TECHNICAL MAGAZINE

Department of
Electronics & Communication Engineering

A.Y. 2024-25






VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Siddhartha Academy of General & Technical Education)

Estd. 1977

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Department Vision

To produce globally competitive and socially sensitized engineering graduates and to bring out quality research in the frontier areas of Electronics and Communication Engineering.

Department Mission

To provide quality and contemporary education in the domain of Electronics and Communication Engineering through periodically updated curriculum, best of breed laboratory facilities, collaborative ventures with the industries and effective teaching-learning process.

To pursue research and new technologies in Electronics and Communication Engineering and related disciplines in order to serve the needs of the society, industry, government and scientific community.

PROGRAM OUTCOMES

Program outcomes examine what a program or process is to do, achieve, or accomplish for its own improvement and/or in support of institutional or divisional goals: generally numbers, needs, or satisfaction driven. They can address quality, quantity, fiscal sustainability, facilities and infrastructure, or growth.

After completion of the Electronics & Communication Engineering programme, the students will be able to have:

PO1: Engineering knowledge: An ability to apply k nowledge of mathematics, science, fundamentals of engineering to solve electronics and communication engineering problems.

PO2: Problem analysis: An ability to identify, formulate and analyze electronics and communication systems reaching substantiated conclusions using the first principles of mathematics and engineering sciences

PO3: Design/development of solutions: An ability to design solutions to electronics and communication systems to meet the specified needs.

PO4: Conduct investigations of complex problems: An ability to design and perform experiments of complex electronic circuits and systems, analyze and interpret data to provide valid conclusions

PO5: Modern tool usage: An ability to learn, select and apply appropriate techniques, resources and modern engineering tools for modeling complex engineering systems.

PO6: The engineer and society: Knowledge of contemporary issues to assess the societal responsibilities relevant to the professional practice.

PO7: Environment and sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development

PO8: Ethics: An understanding of professional and ethical responsibilities and norms of engineering practice.

PO9: Individual and team work: An ability to function effectively as an individual, and as a member in diverse teams and in multidisciplinary settings.

PO10: Communication: An ability to communicate effectively with engineering community and with society at large.

PO11: Project management and finance: An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to manage projects.

PO12: Life-Long Learning: An ability to recognize the need for, and engage in independent and life-long learning in the broadest context of technological change.

ABOUT THE DEPARTMENT

Established in the year 1977, the department of ECE offers B. Tech Programme in Electronics & Communication Engineering with an intake of 240 and two M. Tech Programme in VLSI Design & Embedded Systems . The department has been accredited by NBA of AICTE four times. More than 40% faculties are with Ph.D. qualification. Led by a team of highly qualified experienced faculty with specializations such as RF &Microwave, Antennas, Digital Signal Processing, Wireless Communications, Digital Image Processing, VLSI and Embedded systems. The department provides excellent academic and research environment to the UG, PG and research students. A Centre of Excellence(TIFAC CORE- DST) in Telematics was established in the year 2009 with the state of the art facilities. Having successfully completed many research projects funded by UGC, AICTE, DST, NRSC-ISRO DLRL & ANURAG-DRDO etc., it is also recognized by JNTUK as "**Research Center.**" Faculty members extend guidance to research scholars, produce Ph.D.'s and publish their findings in peer reviewed national and international journals and conferences.

Message by HoD

As a part of nurturing the students with qualities like teamwork, ***technical*** skills and a glimpse of the competitive world of ***engineering*** and ***technology we are encouraging students to publish articles in the frontier areas of electronics and communication engineering.***

I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind.I would like to thank the editorial team members for bringing out this magazine regularly.. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

Dr. Venkata Rao Dhulipalla

Technical Magazine 2024-25

DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

Department of Electronics & Communication Engineering

Editorial Board	ISSUE	Academic Year
Dr D. Venkata Rao, Dr. K V Prasad	APRIL- JUNE	2024-2025

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DESIGN OF UWB MIMO ANTENNA WITH ENHANCED ISOLATION FOR WEARABLE APPLICATIONS

Kora Madhusudhan Rao, Kurakula Jaya Naga Sai Manikanta, Guttikonda Manideep

Introduction:

Multiple antennas at the transmitter and receiver introduces signaling degrees of freedom that were absent in SISO systems. This is referred to as the spatial degree of freedom. The spatial degrees of freedom can either be exploited for "diversity" or "multiplexing" or a combination of the two. In simple terms, diversity means redundancy. A simple example of diversity is multiple antennas trying to receive the same signal. The received signal on the two antennas is corrupted by noise that is uncorrelated between antennas, therefore by combining the two signals a better-quality signal can be reconstructed. The analogy here is that by looking at the same object from two different vantage points, richer information on the object can be obtained. Diversity can also be achieved using multiple transmit antennas by using *Space Time Coding* (STC) techniques.

The second major MIMO technique is *Spatial Multiplexing*. Spatial multiplexing enables a MIMO transmitter/receiver pair to increase its throughput without increasing bandwidth usage or transmit power. Multiplexing increases throughput linearly with the number of transmit or receive antennas, whichever is lower. The transmitter sends signals carrying different bit streams from each of its antennas. Each receiver antenna receives a linear combination of the transmitted signals. The wireless channel is a matrix that is a function of transmit/receive antenna array geometry and the scatters/reflectors present in the environment.

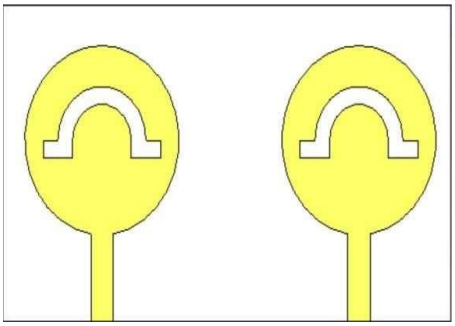


Fig.4.1 Front part

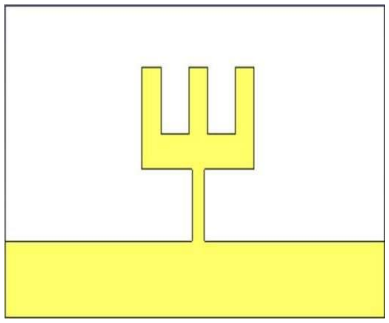


Fig.4.2 Back part

When a MIMO transmitter/receiver pair operates in an environment rich in scattering, the channel matrix becomes invertible, thus enabling the receiver to decode all the different signals transmitted from the various transmit antenna apertures, resulting in multiplexing gain. There is a trade-off between the amount of diversity and multiplexing gain a MIMO system can provide.

S_{11}/S_{22}: The most commonly quoted parameter in regards to antennas is S11. S11 represents how much power is reflected from the antenna, and hence is known as the reflection coefficient (sometimes written as gamma: or return loss. If S11=0 dB, then all the power is reflected from the antenna and nothing is radiated. If S11=-10 dB, this implies that if 3 dB of power is delivered to the antenna, -7 dB is the reflected power. The remainder of the power was "accepted by" or delivered. **S_{12}/S_{21}:** S21 represents the power transferred from Port 1 to Port 2. In general, SNM represents the power transferred from Port M to Port N in a multi-port network.

Fig:1. S_{11} plot

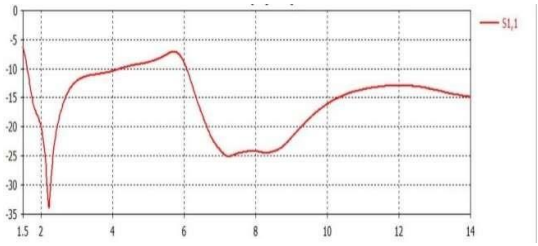
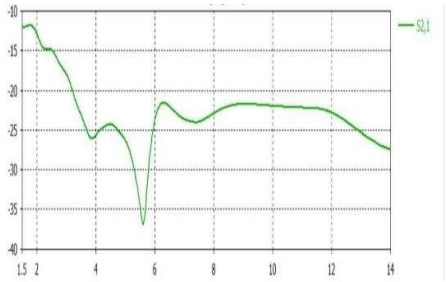


Fig:2. S_{21} plot



DG (Directivity Gain): DG is a measure of the gain of an antenna compared to an ideal isotropic radiator. It indicates how well an antenna focuses its radiation in a particular direction. A higher DG value suggests that the antenna is more effective at concentrating its radiation in a specific direction, which can be useful in applications where directional coverage is desired.

ECC: The ECC is a key element for assessing the performance of the diversity in a MIMO antenna system. In regard to assess the competency of the pro-posed antenna model, it must approve that the ECC is relatively small, ideally under 0.5, suggesting the model to provide a strong diversity

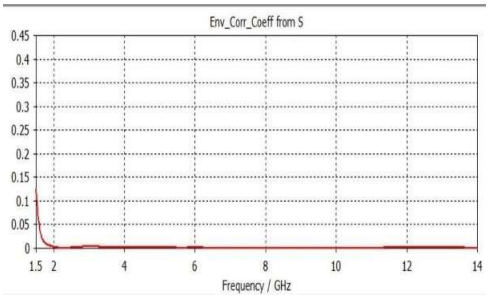


Fig:3. ECC plot

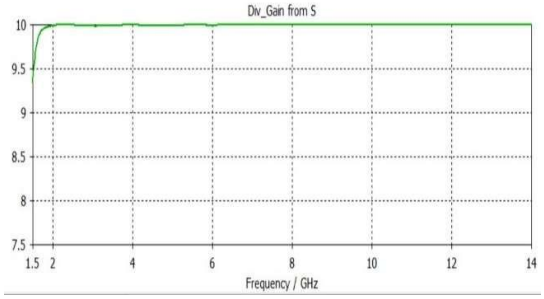


Fig:4. DG plot

VSWR: It stands for Voltage Standing Wave Ratio, and is also referred to as Standing Wave Ratio (SWR). VSWR is a function of the reflection coefficient, which describes the power reflected from the antenna. If the reflection coefficient is given by s11 or reflection coefficient or return loss.

FAR FIELD: The field, which is far from the antenna, is called as **far-field**. It is also called as **radiation field**, as the radiation effect is high in this area.

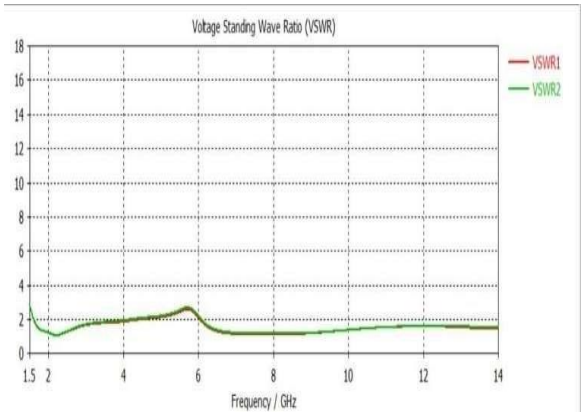


Fig:5VSWR plot

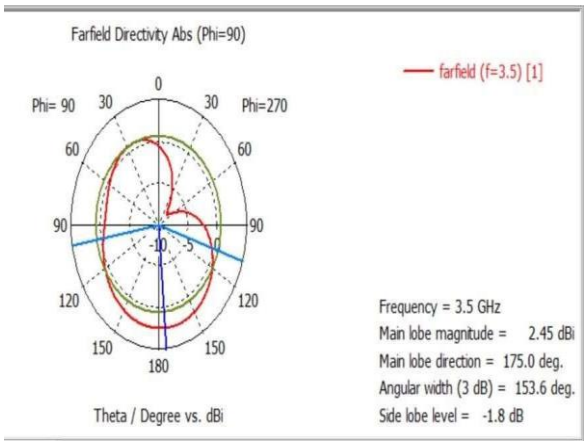


Fig :6 Far Fields

SURFACE CURRENTS: Surface current is a current flowing in the antenna, and has units of charge per unit time per unit length. A two-element wearable UWB-MIMO antenna with inverted E-shaped stub as a decoupling network is proposed. The decoupling structure provides an isolation enhancement of -34 dB in this communication. The proposed design is fabricated on a wearable jean's cloth, acting as a substrate, and a inverted E-shaped stub, mounted on the backside of antenna and attached to the partial ground for enhancing the port isolation. The proposed UWB- MIMO is simulated with dimensions 50 × 35 x 1.59 mm^3 and covers the entire UWB frequency. The diversity gain (DG) of the proposed design is greater than 9.9, with envelope correlation coefficient (ECC) less than 0.05 across the entire band. The results of the SAR provides that the antenna performs satisfactorily and is suitable for wearable applications. Simulation and fabricated model of the proposed antenna is a worthy candidate applicable for UWB MIMO applications.

