall comparison

Here, model 1, 2 and 3 are the pre trained model with splitting of training and testing data including prediction as well as classifi-

Table 3  
Proposed RDNN model for Sonar Abnormal dataset.

Layer	Layer size	Input Shape	Activation	Optimizer
Model1	Dense(100)	60	ReLU	Adam
Model2	Dense(30)	60	ReLU	Adam
Model3	Dense(60),Dense(60)	60	ReLU	Adam
Proposed RDNN Model	Dense(60)	60	ReLU	Adam

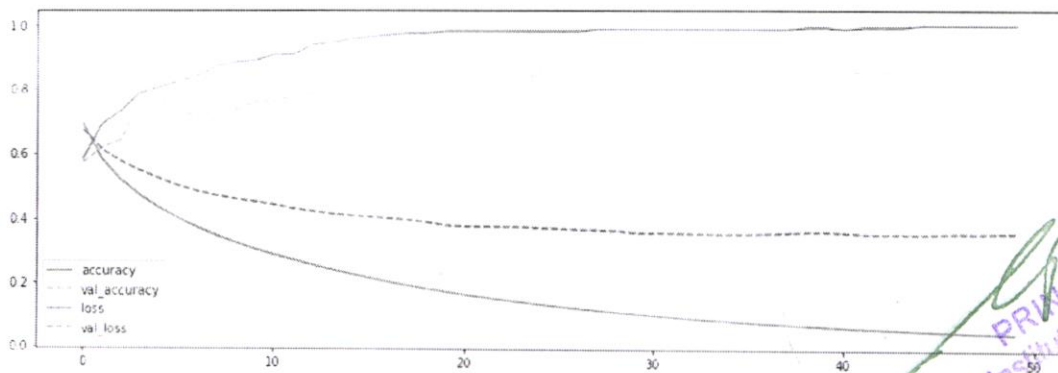


Fig. 6. Estimating metrics such as accuracy, validation accuracy, loss and validation loss for model 1.

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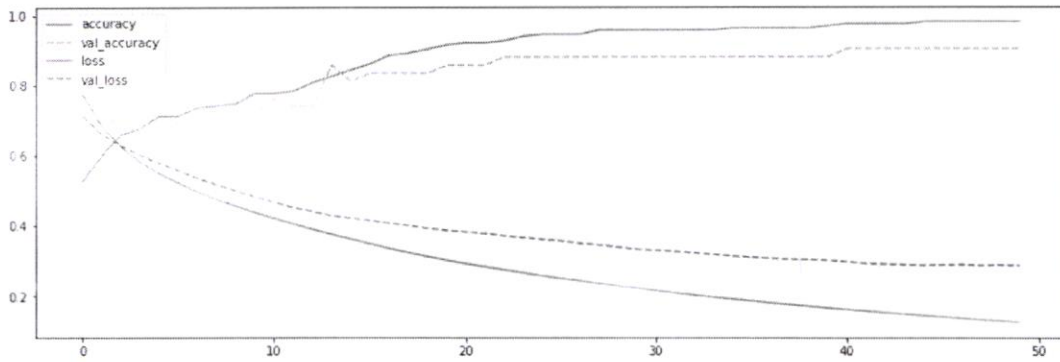


Fig. 7. Estimating metrics such as accuracy, validation accuracy, loss and validation loss for model2.

