JEPPIAAR INSTITUTE OF TECHNOLOGY
(An Autonomous Institution)
"Self-Belief | Self-Discipline | Self-Respect"
Kunnam, Sunguvarchatram, Sriperumbudur – 631 604.

International Conference on
Emerging Trends in Computing and Engineering Systems

(ICETCES-2025)

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International Conference on
Emerging Trends in Computing and Engineering Systems
(ICETCES-2025)

Chennai, Tamil Nadu
09.05.2025 to
10.05.2025

Organized by:

Jeppiaar Institute of Technology
(An Autonomous Institution)

ABOUT THE INSTITUTION

Jeppiaar Institute of Technology is a Christian Minority Institution, affiliated to Anna University, Chennai, approved by AICTE and certified with ISO 9001:2015. It was established in 2011 by our Honourable Chairman Late Col. Dr. Jeppiaar. The concept to build environment-friendly sustainable living practices is achieved in our Green Campus situated among the Electronic Belt of Sriperumbudur in a widespread area of 12.52-acre land at Kunnam, Sunguvarchatram, Sriperumbudur, and Chennai.

Jeppiaar Institute of Technology is an entity of Jeppiaar Remibai Educational Trust. Our honourable Chairman Late Col. Dr. Jeppiaar is well known for his dedication to spread knowledge among the youth of India through technical education. Jeppiaar Institute of Technology propels relentlessly towards fulfilling the chairman's vision "Aspires to provide technical education in futuristic technologies with the perspective of innovative, industrial and social application for the betterment of humanity".

ABOUT THE DEPARTMENT

The Department of Computer Science and Engineering (CSE) was established in 2011 with a sanctioned intake of 60 students. From 2023 onwards, the department revised its sanctioned intake to 120 students, and from 2024, it further increased the intake to 180 students. The department is accredited by NBA. The primary objective of this department is to impart futuristic technological education, foster innovation, promote collaborative research, and develop quality professionals in computer science. The department has well-equipped laboratories, good infrastructure, and highly qualified and experienced faculty. A significant number of research papers are published by the faculty in national and international conference proceedings and journals. The department has also signed MOUs with various organizations to provide real-time training to the students. The department is associated with the Computer Society of India – Chennai Chapter (CSI), the Institute of Electrical and Electronics Engineers (IEEE), IEEE Women in Engineering (WIE), and the Indian Society for Technical Education (ISTE).

To encourage creative solutions, a Design Thinking Club has been introduced. In addition to various industry-sponsored laboratories, a Nano-Satellite Research Lab has been established for research projects in satellite communication, Robotic Process Automation, etc.

The Department of Information Technology (IT) was established in the year 2011 with the sanctioned intake of 60 has now heightened to a sterling intake of 180 to facilitate the evolution of problem solving skills along with the knowledge application in the field of Information technology, understanding industrial and global requirements for the benefit of the society. The department was accredited by NBA. The Department has the state of-the-art facilities for various laboratories, a well-equipped seminar hall, Wi-Fi enabled class rooms to support e-learning with Projectors and a department Library. Though the main focus is on academic excellence of students, faculty members do motivate the students to participate in technical activities for enhancing their fundamental technical knowledge. Students are also encouraged to participate in various inter-disciplinary and industry sponsored contests as well as cultural events in and outside the college. Our students make best use of these opportunities and bring laurels to the Department. Regular training programs are conducted to enhance the employability of our students. The training programs focus on enhancing their soft skills and programming ability. In addition to the co-curriculum activities, a wide range of value-added courses are also available in order to improve and refine the overall potential of the students. As an outcome of the endeavors of the department, the students have made their flags high in various national and international forums. The department has signed about 21 Memorandum of Understanding (MoU's)

The Department of Information Technology is associated with Computer Society of India – Chennai Chapter (CSI).We have a strong Alumni team who are placed in well reputed MNCs' across the globe from Coding Mart, Amazon, etc. Despite their busy schedule, they make themselves available on the campus to help the students during the placement training process by conducting mock interviews, group discussions, guest lectures, and motivational talks. Though the main focus is on academic excellence of students, faculty members do motivate the students to participate in technical activities for enhancing their fundamental technical knowledge. Students are also encouraged to participate in various inter-disciplinary and industry sponsored contests as well as cultural events in and outside the college. Our students make best use of these opportunities and bring laurels to the Department.