Fig:7 Surface currents

EXPLAINABLE AI FOR CNN-LSTM BASED EMBRYO SELECTION FOR IVF TREATMENT

N. Madhavi, T. Bharadwaj

Introduction:

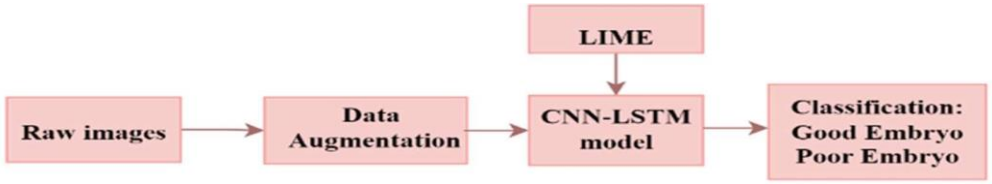
Infertility is a frequent reproductive health issue impacting millions globally. According to WHO, 1 in every 4 couples ex. To tackle this, assisted reproduction techniques (ART) were formulated. In vitro fertilization (IVF) emerges as a prominent method of ART. Multiple studies have aimed to create automated grading systems, implementing methos such as CNNs to overcome the limitations associated with manual grading of embryos.

Abstract:

Infertility has a considerable impact on individuals' quality of life, affecting them socially and psychologically, with projections indicating a rise in the upcoming years. In vitro fertilization (IVF) is among the primary techniques employed to address the rising problem of low fertility. In this study, we introduce an explainable artificial intelligence (XAI) framework for classifying embryos, employing a fusion of convolutional neural network (CNN) and long short-term memory (LSTM) architecture, referred to as CNN LSTM. Utilizing deep learning, our model achieves high accuracy in embryo classification while maintaining interpretability through XAI. The model is designed as a binary classifier, distinguishing between two classes: good and poor embryos. Notably, our proposed CNN-LSTM model achieves a notable accuracy of 90% before augmentation and an impressive 97.7% after augmentation, highlighting its potential for clinical application.

Methodology:

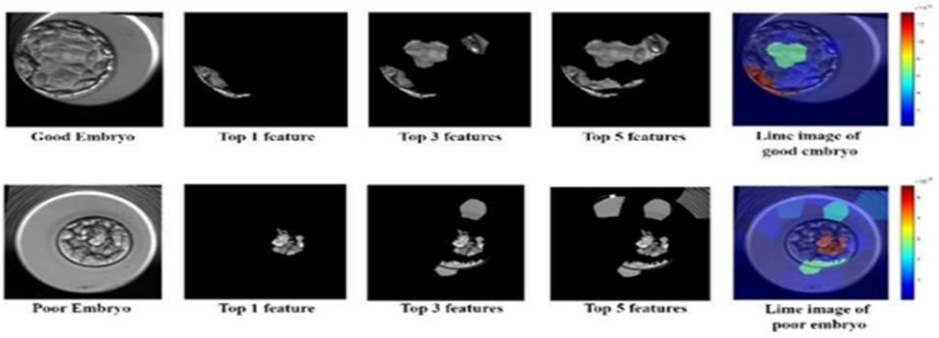
The proposed CNN-LSTM model comprises 13 convolution layers and 128 hidden units of LSTM. Since the dataset consists of less number od samples, we employed image augmentation techniques such as rotation & reflection. such as rotation and reflection. Subsequently, the augmented images were fed into the model and used for training. To explain the transparency of the proposed CNN- LSTM model, especially for embryo classification, an innovative application of local interpretable model-agnostic explanation (LIME) for the interpretability of relevant features is employed.



Results:
The proposed CNN-LSTM model demonstrated remarkable accuracy of 90% before augmentation and notable 97.7% accuracy after augmentation as shown in table below.

	Accuracy	Precision	Recall	F1-score	Sensitivity
Before augmentation	90	83.3	100	90.9	100
After augmentation	97.7	100	95.4	97.6	95.4

XAI techniques indicates the most important regions that are crucial for the recognition of the classes. Fig below represents the visual representations of the embryos.



Conclusions:
This study highlights the importance of accurate and timely assessment in addressing challenges encountered in IVF treatment. . Utilizing embryo images as an input, the CNN-LSTM model proposed in this study was trained on the augmented images derived from the raw embryo images for embryo grading. LIME allows for visualizing the model's decision-making procedure. This integrated approach holds the potential for advancing embryo classification, enabling more informed decisions in medical interventions.

DESIGN AND ANALYSIS OF MICROSTRIP BANDPASS FILTER USING HAIRPIN STRUCTURE FOR SATELLITE APPLICATIONS.

Pathan Raziya, Majji Harshitha, Bole Tejaswi

Introduction:

The hair pin line filter, similar to the half-wave parallel coupled line filter, is popular in strip line or microstrip circuits due to its ground less configuration. Acting as a folded version of the parallel coupled line filter, it utilizes U-shaped resonator structures to reduce size and simplify design.

ABSTRACT:

The study introduces a microstrip Hair pin bandpass filter designed for 15GHz frequency with a bandwidth exceeding1GHz and return loss(S11) above-10dB. It's simulated using HFSS software and fabricated on an FR4 substrate. Dispersion parameters are measured with a vector network analyzer (VNA) for comparison. The achieved filter operates at 15GHz with a 2.6GHz band width and return loss around -27dB, suitable for satellite applications.

SOFTWARE USED:

The Simulation is carried out using HFSS software which stands for High Frequency Structured Simulator software which can be used for high frequency antennas and filters. VNA is used to measure the fabricated results.

SIMULATED DESIGN MODEL:

Fig 1: Hairpin Structure arrangement in HFSS

FABRICATED DESIGN:

Fig 2: Top and Bottom view of Fabricated design

RESULTS:

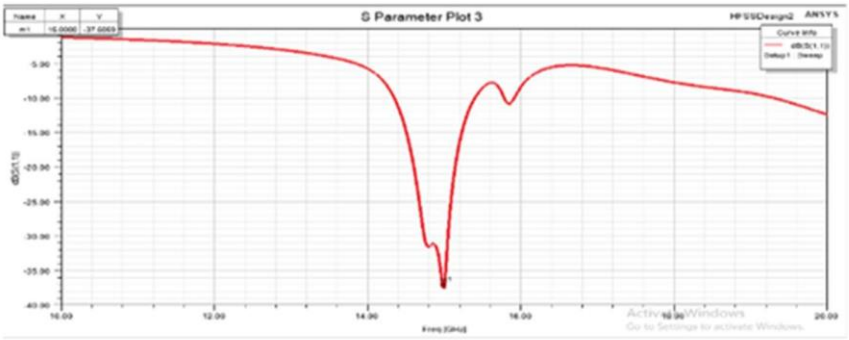


Fig 4: Return loss of simulated design

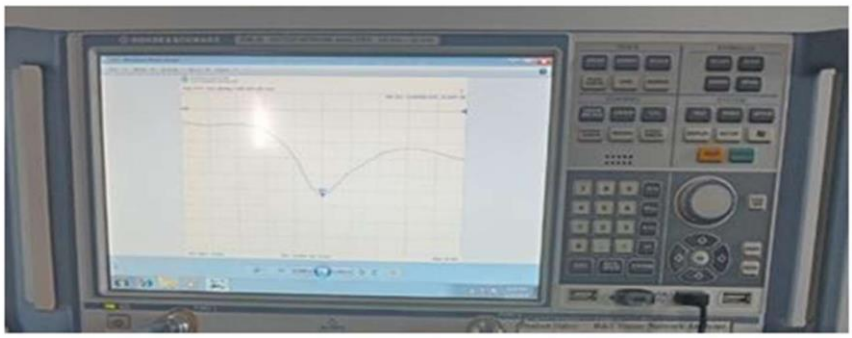


Fig 4:Return loss of Fabricated model

CONCLUSION:

The simulated design aims for a 15GHz center frequency with a 5th order and return loss exceeding 10dB. Results align well with criteria. Simulation yields a 15GHz filter with a return loss of37.59dB, consideringFR4 substrate (dielectricconstant:4.4, thickness: 1.6 mm). Fabrication may vary, resulting in a measured return loss of -27.6dB at 15GHz, with a model size of 1.7x1.6mm, suitable for satellite applications.

Parameters	Considerations	Simulated values	Fabricated values
LCF	14.5	14.35	14
UCF	15.5	15.49	16.6
Return loss	<-10	- 37.59	- 27.6
Size	-	1.7 x 1.6 mm	1.7 x 1.6 mm

LIST OF PUBLICATIONS:

Dr. M. Padmaja and presented the paper entitled “Design of Microwave Band Pass Filter Using Hairpin Structure” in the “2nd IEEE International Interdisciplinary Humanitarian Conference for Sustainability (IIHC-2023)" held on 3rd& 4thNov,2023 organized by Sri Venkateshwara College of Engineering, Bengaluru.

Efficient Approximate Adder Design for Image Processing Applications: Balancing Area, Power, and Delay

V. Sreeja, Ch. Tharani, A. Vivaswanth

Introduction:

Adders are crucial in digital circuit design, especially as demands for high performance computing rise with data-intensive applications. Efficiency is key, particularly in real-time processing, driving the need for optimized adder designs that balance accuracy with resource utilization. Traditional exact adders ensure precision but often at the cost of increased area, power, and delays. To overcome these challenges, engineers are turning to approximate computing, which offers benefits in area, power consumption, and speed, particularly suitable for data-intensive tasks tolerating minor errors. In image processing, where precision isn't always critical, we utilize approximate adders to enhance operations while maintaining imperceptible errors for a seamless user experience.

Abstract:

Adders play a fundamental role in arithmetic operations in digital circuit design, serving as the foundation for many computation activities. With the rising need for high-performance computing systems and the growth of data-intensive applications, there is a greater emphasis on improving the efficiency of adder designs. Traditional precise adders ensure accurate computation but often come at the expense of power, area consumption, and delay. This paper presents an efficient Approximate Full Adder (FA) targeting area and power optimization as primary objectives. The proposed circuit is simulated using Cadence tool with a 90nm technology node. Simulation results indicate that, on average, the proposed FA demonstrate a remarkable 41.6% reduction in area and a significant 53.3% decrease in power consumption compared to existing efficient approximate adder IFA. These improvements are achieved through innovative circuit optimizations tailored specifically for approximate computing. Furthermore, we demonstrate the practical applicability of the proposed FA design by integrating it into an image processing application. Keywords: Approximate computing, Area optimization, Power optimization, Computation performance, Image brightness application.

Proposed Approximate Full Adder:

Inputs			Exact Adder		Proposed Design	
a	**b**	**c**	sum	carry	sum	carry
0	**0**	**0**	0	0	0	0
0	**0**	**1**	1	0	1	0
0	**1**	**0**	1	0	1	0
0	**1**	**1**	0	1	1*	0*
1	**0**	**0**	1	0	1	1*
1	**0**	**1**	0	1	1*	1
1	**1**	**0**	0	1	1*	1
1	**1**	**1**	1	0	1	0

Table-3: Truth table of proposed adder
(* indicates the error)

The sum and the carry equations for our proposed adder are as follows,

sum = a + b + c

carry = a

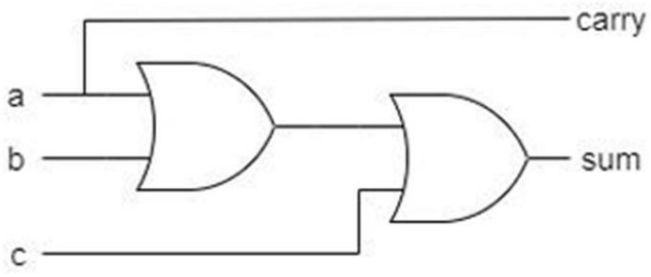


Fig.5 : Circuit diagram of the proposed adder

Results:

Design	Area (μm^2)	Power (nW)	Delay (ps)
Exact	45	4140.772	921
AFA	11	1293.748	459
MFA	18	2169.32	936
MBAFA	12	1102.721	519
IFA	12	1149.315	388
Proposed Design	7	514.63	392

Table-4: Area, Power and Delay of existing approximate full adders and proposed approximate adder.

Applications:

- Image Blending Application:

Input Image 1

Input Image 2

Blended Image

- Image Brightness Enhancement:

At C=50

At C=100

At C=128

- Image Smoothing Application:

Original Image

Smoothened Image

Conclusion:

The proposed Approximate Full Adder achieves an 84.4% decrease in area and a significant 87.5% drop in power consumption compared to accurate Full Adder. The integration of the proposed approximate full adder design into an image processing application not only enhances computational performance and reduces energy consumption but also results in significant improvements in image quality while maintaining comparable performance to other advanced adder designs. These advancements contribute to the evolution of approximate computing methodologies for image processing, offering substantial gains in area, power consumption, and delay for practical, low-power implementations.