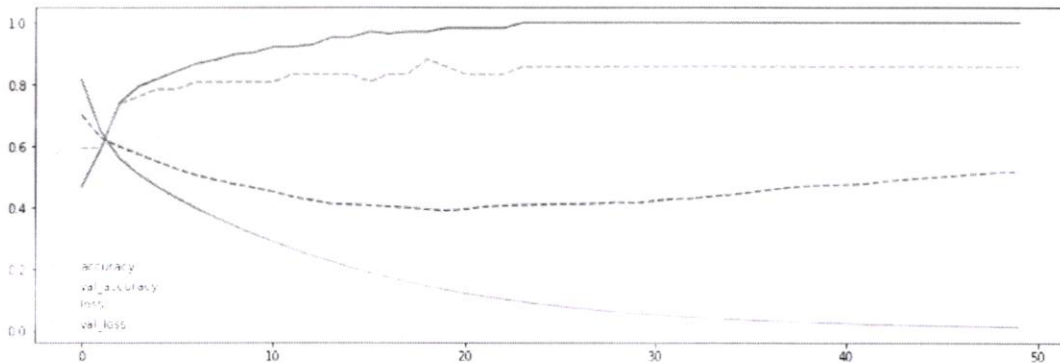


Fig. 8. Estimating metrics such as accuracy, validation accuracy, loss and validation loss for model3.

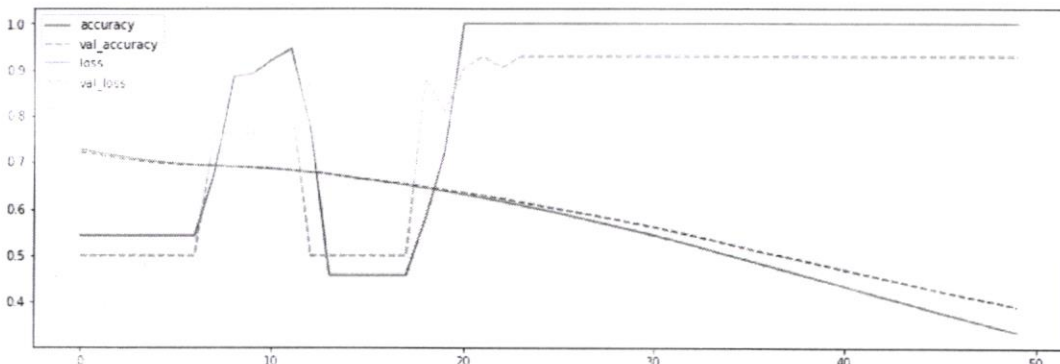


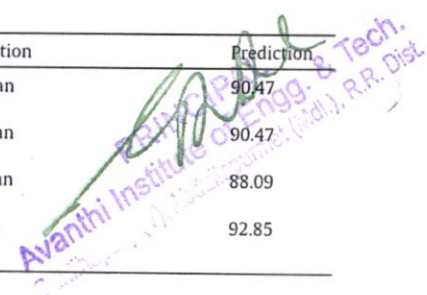
Fig. 9. Estimating metrics such as accuracy, validation accuracy, loss and validation loss for RDNN proposed model.

cation of underground objects as mines or rocks. While comparing with existing models, this RDNN model generates better mean accuracy as 100% with 0% Standard Deviation in prediction and

also classification of objects achieves 92.85%. The overall comparison on prediction and classifying rocks or mines using sonar dataset is described in Table 4.

Table 4  
Overall comparison among models.

Model	Training	Testing	K-fold Evaluation	Prediction
Model1	100	85.7	88.57 for mean 9.1% SD	90.47
Model2	98.84	90.48	82.57 for mean 7.63 for SD	90.47
Model3	100	85.7	84.41 for mean 9.95 for SD	88.09
Proposed Model(RDNN)	100	92.86	100 for mean 0.00 for SD	92.85





## 8. Conclusion

In this proposed work, RDNN classifier model have been applied for metal classifying namely rock or mine in underwater acoustics through statistical analysis in deep learning based neural networks using sonar datasets. Sonar technology combined with an unmanned autonomous vehicle can be used to remove signals in underwater communication. But, here Rock/mine detection neural network approach reveals enhanced outcomes by achieving mean accuracy of 100% with 0% SD using k-fold evaluation and sonar prediction achieves 92.85% to enhance the model performance. To achieve more prediction accuracy, the hyper parameters has to be done in sonar dataset for better classification of objects like mine/rocks in underwater acoustics.