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PREFACE TO THE CONFERENCE PROCEEDINGS

The ***"International Conference on Emerging Trends in Computing and Engineering Systems (ICETCES-2025)"***is being organized by ***Jeppiaar Institute of Technology, Chennai, Tamilnadu*** *on* ***09 to 10th 2024***

Jeppiaar Institute of Technology has a sprawling student –friendly campus with modern infrastructure and facilities which complements the sanctity and serenity of the major city of Chennai in Tamilnadu.

The ***"International conference on Emerging Trends in Computing and Engineering Systems" (ICETCES)*** was a notable event which brings academia, researchers, engineers, industry experts and students together.

The purpose of this conference is to discuss applications and development in area of **"Computing and Engineering Systems".**

The International Conference attracted over 150 submissions. Through rigorous peer reviews 55 high quality papers were recommended by the Committee. The Conference apply focuses on the tools and techniques for the developments on current technology.

We are indebted to the efforts of all the reviewers who undoubtedly have raised the quality of the proceedings. We are earnestly thankful to all the authors who have contributed their research works to the conference. We thank our Management for their wholehearted support and encouragement. We thank our Principal for his continuous guidance. We are also thankful for the cooperative advice from our IQAC Director, advisory Chairs and Co-Chairs. We thank all the member so four local organizing Committee, National and International Advisory Committees.

ICETCES- 2025

DIRECTOR/CHAIRMAN MESSAGE

Dr.S.MARIE WILSON
DIRECTOR & CHAIRMAN

It gives me immense pleasure to pen that Jeppiaar Institute of Technology an ***International Conference on Emerging Trends in Computing and Engineering Systems (ICETCES-2025) on May 09th and 10th 2025***. The applications of any advances Engineering & Technologies to facilitate the nation for its development.

The conference is aimed to serve as a premier venue for the dissemination of leading edge research in **Computing** & **Engineering Systems.**

I hope that this conference would certainly light up innovative ideas by paving way to new inventions and integrate new technologies in the Engineering & Technology sector and the deliberations in the conference will help researchers from academia, industry and the conference will provide a platform for initiating collaborative research projects.

All the best

PRINCIPAL MESSAGE

Dr.J.VENU GOPALA KRISHNAN,

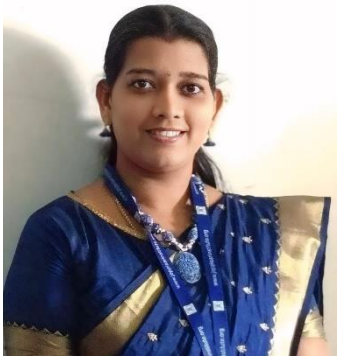
PRINCIPAL,

JEPPIAAR INSTITUTE OF TECHNOLOGY

I congratulate Jeppiaar Institute of Technology & ***International Conference on Emerging Trends in Computing and Engineering Systems (ICETES-2025)*** on ***09th and 10th MAY 2025***. This International conference that is being organized in the department of CSE sure about the conference that it will serve an effective platform for the technocrats to share their ideas and research. I always encourage to such type of event, which eventually make the society technology aware.

I wish every success to the conference.

IQAC DIRECTOR MESSAGE



Dr. SHENBAGA EZHIL,

DIRECTOR, INTERNAL QUALITY ASSURANCE CELL,
JEPPIAAR INSTITUTE OF TECHNOLOGY

I am delighted to congratulate the Department of Computer Science for organizing the International Conference on Emerging Trends in Computing and Engineering Systems on 09/05/2025 to 10/05/2025.