UNDERWATER OPTICAL WIRELESS COMMUNICATION THROUGH CHANNEL OPTIMIZATION MODELLING AND ENCODING STRATEGIES

D. Akhila, Y. Lasya Sree, D. Virinchi

Introduction:

Underwater wireless information transfer is crucial for military, industry, and scientific applications, including surveillance, pollution monitoring, and oceanography. Underwater optical communication (UWOC) offers high data-rate and long-range solutions, yet faces challenges like scattering, absorption leading to signal loss and high bit error rates. This project explores advanced encoding and detection techniques, such as Alamouti and repetition coding, to improve resilience. Comparative analysis across link configurations (SISO, MIMO, STBC) aims to identify optimal setups for robust data transmission, focusing on minimizing bit error rates. The research aims to provide insights and tools to enhance UWOC performance despite underwater challenges.

Abstract:

The study tackles challenges in Underwater Optical Wireless Communication (UWOC) by addressing scattering, absorption, and turbulence issues. It proposes spatial diversity in UWOC links to mitigate turbulence induced fading, utilizing Multiple-Input Multiple Output (MIMO) systems with Orthogonal Frequency Division Multiplexing (OFDM) and On-Off Keying (OOK) modulation. Bit Error Rate (BER) is compared for different signal types and detection methods. The analysis includes MIMO, MISO, and SISO links to evaluate their performance in realistic underwater communication conditions.

Keywords: Maximum-Likelihood (ML), Minimum Mean Square Error (MMSE), Space-time block codes (STBC) SISO, MISO, SIMO.

Methodology:

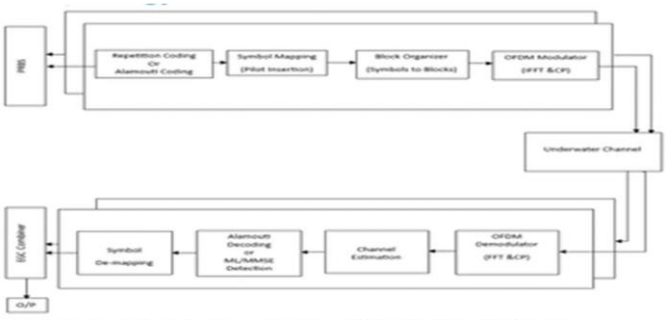


Fig 1 Block Diagram of UWOC-OFDM

Results:

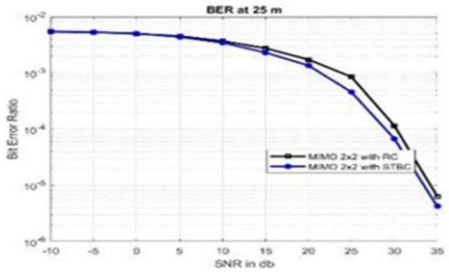


Fig – A

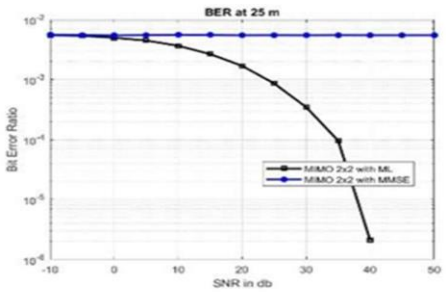


Fig - B

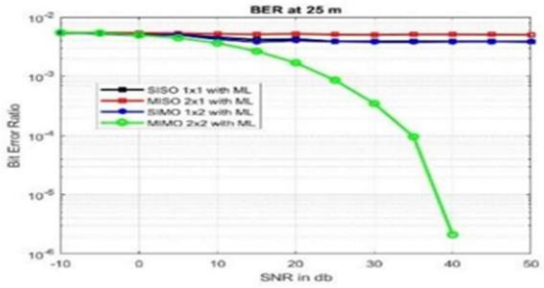


Fig - C

Fig – A, B, C represents “Comparison of Repetition coding and Alamouti coding techniques”, “Comparison of Maximum likelihood and Minimum mean square error detection techniques”, “Comparison of MIMO, MISO, SIMO, SISO links” respectively.

Conclusion:

This project proposes an underwater wireless communication system using Alamouti coding for high data-rate performance, with Alamouti outperforming Repetition coding at higher SNRs. Machine learning (ML) and Minimum Mean Squared Error (MMSE) are compared for symbol estimation, with ML preferred for low BER but MMSE for lower complexity. MIMO configurations excel over SISO, with MIMO offering the best performance. Future research areas include Adaptive Coding and Modulation, advanced signal processing techniques like deep learning, and hybrid MIMO configurations for improved robustness and performance.

TRANSFER LEARNING APPROACH FOR DETECTION OF SCHIZOPHRENIA THROUGH SPECTROGRAM

Gnaneswari Kancherla, G. Srinivasa Panchavedi,, Y. Bhaskar Reddy

Introduction:

The brain, vital for cognitive and emotional processes, faces challenges like schizophrenia. This disorder distorts reality perception and disrupts thinking patterns. Its causes are complex. Understanding brain significance and conditions like schizophrenia is essential for empathy and mental health progress. Deep learning models like Inception, Exception, and Dense121 can aid schizophrenia detection by analyzing EEG data, discerning subtle abnormalities.

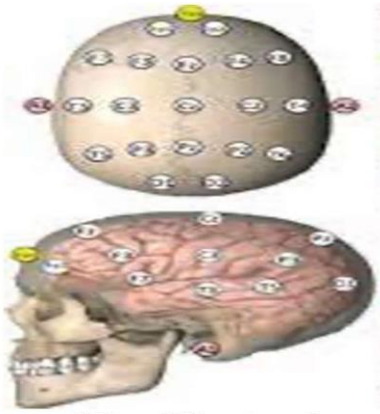
Abstract:

Schizophrenia, a severe mental illness, presents diagnostic and treatment challenges. Post-COVID 19 cases are increasing, emphasizing the need for better diagnostics. A deep learning model using transfer learning with Inception V3, Xception, and DenseNet121 is proposed to enhance accuracy.

Keywords: Schizophrenia, EEG, Transfer Learning, Deep Learning. Keywords: Schizophrenia, EEG, Transfer Learning, Deep Learning, Inception V3, Xception, DenseNet121.

Methodology:

In schizophrenia detection, Inception, Xception, and DenseNet121 models analyze EEG data. Data collection includes 28 recordings from F20.0 diagnosed patients, excluding specific groups based on age and health. Electrodes follow the 10-20 system, covering frontal, central, parietal, and occipital regions. Preprocessing involves segmentation, baseline correction, and average referencing using C3. Spectrograms via STFT visualize frequency changes. Transfer learning with Inception, Xception, and DenseNet121 models examines EEG patterns. Custom classification heads fine-tune models for adaptability. Results show Inception and DenseNet121 outperform Xception in schizophrenia detection, with variability attributed to dataset diversity and parameter updates.



Electrode Code	Brain Area Represented
FPz	Midline Forehead (Ground)
FP1	Front Left Side Of Frontal Lobe (Brodman Area 10)
FP2	Right Side Of Prefrontal Cortex
F3, F7	Left Frontal Cortex
Fz	Midline Frontal Cortex
F4, F8	Right Frontal Cortex
A1	Left Earlobe (Reference)
T3, T5	Left Temporal Lobe
C3	Left Primary Somatosensory Cortex In Parietal Lobe
Cz	Midline Central
C2	Right Primary Somatosensory Cortex In Parietal Lobe
T4, T6	Right Temporal Lobe
A2	Right Earlobe (Reference)
P3	Left Parietal Lobe
Pz	Midline Parietal
P2	Right Parietal Lobe
O1	Left Secondary Visual Cortex In Occipital Lobe
O2	Right Secondary Visual Cortex In Occipital Lobe

Fig. Electrode – brain area representation

Results:-

Figure depicts the accuracy variations of three models epoch-wise.

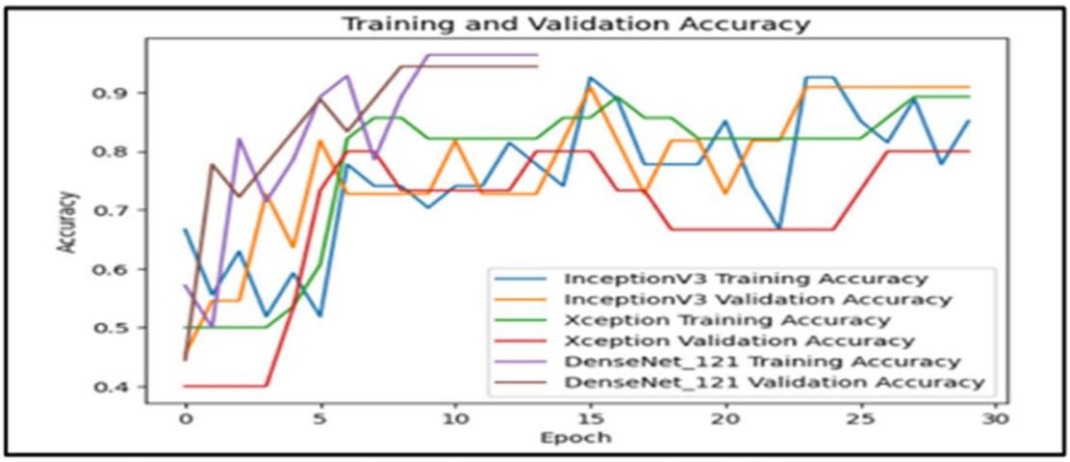


Fig. Comparitive plot of training and validation accuracies

Conclusions:

Transfer learning with model architectures is effective in schizophrenia detection, extracting hierarchical information from EEG signals. This study explores multimodal analysis by combining electrode spectrograms with state-of-the-art deep learning architectures. InceptionV3 and DenseNet 121 excel in detecting schizophrenia, showing superior adaptability compared to Xception. Though variability exists due to dataset diversity and iterative updates, the models demonstrate efficacy in capturing intricate patterns. High accuracy suggests clinical significance, offering promise for early diagnosis and intervention in schizophrenia

INSTANT WIRELESS DISPLAY

N. Baby Sarojini

Introduction:

In today's digital age, where instant communication and information dissemination are paramount, this project stands at the forefront of innovation. It represents a fusion of state-of-the-art IoT technologies and advanced wireless communication modules, poised to redefine conventional notice board systems. The project's implementation revolves around creating a smart notice board system, leveraging a Wi-Fi-based controller card, Bluetooth-enabled Android smartphone control, and an electronic display notice board integrated with Android devices. This strategic integration aims to revolutionize how information is shared, simplifying processes, minimizing manual interventions, and offering real time updates seamlessly across diverse sectors. At its core, this project embodies the essence of modernization and efficiency in information management. By harnessing the power of IoT and wireless communication, it introduces a paradigm shift in traditional notice board functionalities. The Wi-Fi-based controller card serves as the backbone for wireless connectivity, enabling data transmission from various sources to the electronic display notice board. Concurrently, the integration of Bluetooth technology empowers users with convenient control options via Android smartphones, enhancing accessibility and user experience.

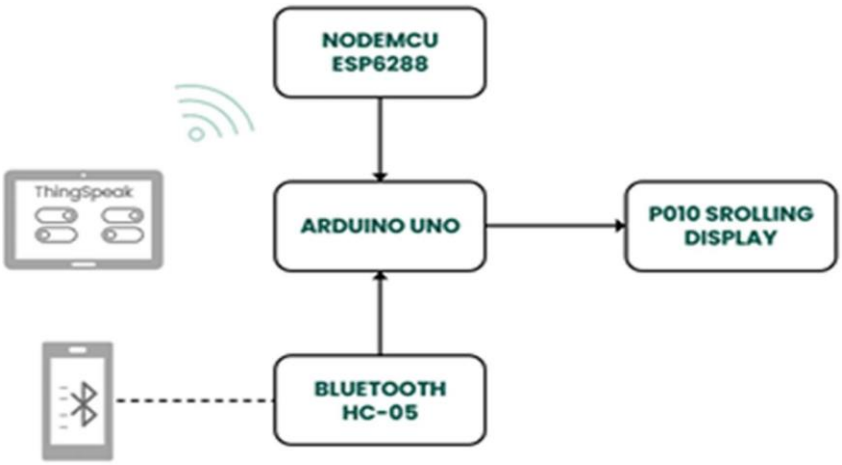
Abstract:

In response to the evolving landscape of digital communication, the "Instant Wireless Display" project leverages cutting-edge IoT and communication technologies. Through the integration of NodeMCU ESP8266, Arduino Uno, and HC-05 Bluetooth module, this system enables real-time data transmission and seamless message showcasing. The project's focus on simplicity and cost-effectiveness revolutionizes traditional notice board systems, facilitating instant wireless communication and enhancing information dissemination across educational, public, and commercial sectors.