## 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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# EXPERIMENTATION AND ANALYSIS OF NATURAL FIBER REINFORCED POLYMER MATRIX COMPOSITE

**Dr Ramesh Babu Yeluri**

Associate Professor, Department of Mechanical Engineering  
Avanhi Institute of Engineering and Technology, Hyderabad, Telangana, India-501512,  
[yrameshbabu321@gmail.com](mailto:yrameshbabu321@gmail.com)

**Kolla Sumanth**

Assistant Professor, MED, Avanhi Institute of Engineering and Technology,  
Hyderabad, Telangana, India-501512

**Mallikanti Venkateswarlu**

Assistant Professor, MED,  
Avanhi Institute of Engineering and Technology, Hyderabad, Telangana, India-501512

**G Vinod Kumar**

Assistant Professor, MED,  
Avanhi Institute of Engineering and Technology, Hyderabad, Telangana, India-501512

**Abstract** - The high cost of synthetic fibers such as glass, carbon, etc, results in high cost of production and products derived from these materials which has necessitated alternative means of materials development. This has also informed the utilization of locally available bamboo fiber for composite materials development. Natural fiber has emerged as a renewable and cheaper substitute to synthetic materials such as glass, carbon and afraid, which are used as reinforcements. In this work, the objective was to develop, investigate and analyze the mechanical properties of a composite material using bamboo fiber and jute fiber sandwich type composite. The long bamboo fiber was extracted using chemical digestion and maceration methods. The fabrication of the composite was carried out using epoxy resin as the matrix and the bamboo fiber and jute fiber as reinforcement. Tests were carried out to determine the mechanical properties such as tensile, hardness strengths. The results were studied and compared with the composite of bamboo fiber with epoxy resin and it process that the material developed can be used in structural applications with strong dependence on its mechanical properties

**Index Terms** - composites, types of fiber, reinforcement materials, and mechanical properties.

## INTRODUCTION

Composites are combination of two materials in which one of the material act as Reinforcement and the other as matrix. The reinforcement may be in the form of fiber woven cloth or in particulate form which may be embedded in the other material called matrix. The reinforcement material may be of ceramic, polymer or metallic and matrix material may be of polymer, metallic or ceramic in nature. Composites are used, as the mechanical properties of the composite as a whole is superior to that of the individual components.

Composites are able to meet diverse design requirements with appreciable weight saving. The high strength to weight ratio is an important aspect to be considered making these materials for automotive applications,

Epoxy resin is one of the excellent thermosetting polymer resins. The cost-to- performance ratio of epoxy resin is outstanding. Epoxy resins possess characteristics such as high strength low creep, good adhesion to



most of the substrate materials, low shrinkage during curing and low viscosity. Due to these reasons epoxy resins are significantly used as matrix material in many applications such as aerospace, structural applications, ship building, and automobile industries and so on. The tensile strength and the tensile modulus of Glass fiber/Epoxy composite increases in fiber loading and the addition of Nano-clay particles to the Glass fiber/Epoxy composite increase the tensile strength and the tensile.

- **Types of Composites:** The 3 Basic Types of Composites are generally identified as Particle-Reinforced (Aggregates), Fiber-Reinforced (Continuous Fiber or Chopped Fiber), Natural Composites (Examples: Wood and Bone).

#### NANO COMPOSITE

Composite is a multiphase solid material where one of the phases has one, two or three dimensions of less than 100 nanometers (nm), or structures having nano-scale repeat distances between the different phases that make up the material. In the broadest sense this definition can include porous media, colloids, gels and copolymers, but is more usually taken to mean the solid combination of a bulk matrix and nano-dimensional phase(s) differing in properties due to dissimilarities in structure and chemistry. The mechanical, electrical, thermal, optical, electrochemical, catalytic properties of the nano-composite will differ markedly from that of the component materials. Size limits for these effects have been proposed, <5 nm for catalytic activity, <20 nm for making a hard magnetic material soft, <50 nm for refractive index changes, and <100 nm for achieving super para magnetism, mechanical strengthening or restricting matrix dislocation movement.

Nano composites are found in nature, for example in the structure of the abalone shell and bone. The use of nano particle-rich materials long predates the understanding of the physical and chemical nature of these materials. In mechanical terms, nano composites differ from conventional composite materials due to the exceptionally high surface to volume ratio of the reinforcing phase and/or its exceptionally high aspect ratio. The reinforcing material can be made up of particles (e.g. minerals), sheets (e.g. exfoliated clay stacks) or fibers (e.g. carbon nano-tubes or electro spun fibers).