In today's dynamic academic and computing environment, fostering a culture of continuous learning and innovation is essential. This conference provides an excellent platform for academicians, researchers, and industry experts to engage in meaningful dialogue, exchange insights, and explore new future developments that enhance engineering system practices.

I am confident that the knowledge shared and the collaborations formed during this conference will contribute significantly to advancing quality research and promoting excellence in computing technology.

My best wishes to the organizing team, delegates, and participants for a fruitful and impactful conference.

DEAN MESSAGE

Dr.S.MADHUSUDHANAN

PROF. & DEAN,

JEPPIAAR INSTITUTE OF TECHNOLOGY

It is Very Proud to Note that Department of Computer Science and Engineering is Organizing the Prestigious International Conference on Recent trends in Computing and Engineering Systems.

The scope of the ***ICETCES-2025*** is to provide an international forum for the researchers, academicians, students, developers and practitioners from the industry for exchange of ideas and knowledge. I am sure that the conference would enjoy a great success in its intended purpose and wish all the delegates and participants a very purposeful two days of meaningful deliberations.

CONVENER MESSAGE

Dr.D.KUMUTHA

HOD/CSE,

JEPPIAAR INSTITUTE OF TECHNOLOGY

It feels proud to mention here that the ***Jeppiaar Institute of Technology*** is organizing ***International Conference on Recent Trends in Computing and Engineering Systems (ICETES-2025) 09th to 10th May 2025***.

We are confident that this conference will serve as a catalyst for future advancements and international partnerships that will propel progress in engineering and technology. To all delegates and distinguished speakers, I extend my best wishes for a productive and rewarding conference experience. I eagerly anticipate the valuable insights and meaningful discussions that will emerge from this gathering of scholars and professionals.

I wish lots of success to the conference.

International Conference on Recent Trends in Computing and Engineering Systems (ICETCES -2025)

Chennai,May 09th to 10th,2025

Chief Patrons:

Dr.N.Marie Wilson, Chairman

JIT

Patrons:

Dr.J. Venu Gopala Krishnan

Dr.R.Madhusudhanan ,

Dean JIT

Dr.S.Shenbaga Ezhil.

IQAC Director

Keynote Speaker:
Ts.Dr.Sundaresan Perumal
USIM(Malaysia)

CONVENER:
Dr.D.Kumutha,HOD/CSE

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International Conference on Emerging Trends in Computing and Engineering Systems- May 9th & 10 th 2025

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Revolutionizing Talent Acquisition: Designing an AI- Powered HR Recruitment Platform

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Abstract—This study introduces an advanced AI- powered recruitment platform, WorkWise, designed to redefine talent acquisition by integrating generative AI and natural language processing (NLP). The platform does a better job of scanning resumes, matching candidates, and scheduling interviews, compared to traditional ATS systems, and through comparative analysis. Improvements to dynamic skill matching and real-time analytics have enhanced performance and brought about a seamless hiring process. Using intelligent dashboards and a chatbot will give the recruiter insights and help engage a candidate, ensuring fairness & transparency. The research shows how it can make recruitment efficient and help hire from anywhere worldwide. The combination of various AI tools and design, which scales easily, creates trust among HR professionals and candidates in the selection of the modern workforce.

Keywords—Artificial Intelligence, Resume Screening, Human Resource Management, Talent Acquisition

1 Department of CSE and IT, Jeppiaar Institute of Technology, Sriperumbudur

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Machine Learning Approaches for Air Quality Prediction and Analysis

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Abstract— Predicting air quality is becoming increasingly important for protecting public health, supporting environmental policies, and guiding urban planning decisions. Traditional monitoring systems often face challenges due to the limited number and spread of sensors, which makes it hard to deliver accurate, real-time data across wide areas. To address this gap, this study explores how machine learning can be used to forecast air quality using various types of environmental and land-use data. By analyzing historical trends in pollution levels alongside weather conditions, traffic flow, and patterns of land development, machine learning models can offer timely and reliable predictions. The approach also examines how urban infrastructure, green spaces, and ongoing development affect air quality. Several algorithms—including regression techniques, decision trees, and neural networks—are tested to see how well they perform in this context. The findings suggest that machine learning can significantly enhance the accuracy of air quality forecasts, opening the door to smarter environmental planning and better public health outcomes.