Methodology:

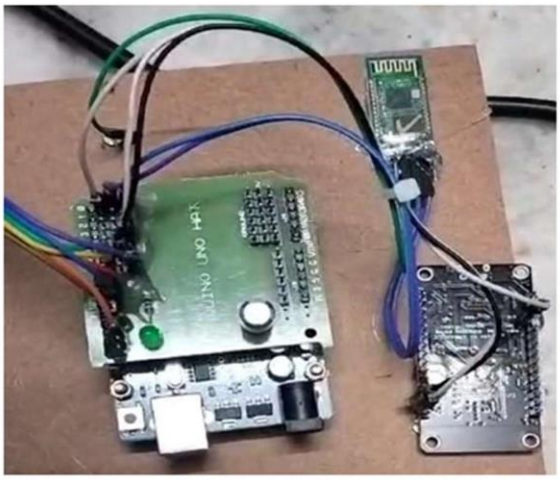
The project embarked on a comprehensive exploration of key technologies like NodeMCU ESP8266, Arduino Uno, HC-05 Bluetooth module, and P10 LED display, delving into their functionalities and integration potential for wireless communication and data presentation. This initial phase laid the groundwork for understanding the intricacies of hardware and software interactions necessary for the project's success. Systematic plan was formulated, encompassing hardware integration, software development, and user interface design. Hardware integration involved intricate connections and setup procedures to ensure seamless interaction between

NodeMCU ESP8266, Arduino Uno, HC-05 Bluetooth module, and the P10 LED display. This phase required meticulous attention to detail to establish reliable communication channels and data transmission protocols. Software development became a focal point, with dedicated efforts in coding and programming using Arduino IDE for data processing and Bluetooth communication protocols. Additionally, the creation of an Android application for Bluetooth control added a layer of user-friendly interface, enhancing the project's accessibility and usability for end-users. Throughout the implementation phase, rigorous testing, validation, and iterative improvements were paramount, ensuring the system's functionality, reliability, and user experience met the project's objectives. By embracing technological advancements and leveraging IoT-driven solutions, this project sets a new standard for efficient, real-time information dissemination, paving the way for a more connected and informed society.

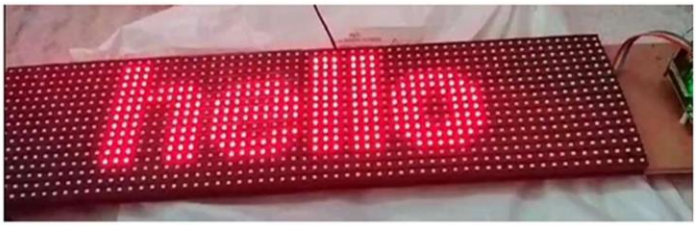


Results:

The successful implementation of the project results in a dynamic wireless display system where information is efficiently transmitted and displayed on a scrolling LED screen. This integration of Wi-Fi and Bluetooth technologies enhances communication capabilities, allowing for real-time updates and versatile data showcasing. The system's ability to transmit information wirelessly and display it instantly represents a significant advancement in modern information dissemination, catering to diverse applications and user needs across various environments.



Hardware setup



Output of scrolling display

Conclusions:

The completion of the Instant Wireless Display system represents a significant advancement in modern information dissemination technologies. Through meticulous re-search and implementation, the system seamlessly integrates Wi-Fi and Bluetooth communication, enabling rapid and real-time data transfer to the LED display board. This integration not only enhances functionality but also ensures versatility across various settings. The system's performance evaluation demonstrates its efficiency and reliability, with swift data transmission and minimal latency for displaying information on the LED board. The high uptime of Bluetooth connectivity further solidifies the system's stability in communication channels. Moving forward, potential enhancements such as intuitive user interfaces, remote management capabilities, and cloud integration can elevate the system's functionality and scalability. These improvements will undoubtedly contribute to revolutionizing information sharing in diverse environments.

DEEP LEARNING-BASED APPROACH FOR FRUIT DISEASE DETECTION

B. Jayendra Nayak, M. Devi Sri

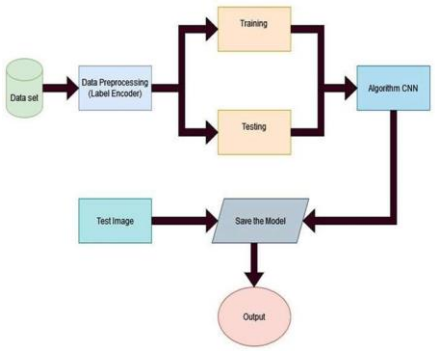
Introduction:

Image caption generation represents a significant advancement at the crossroads of computer vision and Natural Language Processing, involving the automated creation of descriptive textual captions for images. This task demands AI models to not only comprehend visual content but also articulate it in natural language. The advent of deep learning techniques, notably Convolutional Neural Networks (CNNs) for image comprehension and LSTM networks for sequential language modeling, has propelled remarkable progress in image captioning.These models capability to produce human-like captions accurately depicts visual scenes, offering vast potential across various domains. This ranges from assisting visually impaired individuals in accessing visual content to improving content indexing and retrieval within multimedia databases.

Abstract:

Fruits help patients recover from illnesses, and doctors recommend them as a vital component of the agriculture sector. Unfortunately, some diseases can affect both patients and healthy individuals who consume infected fruit. Accurate and efficient fruit disease identification is made possible by deep learning models. CNN (Convolutional Neural Network) aids in training the model to clearly identify various diseases related to various fruits. Early diagnosis of diseases enables farmers to take preventative measures, reduce loss, and receive guidance.

METHODOLOGY:



HARDWARE & SOFTWARE REQUIREMENTS

1.KAGGLE NOTE BOOK

RESULTS

Fig. 1: Test Image

```
1/1 [==============================] - 0s 26ms/step
Predicted Class Label: Alternaria
```

Fig. 2: Output Prediction of Test Image

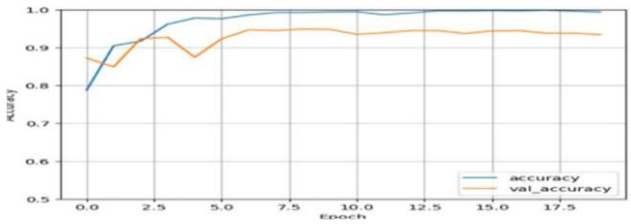


Fig. 3: output Graph

CONCLUSION:

This study shows how advanced technology called Convolutional Neural Networks (CNNs) can be used to identify and categorize diseases in fruits. We used a specific type of CNN called Efficient Net to create a model that can accurately detect various fruit diseases, such as Alternaria and Stem and Rot. We tested this model using a dataset of images showing fruits affected by different diseases, and the results were very promising. The model's ability to accurately recognize fruits and their diseases suggests that it could be incredibly helpful in agriculture.This research is significant because it could make a big difference in the agriculture industry. Being able to identify fruit diseases early and accurately can help farmers take action to prevent them from spreading. This, in turn, can reduce crop losses and improve overall crop management practices. CNNs like Efficient Net offer a scalable and effective way to identify diseases, which can be especially useful for farmers who have limited resources.

DESIGN OF CYLINDRICAL DIELECTRIC RESONATOR ANTENNA FOR WI-MAX APPLICATIONS

P. Yoga Harshitha, J. Sai Lakshmi Praveena, Y. Aslesh Sai Krishna

Introduction:

DRA antennas employ dielectric resonators to efficiently radiate electromagnetic waves, offering advantages such as compact size, high radiation efficiency and frequency agility, making them suitable for modern communication systems requiring small form factors and robust performance. In this design we have used a cylindrical DRA over a patch with U- shape slot on it using FR4 epoxy as substrate with dielectric constant 4.4 and aluminum ceramic Results: as dielectric resonator with dielectric constant 9.9.

Abstract:

Cylindrical DRA for Wi-Max applications is presented. Wi- Max is a wireless communication technology that provides high-speed internet access over long distances. The antenna is designed on FR4 epoxy substrate having dielectric constant 4.4. Al2O3 ceramic is used as dielectric resonator material with dielectric constant 9.9. The antenna is fed by microstrip line feeding. The results of the design are observed in HFSS software. The resulting antenna works at frequencies 6.1GHz, 3.9GHz and 2.2GHz for Wi-Max applications and at 4.5GHz for C band applications. Simulated antenna is fabricated. Fabricated antenna works at frequencies 6.1GHz, 3.9GHz, 4.5GHz and 2.2GHz.

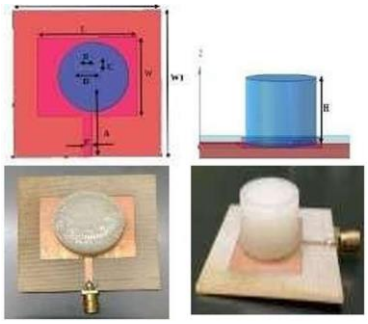
Keywords:

Cylindrical dielectric resonator antenna, microstrip line feeding, U-shaped slotted antennas, WI-MAX

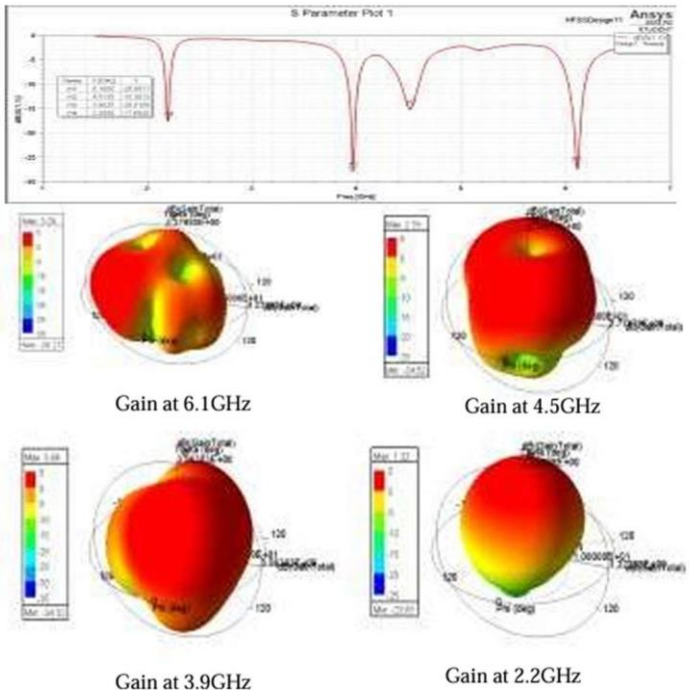
Methodology:

In the proposed design, HFSS is used as simulator. A ground is placed of dimensions 55x55mm. A box is drawn and assigned FR4 epoxy to it, a cylinder is drawn over it and aluminum ceramic material is assigned to it. Microstrip feedline is drawn with mentioned dimensions. A rectangular patch is drawn and U-shape slot is made in it. Port is drawn to feedline. Lumped port is assigned to port and perfect E is assigned to ground, patch. Results are observed and compared

Variables	Values (mm)	Variables	Values (mm)
L1	55	A	24.7
W1	55	E	3.1
C	5	L	37
H	13	W	29.5
R	13	D	10



RESULTS:



Conclusion:

Values (mm) 24.7 3.1 Gain at 2.2GHz A cylindrical DRA fed by a microstrip feedline is designed over a patch and a U-shaped slot is introduced in the patch. FR4 Epoxy is used as a substrate with dielectric constant of 4.4. Al2O3 is used as dielectric material with dielectric constant 9.9. The return losses of 26.88 dB, 15.28 dB, 28 dB and 17dB are obtained for the simulated antenna. VSWR of the simulated antenna are 1.09, 37 29.5 10 1.42, 1.08, 1.3 for 6.1GHz, 4.5GHz, 3.9GHz and 2.2GHz respectively. The return losses of 18dB, 21dB, 15dB and 21dB and VSWR.

CROP YIELD PREDICTION USING MACHINE LEARNING

Thanmai, A. Sasidhar Sai

Introduction:

Crop yield prediction is one of the challenging tasks in agriculture. It plays an essential role in decision making at global, regional, and field levels. The prediction of crop yield is based on soil, meteorological, environmental, and crop parameters. Decision support models are broadly used to extract significant crop features for prediction. Precision agriculture focuses on monitoring (sensing technologies), management information systems, variable rate technologies, and responses to inter and intervisibility in cropping systems. The benefits of precision agriculture involve increasing crop yield and crop quality, while reducing the environmental impact.. Farmers can make well informed decisions for optimizing crop output and minimizing uncertainties in the ever-changing agricultural landscape by utilizing these algorithms to obtain insights about ideal planting periods, resource allocation, and probable yield variances.