The area of the interface between the matrix and reinforcement phase(s) is typically an order of magnitude greater than for conventional composite materials. The matrix material properties are significantly affected in the vicinity of there inforcement.

Other kinds of Nano particulates may result in enhanced optical properties, dielectric properties, heat resistance or mechanical properties such as stiffness, strength and resistance to wear and damage. In general, the nano reinforcement is dispersed into the matrix during processing. The percentage by weight (called mass fraction) of the Nano particulates introduced can remain very low (on the order of 0.5% to 5%) due to the low filler percolation threshold, especially for the most commonly used non-spherical, high aspect ratio fillers (e.g. nanometer-thin platelets, such as clays, or nanometer-diameter cylinders, such as carbon nano-tubes). The orientation and arrangement of asymmetric nano-particles, thermal property mismatch at the interface, interface density per unit volume of nano composite, and polydispersity of nano particles significantly affect the effective thermal conductivity of nano composites.

Nano composites are further classified into 3-types are Ceramic-matrix nano composites, Metal-matrix nano composites, Polymer-matrix nano composites.

- **PMC manufacturing processes:** They are lot of well-established manufacturing processes which are available to produce components with polymer composite materials few of them are Wet lay-up/hand lay-up method, Spray up Molding, Resin Transfer Molding, Filament winding Method

In the present work epoxy resin is chosen as matrix, E-glass fiber, Wollastonite / Silicon is chosen as reinforcement. Room temperature cured Epoxy System filled with glass Fiber and Wollastonite / Silicon were synthesized by mechanical shear mixer, and then the mixture of epoxy and Wollastonite / Silicon is blended.

Mechanical properties like Flexural strength, Tensile strength of the micro hybrid composite are studied by UTM (Universal Testing Machine). The images of the fractured structures are taken using Scanning



Electron Microscope. The observation established good miscibility of Epoxy and Homogenous dispersion of silicon / Wollastonite in the matrix.

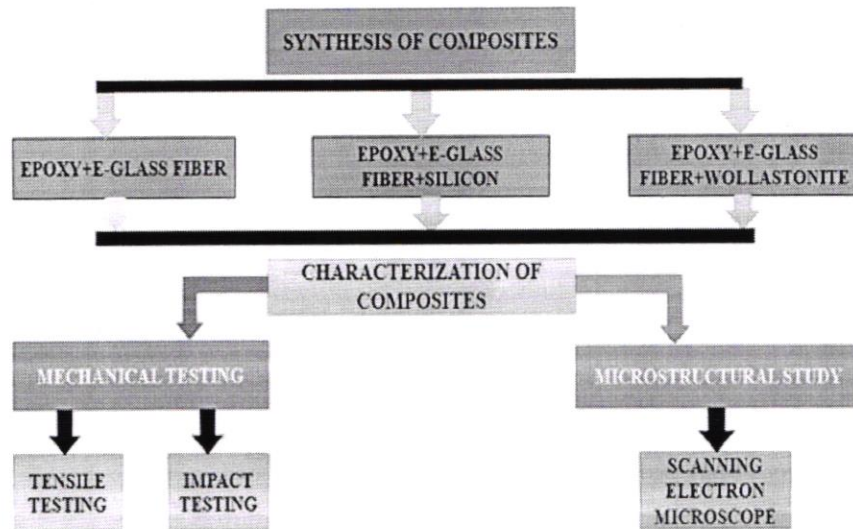


Figure 1  
OVERVIEW OF THE WORK

## PREPARATION OF COMPOSITES

### 4.1 PROCEDURE FOR PREPARING TEST SAMPLES:

The present problem has been formulated to implement different test to the structures so as to establish facts related to the flexural behavior of glass epoxy. the experimental work consist of preparing test samples, the samples are prepared made of e-glass woven fabric epoxy laminates made of various orientation sequences have been prepared as per ASTM D

- **Design and Fabrication of Metallic Mould:** The pressure to be applied to consolidate laminate after impregnating resin should be applied by compression as the required specimen are to be manufactured as per ASTM specifications. The mould is made of MS material.
- **Pressure plate:** Pressure plate is made of the MS plate with surface finish ensuring perfect flatness 5mm thickness is maintain to meet the requirement to withstand the compressive force. This particular method of making laminate to ensure that the thickness of the laminates will be uniform with constant volume fraction of matrix and reinforcement.