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Fake News Detection Using Machine Learning: A Passive Aggressive Classifier

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Abstract — The proliferation of fake news on digital platforms necessitates robust automated detection systems. This paper presents a machine learning-based approach for fake news classification using TF-IDF (Term Frequency-Inverse Document Frequency) for feature extraction and a Passive Aggressive Classifier (PAC) for real-time prediction. The system achieves 95% accuracy, outperforming traditional keyword-based methods by 20%, while maintaining scalability. Deployed via a Flask web application, it enables users to verify news articles instantly. Experimental results on a balanced dataset demonstrate strong performance metrics (93% precision, 96% recall). The proposed solution addresses critical gaps in manual verification and non-scalable tools. Future enhancements include integrating BERT for contextual analysis and extending support for multilingual content. This work contributes to combating misinformation with an efficient, deployable ML system.

Keywords — Fake News Detection, Machine Learning, Passive Aggressive Classifier, TF-IDF, Real-Time Classification, Flask Deployment, Misinformation Mitigation.

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Unified Citizen Services Platform: AI-Driven Government Scheme Mapping & Grievance Redressal

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Abstract— This paper presents *SmartGov Connect*, a mobile application developed to improve citizen access to government welfare schemes and streamline the grievance redressal process. The system employs AI-based rule logic to recommend relevant schemes based on user profiles and provides a real-time complaint tracking mechanism. Developed using React Native and Firebase, the app is accessible to a wide population, particularly in rural and underserved regions. The platform focuses on inclusivity, transparency, and scalability, and aims to bridge the gap between citizens and welfare services in India.

Keywords— Government Schemes, Grievance Redressal, Mobile App, Artificial Intelligence, Firebase, React Native, e- Governance

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PREDICTIVE ANALYTICS FOR CUSTOMER VALUE ASSESSMENT AND SEGMENTATION

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Abstract: Over the past few years, breakthroughs in big data technologies have made it possible for companies to leverage customer data efficiently, changing the way firms achieve a competitive edge. Online shopping websites, especially, can significantly gain from accurate customer segmentation, resulting in reduced marketing costs, enhanced customer satisfaction, and higher Customer Lifetime Value (CLV). Legacy models like RFM analysis do not perform well with high-dimensional data and lack high accuracy. This paper presents a new method that incorporates machine learning methods to improve CLV prediction and customer segmentation. The process entails entity embedding for the better representation of categorical variables to make them more usable. Light Gradient Boosting Machine (LightGBM) is used for effective feature extraction through its histogram-based algorithms for enhanced performance. These refined features are then processed by TabNet, a robust neural network capable of handling high-dimensional tabular data, resulting in more accurate predictions. This method effectively solves for the complexity of large, heterogeneous datasets, yielding more profound and accurate customer insights than standard methods and lower-level machine learning models. The resulting analysis promotes business expansion by facilitating more precise and targeted marketing, ultimately enhancing a firm's competitive advantage.

Keywords: Customer Segmentation, LightGBM, TabNet, Machine Learning, Customer Lifetime Value, E-commerce, and Business Growth.

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Deep Learning Based Digital Forgery Detection Using Explainable AI

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Abstract – The project aims to develop a real-time Digital Security System to detect deep fake media and document forgery, ensuring authenticity, security, and trust in cyber security, legal forensics, and financial sectors. It addresses the rising threats of AI-generated deep fakes and document manipulations, which compromise privacy and lead to fraud. A multi-modal AI model will be developed using CNN, LSTM, MeshNet, ResNet50, Optical Character Recognition (OCR), and Vision Transformers to analyze videos, images, and documents. Deepfake inconsistencies are detected using CNN and ResNet50, while document forgery is identified through OCR and Transformers. The system will be deployed as an EJS-based web application using TensorFlow and Node.js. Datasets include self-generated Aadhar cards and custom-forged documents. The final system is expected to perform real-time fraud detection, provide explain ability through SHAP, and offer a scalable solution suitable for cyber security, financial, and forensic applications.