Abstract:

Agriculture plays vital role in the Indian economy, accounting for approximately 17% of total GDP and employing approximately 58% of the workforce. India is a prominent player in the global agriculture sector. Now a-days Due to climate change in atmosphere, a lot of farmers are currently having trouble predicting and producing their crops. Crop cycles can be upset by abnormal rainfall and temperature swings, which can result in lower yields and financial losses. Machine learning techniques, which are one of the most advanced agricultural technologies, are utilized to overcome these obstacles and to assist farmers in planting appropriate crops. Machine learning helps in crop production prediction by analyzing large data sets such as weather patterns, soil conditions, and previous crop performance. By using various algorithms, we can detect trends and connections, allowing farmers to make educated decisions about irrigation, planting timings, and crop management.

Keywords:

Agriculture, Machine learning techniques, Yield Prediction.

System Block Diagram:

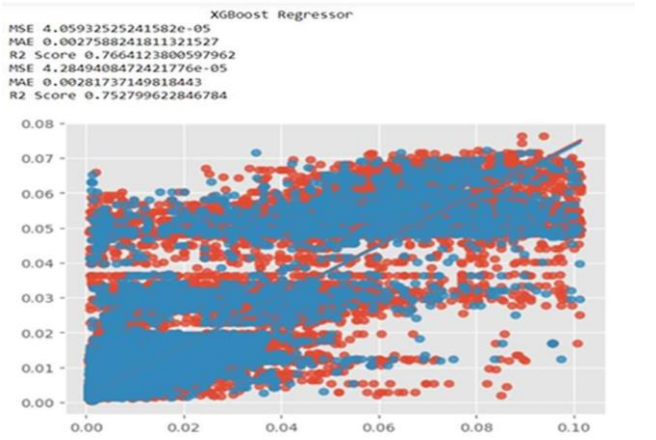
Methodology:

Data Collection: Acquiring a dataset containing vital agricultural attributes such as state names, district details, crop years, seasonal classifications, cultivated area, and production quantities serves as the foundational step in data collection. Data Preprocessing: Data preprocessing, a fundamental step in machine learning, focuses on enhancing the quality and utility of raw data. This involves handling

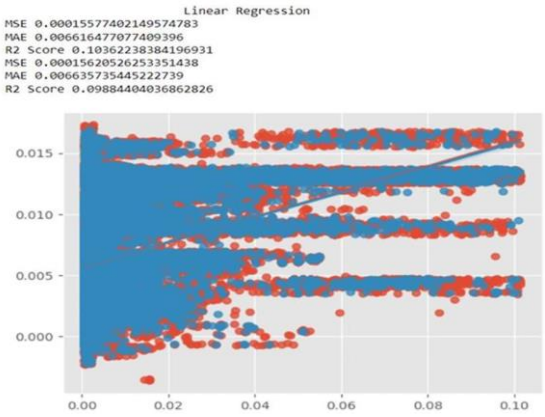
missing values, identifying and removing outliers, and standardizing features to ensure consistency. Feature Engineering: Feature engineering involves crafting new, insightful features from existing ones to enhance a dataset's predictive capabilities. This technique enables the extraction of deeper insights for decision-making, enriching the analysis and modeling of agricultural yield dynamics and effectiveness. Test and Train Data set: The dataset is split into training and testing subsets using a test size of 0.2, allocating 80% for training the predictive model and 20% for evaluating its performance. This partitioning strategy ensures that the model learns from a substantial portion of the data while retaining a separate set for unbiased assessment. By maintaining this 80-20 split, the model's ability to generalize to unseen data can be accurately gauged, enhancing its reliability and effectiveness in real- world applications.

Results:

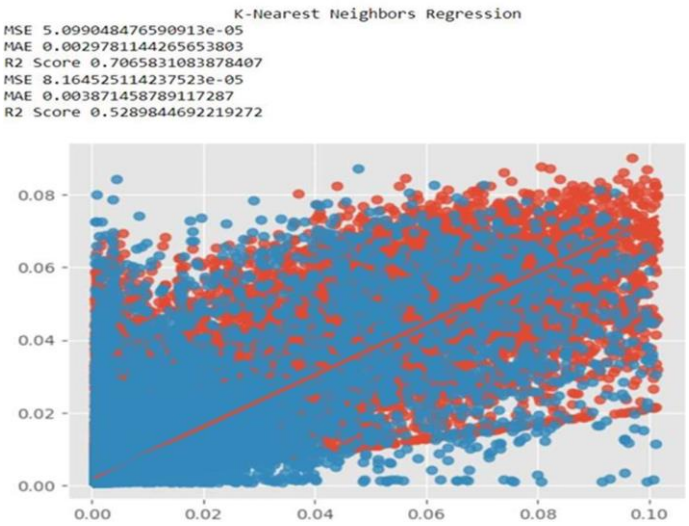
XG BOOST:



Linear regression:



KNN Regression:



Conclusion:

The XG Boost Regressor is an effective tool for detecting aTgricultural yield variability, as seen by its highest R2 score, lowest MAE and MSE values, and improved forecast accuracy. Nevertheless, K-Nearest Neighbours Regression and Linear Regression both exhibit poorer performance, with bigger error metrics and lower R2 scores, demonstrating challenges with accurately predicting agricultural outcomes.

CARDIOVASCULAR DISEASE PREDICTION THROUGH MACHINE LEARNING MODELLING

S. Karun Kalyan Yadav, K. Ranjith Kesav Sai, B. Vaibhav Krishna

Introduction:

The heart, a crucial component of the human body, assumes an important role within the circulatory system, diligently propelling blood across the body to distribute indispensable oxygen and nutrients, thereby ensuring optimal functionality. It's a marvel of biological engineering, beating approximately four million times each year, ensuring the body's continuous supply of oxygenated blood. Despite its resilience, the heart is susceptible to various ailments, with cardiovascular disease (CVD) standing out as a pervasive threat to global health. Cardiovascular disease (CVD) encompasses a range of conditions affecting the heart and blood vessels, including coronary artery disease, stroke, heart.

Abstract:

Cardiovascular diseases (CVD) remain a global health concern, necessitating advanced predictive tools for early identification and intervention. Leveraging machine learning (ML) algorithms has become crucial in its examination and prediction. In this research, effectiveness of several ML algorithms was evaluated such as Random Forest (RF), XG Boost (XGB), Support Vector Machines (SVM), and k- Nearest Neighbors (KNN) for predicting CVD. Additionally, implementation of each classifier is performed by varying dataset sizes. Findings reveal that the Random Forest model exhibits the highest accuracy, achieving 88.04% in proposed model. This underscores the potential of ML, in enhancing CVD prediction, offering valuable insights for healthcare practitioners and policymakers in addressing this pressing public health issue. Guide Details: Name: Dr. P. Satyanarayana Designation: Assistant Professor Batch No:- C9 AY2024 are applied to assess their performance. To enhance accuracy within each algorithm, hyperparameter tuning performed, which involves optimizing specific parameters unique to each algorithm. Results: Keywords: Accuracy, Interface, K-Nearest Neighbors, Machine learning, Random Forest, Support Vector Machines, XG Boost.

Methodology:

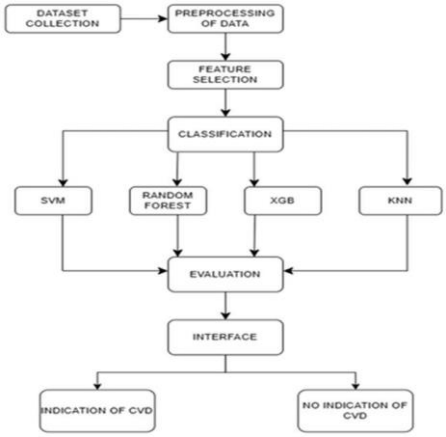


Fig. 1: Workflow of the Project

Atraining dataset (80%) and a testing dataset (20%) are created from the dataset. A model is trained using the training dataset, and its performance is assessed using the testing dataset. Different classifiers, such as SVM,RFclassifier, KNN, and XGB are applied to assess their performance. To enhance

accuracy within each algorithm, hyperparameter tuning performed, which involves optimizing specific parameters unique to each algorithm.

Results:

Algorithm	Accuracy	Precision	Recall	F1-score
Random forest	88.04	88.20	86.85	87.52
XG Boost	87.64	87.13	87.30	87.21
SVM	86.16	83.05	89.64	86.22
KNN	85.02	82.00	88.12	85.21

Table 1: Model Evaluation Metrics

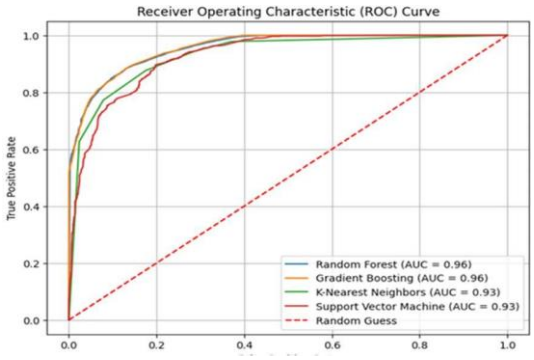


Fig. 2: ROC Curve of classifiers

Conclusion:

Workflow of the Project A training dataset (80%) and a testing dataset (20%) are created from the dataset. A model is trained using the training dataset, and its performance is assessed using the testing dataset. Different classifiers, such as SVM, RF classifier, KNN, and XGB This research underscores the potential of machine learning in predicting cardiovascular disease (CVD), a significant global health challenge. Through rigorous evaluation of various ML algorithms and exploration of datasets, the Random Forest model emerges as the optimal, achieving an impressive accuracy of 88.04%. This highest accuracy model, known as Random Forest, demonstrates the efficacy of ML in enhancing CVD prediction, offering valuable insights for healthcare practitioners and policymakers. Furthermore, an interface has been successfully created to predict whether a patient has a potential risk of CVD or not, further enhancing the accessibility and applicable

SMART TROLLEY SYSTEM USING IoT

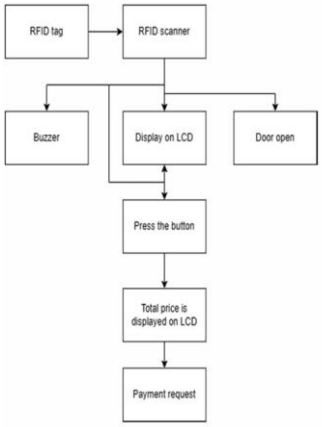
B. Sai Likhitha Sree

INTRODUCTION:

Once customers place their items in a shopping basket, they must wait in line to be billed, which takes more time. The idea behind this smart cart is going to completely change how every customer experiences shopping. The product being placed into the cart will be automatically scanned by the RFID readers that are installed in it.RFID systems use machine-readable methods to retrieve data from appropriate transponders, also referred to as tags. An alternative to barcodes is radio frequency identification, which uses tiny microchips in tags to store and transmit precise information about the item tagged. RFID is superior to bar codes in that it can store more data. After the items placed in the basket, the web application is developed for the billing process.

Abstract:
Even with the advancement of technology, people continue to make in person purchases from stores, which is creating a larger crowd. There is an even greater increase in the number of people when there are special offers and significant discounts. In order to carry their varied products which they want to buy, customers in supermarkets must use a shopping cart or basket. Customers have to stand in a long line to check out and pay for their purchases after finishing their shopping which consumes more time. To address the above issue, a proposed Internet of Things (IoT) Smart Shopping Cart is presented. The RFID reader that effectively reads the product information and each product has an RFID tag attached to it and an web application is developed for the payment purpose. The goal of this prototype is to solve problems with service quality, avoidance of fraud and the time-consuming nature of shopping. Rather than utilizing RFID, the suggested system can be readily implemented with a QR scanner and tested in the real world on a commercial scale later on.

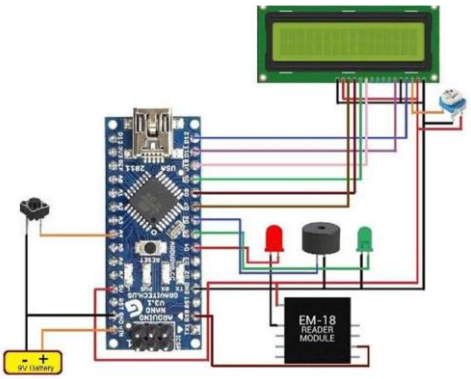
Implementation Block Diagram:



Requirements:
RFID scanner, RFID tags, Arduino Uno, LCD, React js.

Methodology:
In order to create the smart trolley system, the products must be equipped with RFID tags, and an RFID scanner is needed to read the product data, including weight, price, and name. An Arduino Uno and a buzzer module are utilized to connect the components of the system. Once all the products have been scanned, an web application is used for the payment process for the billing purpose and the total price and weight will be displayed on the LCD. The web application was developed using react js.