In the present work composite templates are prepared as per the required dimensions. According to the required dimensions the glass fiber mat has been cut, by making use of different mechanical equipment and measuring equipment's. And then excess material is removed on the surface of the mould and poly vinyl alcohol viscous liquid is applied on the surface of the mould uniformly and left for drying about 15 minutes. This liquid creates an invisible film which works as impervious layer prevents sticking to the mould surface.

Spacers are placed on the borders of the mould to get exact thickness of the laminate and uniform distribution of resin. Each layer of the fiber is kept in the mould and applying resin on to it, then the rolling is done by roller to distribute the resin evenly on to the layers. After completion of distribution of resin on to the layers amylar film is placed to get the surface finish, while after a pressure plate is placed on the layers by that the uniform load is distributed and exact thickness occurs by the spacers. To get the required laminate it has been taken 24 hours while after remove the pressure plate and mylar film and removes the laminate from the mould. The same processes have done for various different layers of



sandwich composite laminates. And finally cut the laminates by using cutter machine in to a required ASTM standard dimension.

The excess sides of the laminate which are formed because of pressure plate during the fabrication is chopped out and according to the required dimension i.e. ASTM638 standards, the sample pieces are taken out with the help of wood cutting machine as shown below.

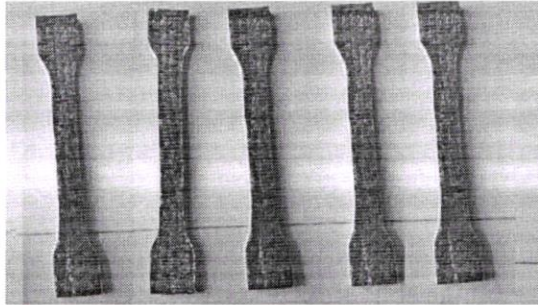


Figure 2

WORK CUTTING THE LAMINATE IN TO A REQUIRED DIMENSION

### DATA EXPERIMENTATION AND ANALYSIS

There are two stages in the process of familiarizing with plastics. The first is rather general and involves an introduction to the unique molecular structures of polymers, their physical and transitions which have a marked influence on their behaviour. The study of specific properties of plastics reveals their application. Besides the relative ease of their moulding and fabrication, many plastics offer range of important advantages in terms of high strength/weight ratio, toughness, corrosion-resistance, wear-resistance, frictional co-efficient, tensile, flexural, compression, impact strength and chemical resistance. Due to these qualities, plastics are acceptable as materials for wide variety of engineering applications. It is important therefore, that an engineer be aware of the performance characteristics and significant properties of plastics. Plastics are generally dealt with, in respect of broad categories of properties, namely, mechanical, thermal and chemical. An important facet of materials development and proper materials selection is testing and standardization. This chapter represents schematically (in simplified form) a number of standard test methods for plastics, highlighting the principles of the mechanical tests and the properties measured with them. List of salient features of testing has been stated below.

- To assess numerically the fundamental mechanical properties of ductility, malleability, resilience, stress-strain and visco elastic behaviour.
- To determine data (i.e. force deformation or stress values) to draw up sets of specifications, upon which the engineer can depend for his design.
- To determine the surface or subsurface defects in raw materials or processed parts.
- To check chemical composition.
- To determine the stability of a materials for particular applications.

The most common testing machine used in tensile testing is the UTM. This type of machine has two crossheads; one is adjusted for the length of the specimen and the other is driven to apply tension to the test specimen.