Keywords – Deepfake Detection, Document Forgery, Explainable AI (XAI), SHAP, CNN, ResNet50, OCR.

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E-COMMERCEWEB–APPUSINGREACT AND NODE.JS

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Abstract—With the rapid advancement of digital technologies, e- commerce platforms have become fundamental to the evolution of retail and business landscapes. This project focuses on the development of a scalable, responsive, and dynamic E-Commerce Web Application, leveraging React.js for the frontend and node.jswith Express.jsforbackendfunctionalities. The primary objectiveis to deliver a user-friendly and seamless shopping experience, supported by secure transaction processes and effective data management. The frontend employs a component-based architecture with Redux to ensure efficient state management and real-time user interactions. Meanwhile, the backend is structured around RESTful API services, incorporating user authentication through JSON Web Tokens (JWT) and data storage via MongoDB. Core functionalities include user account management, product browsing, shopping cart operations, order processing, and a dedicated administrative panel for product and order oversight. Designed with scalability, security, and maintainability in mind, the system architecture is well-suited for practical deployment scenarios.

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ENHANCING CHRONIC KIDNEY DISEASE PREDICTION THROUGH MACHINE LEARNING

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Abstract—CKD is a progressive illness that presents serious health hazards all over the world. Effective patient management and the avoidance of serious consequences depend on early identification. With an emphasis on the AdaBoost and CatBoost algorithms, this work offers a machine learning method for CKD prediction utilizing patient health data. These algorithms were selected due to their excellent accuracy, resilience, and capacity to manage intricate dataset interactions.. Data preprocessing techniques, including imputation of missing values, encoding of categorical features, and feature selection, are implemented to optimize model performance. The proposed method evaluates the models using performance metrics such as accuracy, precision, recall, and F1-score. The findings demonstrate that AdaBoost and CatBoost provide reliable and accurate predictions, highlighting the effectiveness of ensemble learning techniques in CKD diagnosis. This approach offers a scalable and interpretable solution for clinical decision-making, contributing to improved early detection and patient outcomes.

Keywords—Chronic Kidney Disease (CKD), Machine Learning (ML), Early Diagnosis, Ensemble Methods, AdaBoost, Data Preprocessing, Medical Prediction, Clinical Decision Support

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Modernizing Network Attached Storage: A Performance Analysis of Raspberry Pi 5 and SSD Integration

Kr Mugdh Aditya Guneet Bedi Shivam Bhatarah Dr. M. Prabu

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Abstract—This research gave a thorough study and redesign of Network Attached Storage (NAS) systems, particularly focusing on the modern implementations of NAS solutions on Raspberry Pi 5 and SSDs (Solid State Drives). We review the architectural concepts of NAS structures, find their current performance limitations, and present an aggressive exploiting design with the Raspberry Pi 5 at its core SSD's speed advantages. Our exper- imental setup exhibits remarkable enhancements in throughput, latency, and energy consumption compared to conventional NAS configurations. Our results show that our setup is capable of achieving up to 375 MB/s of sustained sequential reads and 8,000 random read IOPS,2 performance metrics that surpass not only traditional HDD-based systems but also some commercial NAS devices, all with substantially reduced power consumption. The architecture described here is efficient and feasible for use in homes and small businesses, but offers advanced features such as data redundancy, secure access, and scalability.