System Block Diagram:



Results:

Fig-1

Fig-2

Fig-3

Fig-4

Fig-5

Fig-6

Conclusion:

introduction of the Smart Trolley system, retail technology has advanced significantly and now provides customers with a smooth and effective shopping experience. This creative system improves overall shopping convenience by streamlining the checkout process and incorporating state-of-the-art IoT technology. This greatly improves efficiency and customer satisfaction by doing away with the need for manual scanning and shortening the time spent at checkout counters. This project's main goal is to make the payment process as quick and easy for customers as possible, so they can enjoy a hassle-free and enjoyable shopping experience. In the future, this prototype can be used in real time by substituting a barcode reader for the RFID.

DESIGN AND FABRICATION OF RECTANGULAR DIELECTRIC RESONATOR ANTENNA FOR SATELLITE COMMUNICATION APPLICATIONS

A.R.V.Manoj Kumar, Shaik Ashraf, B. Yaswanth

Introduction:

In the ever-evolving landscape of satellite communication, the demand for high-performance antennas has become paramount. This paper presents a groundbreaking venture into the realm of antenna design and fabrication, focusing on the development of a Rectangular Dielectric Resonator Antenna (RDRA) specifically tailored for satellite communication applications. The proposed RDRA employs a microstrip line feeding technique and undergoes meticulous optimization with varying slots and dimensions to achieve superior performance characteristics.

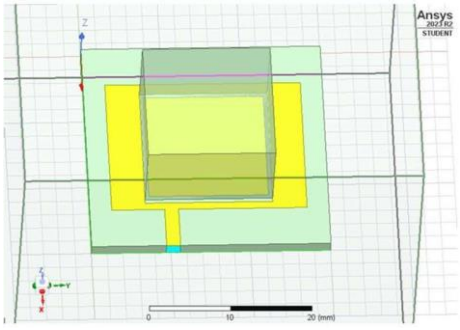
Abstract:

A novel rectangular dielectric resonator antenna (RDRA) employing a microstrip line feeding technique is proposed and optimized with various slots and dimensions to achieve desired characteristics, utilizing fundamental modes for optimal isolation. The RDRA is optimized to resonate in the (4 to 8) GHz C-band frequency range when it is applied to a FR4 substrate with a layer thickness of 1.6 mm and a relative permittivity of εr = 4.4. This makes it perfect for satellite communication applications. Performance analysis conducted using Ansys HFSS2023 software includes evaluation of return loss (S11), voltage standing wave ratio (VSWR), far-field radiation pattern and gain. Experimental validation in an anechoic chamber atmosphere confirms the antenna's efficient operation within the specified frequency band, showcasing its suitability for satellite communication applications.

Keywords:

RDRA, SATELLITE COMMUNICATION, MICROSTRIP LINE FEED.

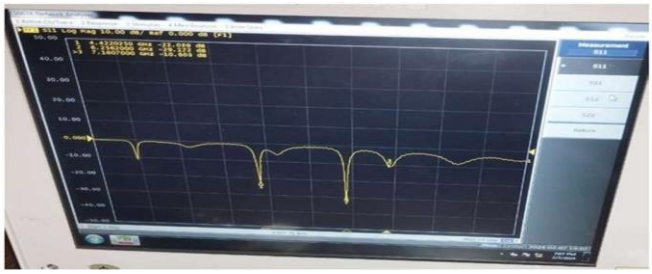
Design of Proposed Dielectric Resonator Antenna:



Hardware &Software Requirements:

1. FR4
2. Alumina
3. HFSS Software

Results:



Conclusions:

The Design and Fabrication of Rectangular Dielectric Resonator Antenna for Satellite Communication Applications, introduces a novel Rectangular Dielectric Resonator Antenna (RDRA) utilizing a microstrip line feeding technique. Through optimization with different slots and dimensions, the RDRA achieves resonance within the C-band frequency range (4 to 8 GHz) using alumina material with a relative permittivity (εr) of 9.9. Implemented on an FR4 substrate (1.6 mm thickness, εr = 4.4), the antenna's performance is thoroughly analyzed using Ansys HFSS2023 software. Key parameters, including Return Loss (S11) and Voltage Standing Wave Ratio (VSWR), are examined, providing valuable insights into the antenna's efficiency. The RDRA is further fabricated and tested in an anechoic chamber atmosphere, demonstrating its potential for satellite communication application

DESIGN OF DUAL BAND MIMO ANTENNA WITH ISOLATION ENHANCEMENT FOR MULTI APPLICATIONS

T. Mohith, Md. Sameer

Introduction:

In this design FR4-Epoxy is used as a substrate. This antenna is capable of operating at multiple frequencies for various wireless applications. The antenna with dimensions 50 mm × 40 mm × 1.59 mm is designed to cover the 1 GHz -8 GHz frequency band. The proposed antenna with defects on the ground plane is used in multi applications due to its compact size.

Abstract:

A multiband MIMO antenna that is capable of 1.47 GHz, 3.51 GHz, and 6.52 GHz bands for this project. The layout of the dual-band MIMO antenna is composed of two identical parts and the isolation is achieved with an incomplete ground plane layer. The typical reflectivity coefficient norm is less bound than −10dB in the frequency span of 1.3 - 3.68 GHz and 5.48 – 8.38 GHz. Simulated results gain good separation and each position has attenuation of −15dB. Proposed model is computed by using HFSS. The summation of the peak gain, envelope correlation coefficients (ECC), and diversity gain (DG) can be simulated and measured in the lower frequencies and higher frequency area, respectively. The dimensions of the exhibited antenna is 50 × 40 × 1.59 mm3. This is enough to support IEEE 802.11(1.36-3.68 GHz, 5.48-8.32 GHz) frequency range.

Parameters:

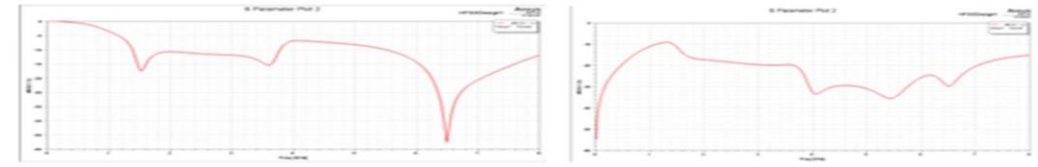


Fig 1:S11 & S12 of Proposed Antenna

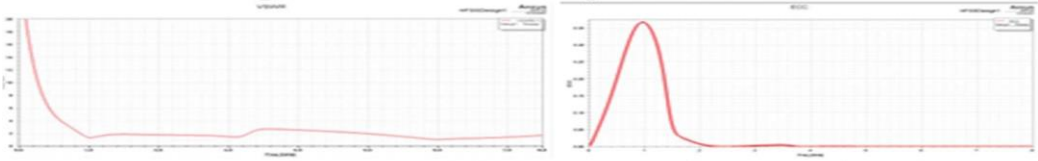


Fig 2: VSWR & ECC parameter of Proposed Design

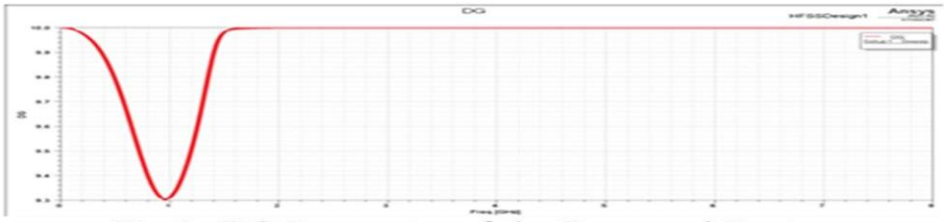


Fig 3: DG Parameter of the Proposed Design

Conclusion:

This research presents a new dual-band MIMO antenna. The suggested antenna's radiation efficiency is increased by the parasitic elements and defective ground, which together create an exceptional isolation of better than -15dB. The antenna uses two symmetrical antenna elements to radiate the frequency range of interest. The frequency bands of 1.45 GHz, 3.5 GHz, and 6.35 GHz are covered by the measured -10 dB impedance bandwidth. Based on the measured S-parameters, the ECC is within the permissible range. The comparison of the simulation and measurement results is comparatively successful. Excellent qualities make the suggested antenna suitable for a variety of applications.

Detection and Classification of Alzheimer's Disease through MRI Imaging: A Deep Learning Perspective

P. Lurdhu Merin, S.V.S Prapoornetri, K. Ashok

Introduction:

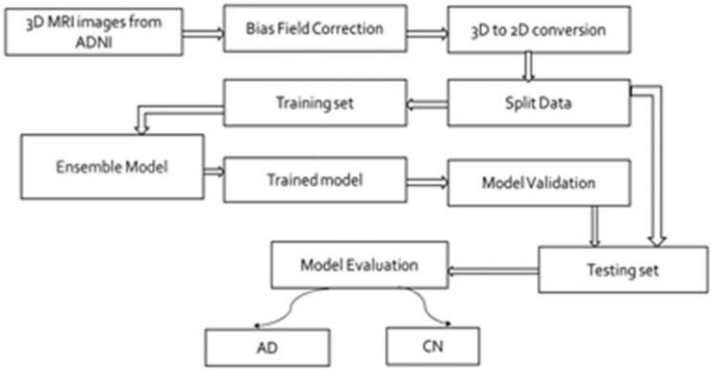
Alzheimer's disease (AD) characterized by progressive cognitive decline, memory loss, and ultimately, the loss of independent functioning. This degenerative disease not only affects the individuals diagnosed but also places considerable strain on caregivers and healthcare providers. Studies have shown that in the year 2020, AD was 7th leading cause of death in the US.

Abstract:

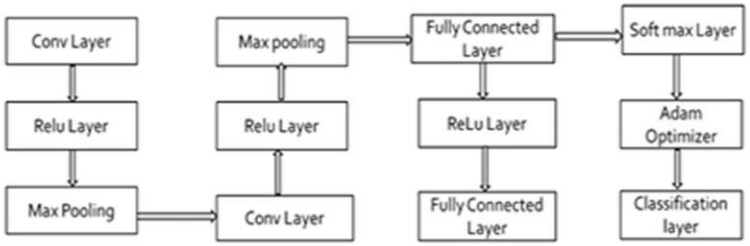
Convolutional Neural Networks (CNN), has propelled the development of innovative algorithms for processing and interpreting MRI data. In this study, a CNN model was deployed thrice and ensembled, using approximately 9000 images from both AD and CN (cognitively normal) classes sourced from ADNI. These images underwent field bias correction and were converted to 2D format. The ensembled CNN model demonstrated promising performance metrics: Accuracy of 0.810, precision of 0.842, and recall of 0.910.

Keywords: Alzheimer's disease, Deep learning, MRI brain images, Convolutional Neural Network

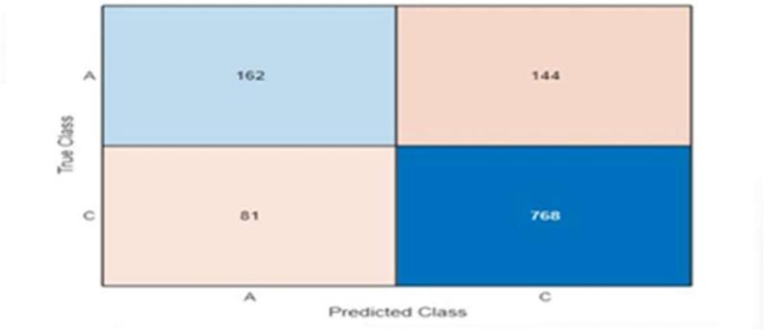
Block diagram of CNN ensemble model:



Block diagram of CNN architecture:



Results:
Confusion Matrix



Metrics calculated:

1.Accuracy:0.810

2.Precision:0.842

3.Recall:0.910

Conclusions:

Our classification model underwent rigorous training and evaluation, focusing on accurately analyzing MRI data to classify each subject as either AD or CN. Through meticulous evaluation, our model showcased promising performance metrics, including high overall accuracy and notable sensitivity and specificity for both AD and CN classes in our model.

ONLINE HAND GESTURE RECOGNITION FOR DEAF AND DUMB PEOPLE WITH SENTENCE GENERATION

P. Haarathi, P. B. Naveena, P. Hema Nandini

Introduction:

Hand Gesture recognition is a technique which is used to understand and analyze the human body language and interact with the user accordingly. This in turn helps in building a bridge between the machine and the user to communicate with each other. Gesture recognition is useful in processing the information which cannot be conveyed through speech or text. Gestures are the simplest means of communicating something that is meaningful. This paper involves implementation of the system that aims to design a vision-based hand gesture recognition system with a high correct detection rate along with a high-performance criterion, which can work in a real time Human Computer Interaction system without having any of the limitations (gloves, uniform background etc.) on the user environment. The system can be defined using a flowchart that contains three main steps, they are: Learning, Detection, Recognitions Plot: VSWR (Voltage Standing Wave Ratio) is a measure of how efficiently radio- frequency power is transmitted from a power source, through a transmission line, into a load (for example, from a power amplifier through a transmission line, to an antenna). In an ideal system, 100% of the energy is transmitted. VSWR value under 2 is considered suitable for most antenna applications.The antenna can be described as having a "Good Match". So when someone says that the antenna is poorly matched, very often it means that the VSWR value exceeds 2 for a frequency of interest.