The machine must have the proper capabilities for the test specimen being tested. There are three main parameters: force capacity, speed, and precision and accuracy. Force capacity refers to the fact that the machine must be able to generate enough force to fracture the specimen. The machine must be able to apply the force quickly or slowly enough to properly mimic the actual application. Finally, the machine must be able to accurately and precisely measure the gage length and forces applied; for instance, a large machine

that is designed to measure long elongations may not work with a brittle material that experiences short elongations prior to fracturing.

Alignment of the test specimen in the testing machine is critical, because if the specimen is misaligned, either at an angle or offset to one side, the machine will exert bending force on the specimen. This is especially bad for brittle materials, because it will dramatically skew the results. This situation can be minimized by using spherical seats between the grips and the test machine. A misalignment is indicated when running the test if the initial portion of the stress-strain curve is curved and not linear.

The strain measurements are most commonly measured with an extensometer, but gauges are also frequently used on small test specimen or when Poisson's is being measured. Newer test machines have digital time, force, and elongation measurement systems consisting of electronic sensors connected to a data collection device (often a computer) and software to manipulate and output the data.

The test process involves placing the test specimen in the testing machine and applying tension to it until it fracture. During the application of tension, the elongation of the gauge section is recorded against the applied force. The data is manipulated so that it is not specific to the geometry of the test sample.

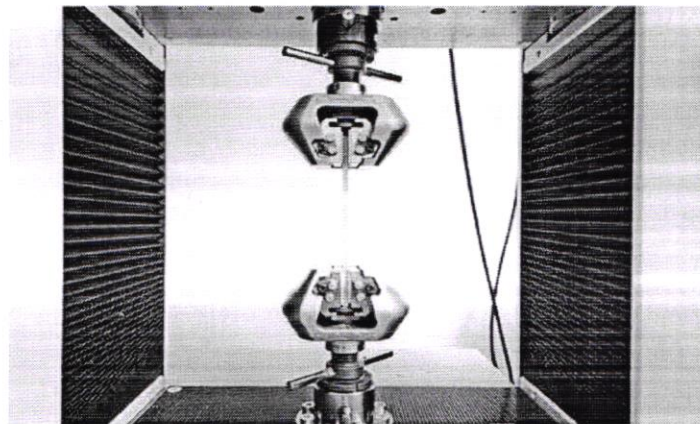


Figure 3

LAMINATE IS FIXED BETWEEN JAWS FOR TENSILE LOADING

### RESULTS AND DISCUSSIONS

The Tensile test (UTM), hardness test has been done and the results obtained were furnished in the form of Data Sheets and the output screen shots and the results were published by performing these testing in the KELVIN LAB Hyderabad are as follows:

TABLE I

TENSILE AND ELONGATION TEST REPORT			
SAMPLE-01			
Test Sr. No.	3813	Test Date	16/10/2021
		Test Time	3:15:09 PM
Customer Name	AVIH HYD		
Customer Code	BAMBOO+		
<b>Sample Details:</b>			
Specimen code	JF-01		
Ref. Standard	ASTM D638		
Grip Length	55	Guage Length	65
Sample Width	11.31	Sample Thickness	5.67
Speed of testing (mm/min): 5			

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TABLE II

Obtained Results	Value	Unit
Area	64.1277	mm <sup>2</sup>
Yield Force	837.37	N
Yield Elongation	3.13	Mm
Break Force	926.3	N
Break Elongation	3.34	Mm
Tensile Strength at Yield	13.06	N/mm <sup>2</sup>
Tensile Strength at Break	14.44	N/mm <sup>2</sup>
Tensile Strength at Max	14.48	N/mm <sup>2</sup>
% Elongation	5.14	%
Max Force	928.69	N
Max Elongation	3.34	Mm
Modulus of Elasticity	330.71	N/mm <sup>2</sup>

### CONCLUSION

Sandwich type composite with bamboo and jute fiber were prepared by Hand Lay Up Techniques and characterized by mechanical tests (tensile Test, hardness test). The test results of the sandwich type composite are compared with bamboo fiber composite laminate.

The tensile test results of composite with bamboo improved with addition bamboo and jute sandwich type composite. This test was performed by universal testing machine; it was found that tensile strength addition jute and bamboo shown very good results compare to the bamboo fiber with epoxy resin.

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# Convolution Neural Network (CNN) Based Computerized Classification of Adulterated Fruits with SIFT and Bag of words (BOW)

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##### Abstract:

Most of the minerals and vitamins can be obtained by humans with the intake of fruits. Fruits are very rich in fibre and health-boosting oxidants can be provided by them. With a daily routine of eating fruits, a human can avoid the risk of diabetes, cancer, heart diseases. But these days fruits are being adulterated for the [1] economic and technical benefits. Adulteration is a kind of illegal act of mixing some harmful chemicals into the fruits in order to increase profits. Eating adulterated fruits can lead to chronic diseases diarrhoea, cancer, liver disorder, and heart diseases. Adulteration is a serious threat to the health of humans. Even though the adulteration of fruits is banned, many traders are applying adulteration in the thirst of more profits. It is very difficult to identify the fruits which undergone adulteration with naked eyes. Image processing techniques can be applied for detecting the adulterated fruits. In this paper, A Convolution Neural Network (CNN) with K-means clustering and Bag of words based technique is proposed to detect the fruits which undergone adulteration. Accuracy of 0.94 is achieved with the proposed system.

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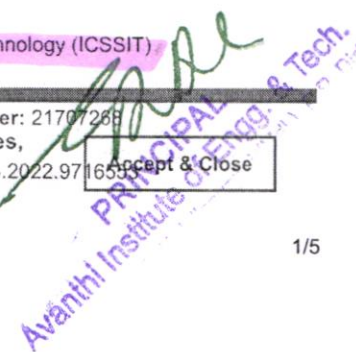
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L Shiva Shankar

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

Alla Sravani

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

T Shravan Kumar

Department of CSE, Spoorthy Engineering College, Ranga Reddy, Telangana, India

S. Rajender

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

CMAK Zeelan Basha

Department of CSE, Koneru Lakshmaiah Education Foundation, Guntur, AP, India

☰ Contents

I. Introduction

According to the reports, in the entire world there are 2000 types of fruits are available. Fruits are very rich in fibre. Fruits are the main source of minerals and vitamins. Health boosting anti oxidants can be produced by the fruits, which makes a human to fight with many kinds of diseases. [2] An apple daily keeps doctor away which makes an human to be healthy. But these days, thee fruits are being adulterated. Almost every food item in these days is getting adulterated. Adulteration [3] is a process of mixing harmful, poor quality, substandard fruits to make fruits look more shining and fresh. There are few fruit business people who are adulterating the fruits in the thirst for more money. The intention of fruits intake is for the nourishment of health which [4] is gained through them. Stages involved in fruits nourishment are production, then processing, and at last distribution of nourishment. Fruits are remained improved in terms of appearance, their texture, and hence the concept of adulteration came into practice. In the process of food adulteration, a fruit's quality gets reduced with the addition of chemicals to the fruits. Due to the addition of chemicals the appearance of fruits gets improved and hence these fruits can attract many customers to buy them and with this fruits can be sold for a huge amount. But the fact is with the consumption of adulteration fruits can cause serious health issues like cancer, heart-related diseases, and many diseases. Formalin is the chemical mostly used for the adulteration of fruits and the prevention of dead bodies from decaying can be done with the same chemical. The above reasons strongly suggest avoiding the fruit adulteration. Though the governments of countries are trying to restrict the fruit adulteration, this is not happening to the full extent. Image processing techniques can be applied to avoid this and the proposed model is shown in fig. 1. Fig. 1

Proposed model

Authors

L Shiva Shankar

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

Alla Sravani

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

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 Guntur, Andhra Pradesh (M), R.R.

S. Rajender

Department of CSE, Avanathi Institute of Engineering and Technology, Ranga Reddy, Telangana, India

CMAK Zeelan Basha

Department of CSE, Koneru Lakshmaiah Education Foundation, Guntur, AP, India

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