Abstract:

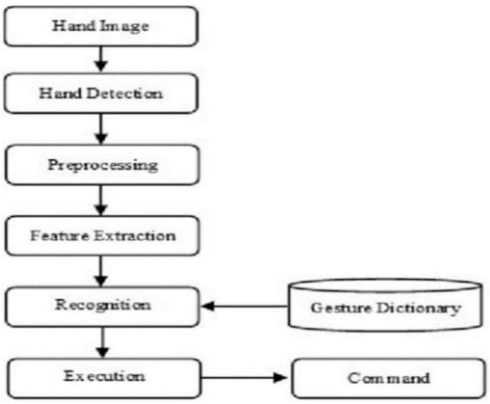
Hand Gesture recognition is an emerging topic in today's technologies. The main focus of this is to recognize the human gestures using mathematical algorithms for human computer interaction. Only a few modes of human-computer interaction (HCI) exist, they are: through keyboard, mouse, touch screens etc. Each of these devices has their own limitations when it comes to adapting more versatile hardware in computers. Gesture recognition is one of the essential techniques to build user-friendly interfaces. Usually, gestures can be originated from any bodily motion or state, but commonly originate from the face or hand. Gesture recognition enables users to interact with the devices without physically touching them. It is also flexible to use. This paper describes how hand gestures are trained to perform certain actions like switching pages, scrolling up or down in a page.

Methodology:

A hand gesture recognition system was developed to capture the hand gestures being performed by the user and to control a computer system based on the incoming information. Many of the existing systems in literature have implemented gesture recognition using only spatial modelling, i.e. recognition of a single gesture and not temporal modelling i.e. recognition of motion of gestures. Also, the existing systems have not been implemented in real time, they use a pre captured image as an input for gesture recognition. To overcome these existing problems a new architecture has been developed which aims to design a vision- based hand gesture recognition system with a high correct detection rate along with a high-performance criterion, which can work in a real time HCI system without having any of the mentioned strict limitations (gloves, uniform background etc.) on the user environment. The design is composed of a human computer

interaction system which uses hand gestures as input for communication as shown in Hand gesture recognition using machine learning algorithm.

Flow chart:



Results:

Conclusion:

The importance of gesture recognition lies in building efficient human-machine interaction. This paper describes how the implementation of the system is done based upon the images captured. Hand detection is done using OpenCV and TensorFlow object detector. And further it is enhanced for interpretation of gestures by the computer to perform actions like switching the pages, scrolling up or down the page. A smart sentence generation system for Sign Language which is designed for interpreting the sign words of sign language into a meaningful sentence.

Future scope:

In future we can implement and enhance this hand gesture prototype with Raspberry Pi and Advanced python tools as well as Artificial intelligence. we can increase the distance of operation and we can provide a assistance to work in a place.

ENHANCING SECURITY IN SWIPT-BASED NOMA NETWORK THROUGH JAMMER SCHEMES AND POWER OPTIMIZATION

D. B. S. Rohan, P. Naga Sridhar, D. Kumar Reddy

Introduction:

In the dynamic domain of 5G wireless communication, non-orthogonal multiple access (NOMA) emerges as a transformative paradigm, optimizing spectrum utilization and accommodating multiple user connections. Through power domain multiplexing, NOMA enhances efficiency and capacity by efficiently sharing channel resources among users. Using successive interference cancellation (SIC), NOMA receivers extract intended signals, while cooperative relaying and SWIPT further augment network efficiency and capacity. Integration with cooperative relaying addresses signal quality and coverage challenges, while SWIPT combines energy- harvesting and information transmission, overcoming limitations of orthogonal multiple access (OMA). This paper comprehensively explores NOMA, including its variants, security aspects, and integration with SWIPT, within the evolving landscape of wireless communication systems.

Abstract:

This work addresses the improvement of secrecy outage probability (SOP) in an energy-harvesting non-orthogonal multiple-access (NOMA) network featuring simultaneous wireless information and power transfer (SWIPT) under total power constraint. The primary objective is to minimize the SOP in the decode- and-forward (DF) relaying-aided downlink NOMA network using a power splitting protocol, considering the presence of untrusted intruder, while ensuring user's quality-of-service (QoS) in an environment with perfect successive interference cancellation (SIC) and channel-state information (CSI). Further, this work introduces various jammer techniques to enhance the security performance of the SWIPT-NOMA network. Additionally, the impact of critical parameters, such as (SNR), as well as the distances between different nodes such as dje, dse, and dsu1, on SOP levels is also investigated under different jamming scenarios. The proposed schemes are validated through Monte-Carlo based simulation results, demonstrating the superior efficacy of control-jammer (CJ) in enhancing secrecy performance.

Keywords: simultaneous wireless information and power transfer (SWIPT), control-jammer (CJ), decode-and-forward (DF), non-orthogonal multiple access (NOMA), secrecy outage probability (SOP).

System model:

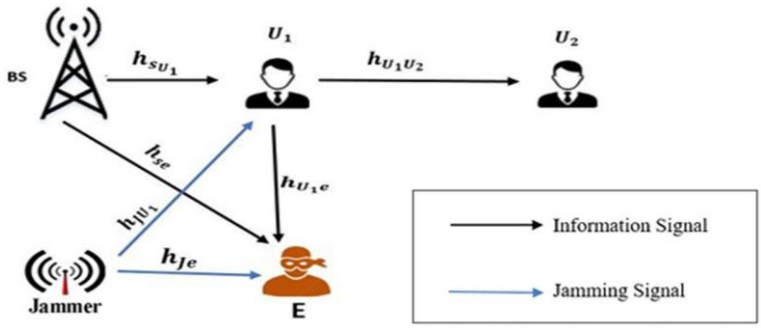


Fig 1: system model

This paper explores a downlink DF relaying-aided SWIPT-NOMA network, which comprises a base-station (BS), cell-center user (U1), a cell edge user (U2), and an intruder (E). Furthermore, the integration of a jammer (J) is regarded as a measure to mitigate the potential impact of intruders on the transmission of confidential information. User (U1) utilizes the DF relaying protocol for transmitting information to User (U2) from the base station. Both users U1and U2are provided with a single antenna and by operate in half-duplex mode under Rayleigh-fading environment.

Results:

A Monte Carlo-based simulation is conducted to validate a cooperative NOMA system with SWIPT under various jammer constraints. The efficiency of CJ over distinct jamming cases is provided under different scenarios, including varying SNR and distances. The study investigates the secrecy performance of a NOMA network employing SWIPT.

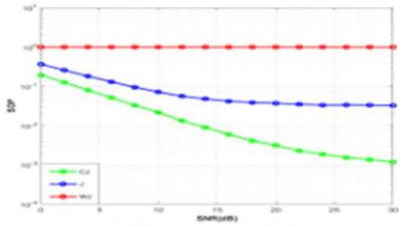


Fig 2: SOP versus SNR at U_1

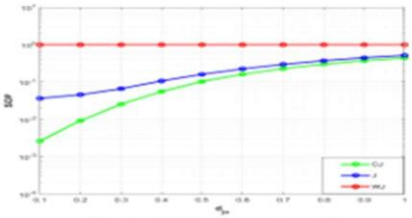


Fig 3: SOP versus d_{je} at U_1

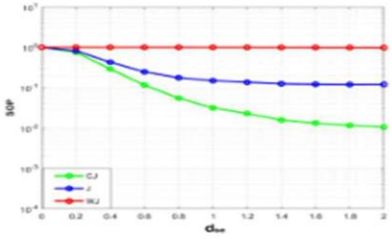


Fig 4: SOP versus d_{se} at U_2

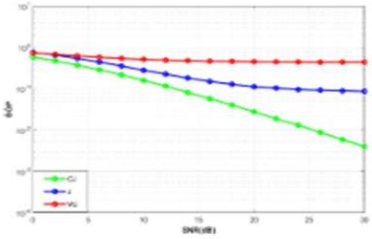


Fig 5: SOP versus SNR (ρ) at U_2

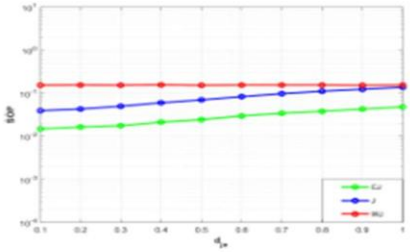


Fig 6: SOP versus d_{je} at U_2

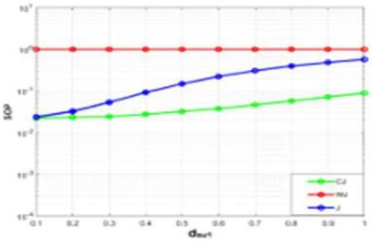


Fig 7: SOP versus d_{su1} at U_2

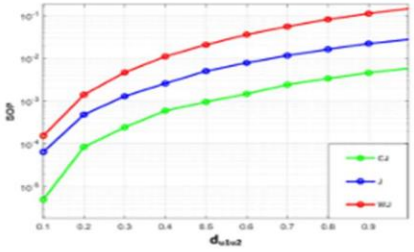


Fig 8: SOP versus d_{u1u2} at U_2

Conclusions:

In conclusion, this study focused on minimizing SOP in an EH-based DF relaying- aided NOMA network with SWIPT while adhering to total power constraints. By employing PS protocol, the aim is to minimize SOP while considering the presence of untrusted intruders and maintaining user QoS with perfect SIC and CSI. Various jamming techniques are introduced to boost security in the SWIPT-NOMA network, and examination of key parameters like SNR) and distances between nodes (dje, dse, dsu1) under different jamming scenarios.

HORTICULTURE ROBOT FOR PRECISION PLANT HEALTH MANAGEMENT

P. Jaxa Hruday A. Bharath Venkata Siva Kiran

Abstract:

In the ever-evolving landscape of greenhouse agriculture, the challenges of pest infestations, fungal infections, bacterial diseases, nutrient deficits, and virus threats demand distinct solutions for unhealthy plants. If left unchecked, these issues can spread to entire crops, leading to diminished yields and compromised plant health. Enter the "Advanced Horticulture Robot," an advanced solution designed to navigate the complexities of plant health management with precision. Incorporating state of the art sensor technologies, this robot combines the ability of an ultrasonic sensors and dynamic camera to detect obstacles and capture clear plant images in real- time. Sophisticated algorithms analyse real-time data, identifying pests, bacterial and fungal infections, nutritional deficiencies, and potential virus threats in crops such as microgreens, bell peppers, tomatoes, cucumbers, lettuce, basil, and chili plants. Upon detecting diseased plants, the robot triggers the motors to spray the pesticide on the plant. This methodical approach offers a revolutionary solution for precise plant health management, minimizing environmental impact, optimizing resource usage, and promoting sustainable greenhouse agriculture.

Keywords– horticulture, robotic system, plant health, dynamic camera system, pesticide dispensing system, automated treatment.

Objectives: The main objectives of the project are

i. Integrate cameras and sensors for plant image capture and data analysis.
ii. Develop image analysis algorithms for disease detection and plant health assessment.
iii. Implement autonomous navigation and obstacle detection using image-based cues.
iv. Design a system for targeted pesticide application triggered by image processing results.
v. Build and test the final robot prototype for precise plant health environments.

Methodology:

management in The proposed system uses object detection by employing relevant equipment. Upon activation of robot, it travels through a pre-defined path by using the IR sensors and whenever the object in that path is identified as unhealthy plant, the pesticide dispensing system will be activated.

Results:

A prototype has been developed which contains all the components. The relevant sensors(IR, UV, Servo motor) are connected to the raspberry pi using PCB connection and camera input is connected to raspberry pi using USB cable whereas the submersible pumps are connected through wires to the raspberry pi. The below figure shows the developed prototype.

Block diagram:

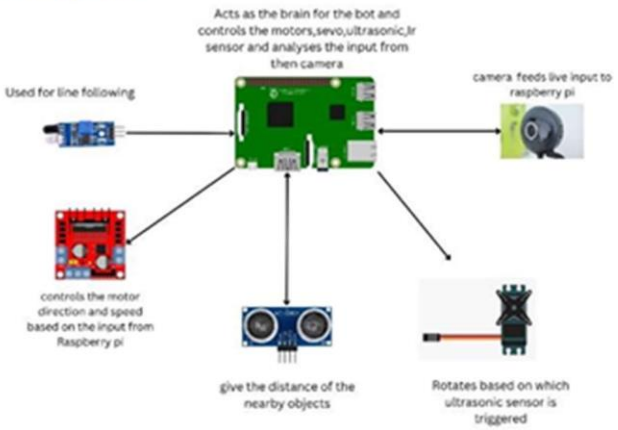


Fig -1: block diagram

Conclusions:

Our horticulture robot equipped with advanced sensors, dynamic camera systems, and precision spraying mechanisms presents a unique solution that is reshaping modern agricultural practices. Its applications extend beyond traditional farming, proving invaluable in the realm of precision horticulture. The robot autonomously navigates between plants by following the line using IR sensors, employing cutting-edge scanning methods to distinguish between healthy and diseased plants and sprays the pesticide with remarkable precision.

Comparative Analysis of Deep Learning Models for Pneumonia Detection and Classification on Chest X-Ray Images

K. SAROJA SAHITYA, K.R.M. AISHWARY

ABSTRACT:

Pneumonia is a viral infection which affects a significant proportion of individuals, especially in developing countries where contamination, overcrowded, and unsanitary living conditions are widespread, along with the lack of healthcare infrastructures. Pneumonia produces pericardial effusion, a disease wherein fluids fill the chest and create inhaling problems. It is a difficult step to recognize the presence of pneumonia quickly in order to receive treatment services and improve survival chances, thus making it necessary to predict pneumonia. In this project, ANN, CNN with VGG16 & RESNET50 are used for pneumonia detection.

Keywords: ANN, CNN, VGG16, RESNET50

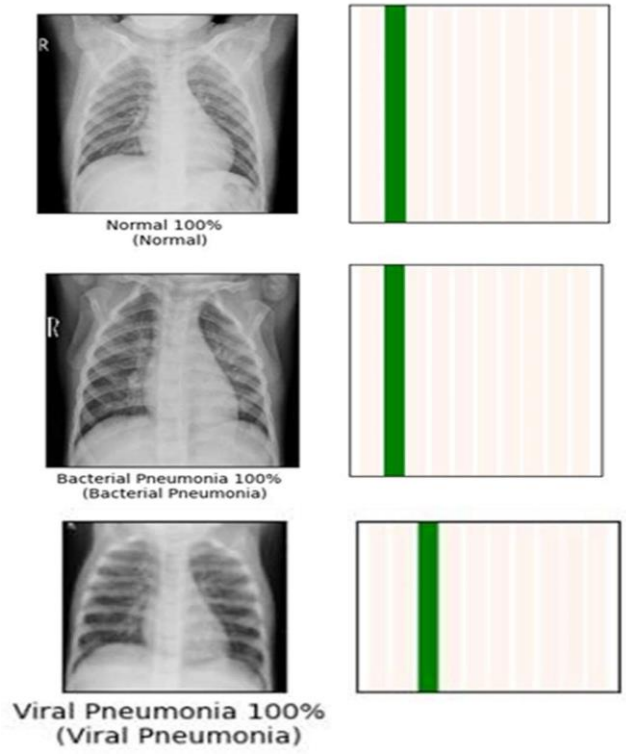
INTRODUCTION:

Pneumonia is a viral infection that produces pericardial effusion, a disease wherein fluids fill the chest and create inhaling problems. It is a difficult step to recognize the presence of pneumonia quickly in order to receive treatment services and improve survival chances. India accounts for 23% of global pneumonia burden, thus making it necessary to predict pneumonia. Deep learning, is a field of artificial intelligence which is used in the successful development of prediction models. In this project, image pre-processing techniques will be used to convert raw X-ray images into standard formats, for analysis and detection deep learning techniques such as ANN, CNN with VGG16 and RESNET50 are used for pneumonia detection. These methods aim to contribute to the development of a more reliable and efficient system for detecting and classifying pneumonia, thereby facilitating improved decision-making in medical diagnostics.

PROPOSED METHODOLOGY:

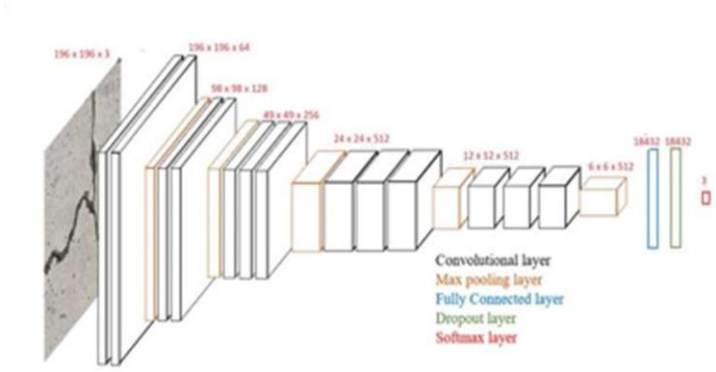
This involves six steps: First, dataset need to be gathered from the repository. Next the images need to be processed by applying one-hot encoding technique. Thereafter, data should be visualized to ensure the image features. Next, build the required model i.e., ANN, VGG16, RESNET50. Next train & compile the model with accuracy metrics. Then, fit the model to the dataset. Lastly, evaluate the model. VGG16 is considered as the final model because of best accuracy. The below figure shows the architecture of VGG16 model.

RESULTS & CONCLUSION: The detected classification for the test dataset is shown below



Results and Discussions: -

This project employs helmet-based engine control, alcohol detection, and IoT integration to enhance motorcycle safety. These innovations aim to reduce accidents and prioritize rider well-being in line with global road safety efforts.Thus, from various algorithms, VGG16 with CNN model as the highest accuracy and is the best model to detect & classify the pneumonia.



A NRF BASED WIRE LESS SENSING SYSTEM TO ALERT RAIL TRACK MAINTAINANCE WORKERS AND MITIGATE ACCIDENTS

N Kiran Manikanta, K Naga Akhil

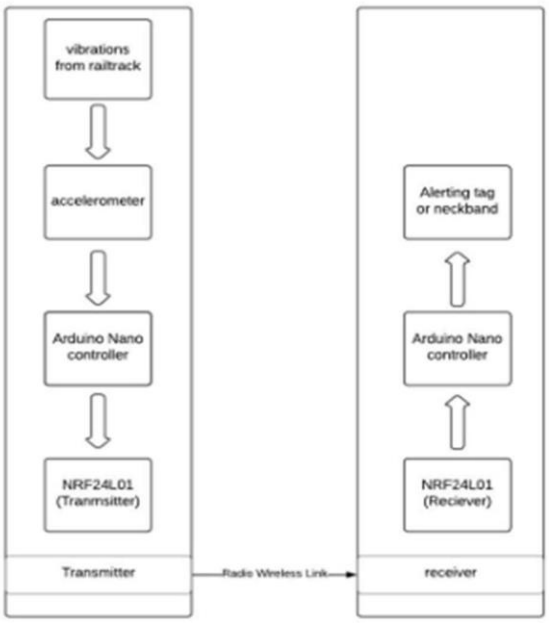
Abstract:

This project goal is to reduce the accidents happened to Railway workers because of the inability of the worker to detect the approaching train. The most commonly used technique to reduce those accidents is Treadle Mechanism. There are other techniques like Inductive sensors, IR beams, Time-domain reflectometry, Magnetometers, Acoustic signals, RADAR to detect trains speed and direction. The methods mentioned here detects the train by early arrival notification but their disadvantages are system complexicity and lack of a single method that addresses all requirements, the need for additional research efforts, and the variability of detection range based on implementation and environmental conditions. The proposed system is simple,wireless, low power system that requires very little human intervention. The system is used to sense the vibrations from rail caused by train movement and continuously alerts the worker about a train arrival from track

Methodology:

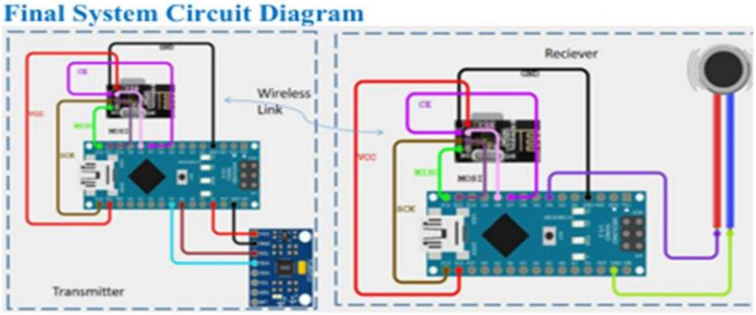
The project aims to create a wireless alert system for railway workers to provide timely warnings about approaching trains. A highly sensitive accelerometer sensor is placed 200 to 500 meters away from the worker, connected to an Arduino microcontroller. The primary objective is to alert the worker when a train is detected using a vibrator actuator. The Arduino nano microcontroller ensures the system is lightweight, portable, energy- efficient, and cost-effective for mobile workers. Wireless NRF24 transceivers maintain communication between the sensor and the alert system.

Block Diagram:



Accelerometer z axis values when continuous vibration is detected:

Final System Circuit Diagram



Output serial monitor window of Receiver when there is continuous vibration detected:

```
Received Trigger Value: 0
Received Trigger Value: 1
Received Trigger Value: 2
Received Trigger Value: 3
Received Trigger Value: 4
Received Trigger Value: 4
Received Trigger Value: 5
Received Trigger Value: 6
Received Trigger Value: 7
Received Trigger Value: 7
Received Trigger Value: 7
Received Trigger Value: 7
Received Trigger Value: 8
Received Trigger Value: 9
Received Trigger Value: 9
Received Trigger Value: 10
Received Trigger Value: 11
Received Trigger Value: 12
Received Trigger Value: 13
Received Trigger Value: 14
```

Conclusion:

The accelerometer receives only two types of inputs: random noise vibration and periodic vibrations, with the latter assumed to be generated by passing trains. If the transmitter circuit continuously detects vibrations for 3.5 seconds an alert message is sent to the receiver; otherwise, no alert is issued. Extensive testing has confirmed the system's alert accuracy

INSULIN RECOMMENDATION SYSTEM FOR DIABETIC PATIENT USING MACHINE LEARNING

K. Chakravarthi G. Vivek B. Yuvaraju

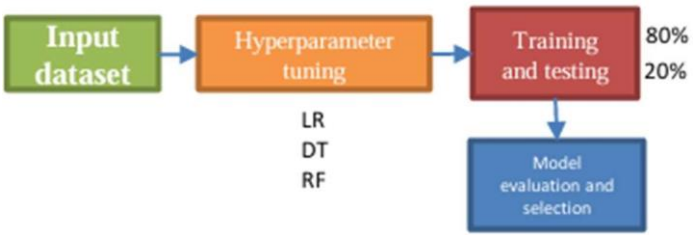
Introduction:

Diabetes, marked by high blood sugar, is a global health crisis with two main types: Type 1 due to insufficient insulin production and Type 2 from insulin resistance. While insulin is essential for many, some manage with oral drugs or lifestyle changes. With over 500 million affected worldwide, the disease has a significant economic toll, particularly in India. Machine learning is transforming insulin dosing by personalizing treatment based on individual data, and tools like LIME improve the transparency of these AI driven models.

Methodology:

In our research, we formed sythetic data from sources on diabetes management and obesity metrics to predict insulin levels using machine learning. We preprocessed the data for analysis and tested various algorithms, including decision trees, random forests, and Linear regression. The models' performance was assessed using test data. The Random Forest regression excelled, achieving an impressive 96% test accuracy. To make the decision-making process understandable, we incorporated explainable AI, particularly LIME, which clarifies predictions on a case-by-case basis.

Block diagram:



Software Requirements:

- Google Collab
- Python Libraries

Results:

Our study evaluated Linear Regression, Decision Tree Regression, and Random Forest Regression for insulin dosage recommendations in diabetic patients. Following hyperparameter tuning, Random Forest Regression outperformed the others with the highest accuracy and precision, and it recorded the lowest MSE and MAE, as well as the highest R-squared values. This model's accuracy reached 96%, confirming its efficacy as the most reliable for insulin prediction in our research.

Table 1: Model Evaluation Metrics

Model	MSE	MAE	R2
Linear Regression (LR)	1.65085	1.02584	0.834138
Decision Tree (DT)	0.00685	0.01873	0.86315
Random Forest (RF)	**0.000462**	**0.00192**	**0.96745**

Conclusion:

In our study, we applied machine learning to predict insulin levels in diabetic patients, identifying random forest regression as the most effective model with a 96% accuracy after hyperparameter optimization. The use of LIME enabled detailed explanations of how each feature influenced insulin predictions. Our results highlight the potential of machine learning for personalized insulin dosage recommendations, utilizing data on BMI, physical activity, and blood glucose levels, thereby offering a practical tool for diabetes management

VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

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