Index Terms—network attached storage, Raspberry Pi, solid- state drives, performance optimization, energy efficiency, storage systems, OpenMediaVault

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DESIGN OF BINARIUM: A CUSTOM 8-BIT PROCESSOR TO FACILITATE LEARNING IN COMPUTER ARCHITECTURE

Kavya M, Hitesh K V, Monish K V, Rohit D R, Sanju Basappa Mudalagi

Department of Electronics and Communication Engineering

Global Academy of Technology, Bangalore, Karnataka, India

Abstract— This paper presents the design and implementation of an 8-bit, single-instruction, manually-clocked processor with a 3-stage pipeline architecture developed specifically for educational applications. Following the development of a custom instruction set architecture (ISA) and processor architecture, the system was implemented using Verilog hardware description language and subsequently validated through functional verification with the ModelSim simulator. To enhance its pedagogical value, the Verilog design underwent synthesis using the open-source Yosys synthesis tool, generating a JSON netlist. This netlist was then transformed into a DigitalJs-compatible JSON format using the YosisToDigitalJs conversion tool. The result of this process was the development of a desktop application that leverage the use of open-source DigitalJS tool to provides students with a visual, real-time, interactive simulation environment for exploring processor operations, thereby facilitating hands-on learning of fundamental computer architecture concepts.

Keywords— single-instruction processor, educational processor design, Verilog HDL, digital logic simulation, computer architecture education, Yosys synthesis, DigitalJS.

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Multiple Disease Detection and Treatment Recommendation System

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Abstract—The integration of deep learning in medical diag- nostics has enabled the development of accurate, automated systems capable of detecting diseases from medical imaging data. This paper presents a unified Multiple Disease Detection and Treatment Recommendation System that leverages deep learning to classify pneumonia, brain tumors, and kidney stones. The brain tumor model identifies tumor presence and type from MRI scans, while the kidney stone model categorizes CT images into cyst, tumor, stone, and normal classes. All models are evaluated using metrics such as accuracy, precision, recall, and F1-score to ensure clinical reliability. A web-based application, developed using Flask and integrated with a user-friendly HTML/CSS/JavaScript frontend, allows users to upload medical images and receive real-time predictions with treatment suggestions.

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Rover Bot: Autonomous Manoeuvring and Manual Control Integration

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Abstract—This project report presents the design and development of the Rover Bot, a robotic platform integrating advanced technologies such as Raspberry Pi 4, Internet of Things (IoT), machine learning, and Simultaneous Localization and Mapping (SLAM). The Rover Bot was engineered to navigate and explore unknown and challenging terrains autonomously while supporting remote manual operation. Their versatility makes them suitable for space exploration, rescue missions, and hazardous environment exploration. The Rover Bot features a Raspberry Pi 4 as its central controller, enabling real-time decision-making and efficient hardware management. The key hardware includes ultrasonic sensors, a camera module, and IMUs for environmental awareness and obstacle detection. The software stack of the platform built on Robot Operating System (ROS) and Python enables SLAM, IOT communication, and advanced control algorithms.

Keywords-Rover, IMUs, ROS, SLAM, IOT.

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Detect skin cancer using Transformative learning ResNet Model

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ABSTRACT:

Skin cancer is one of the most common forms of cancer in the world, and early detection greatly increases the likelihood of successful treatment. This project presents an automated system for the detection of skin cancer, particularly using a deep learning approach using Resnet Architecture (Residual network). This model is trained on publicly available dermatological image datasets, which allow preprocessing techniques to improve image quality and supplement data records. The ability to learn complex functions and simultaneously reduce escape gradient problems is suitable for classifying medical images. Experimental results show high levels of accuracy in distinguishing benign and malignant lesions, indicating the potential of a model as a reliable diagnostic help for dermatologists. The system is intended to support clinical decision-making and to facilitate rapid patient intervention.

Keywords:

Resnet, Automated system, Dermatological image, Malignant lesions, Benign lesions

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

An Accurate Drain Current Model of Multichannel Cylindrical High-K HfO_2-/Si_3N_4-Based GAA-MOSFET

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ABSTRACT

This work presents a compact analytical model for the drain current of a multichannel cylindrical Gate-All-Around (GAA) MOSFET structure, employing a dual high-k gate dielectric stack composed of hafnium dioxide (HfO_2) and silicon nitride (Si_3N_4). The cylindrical GAA architecture provides full 360-degree gate control over the channel, offering superior electrostatic integrity and minimizing short-channel effects such as Drain-Induced Barrier Lowering (DIBL) and threshold voltage roll-off. The inclusion of high-k dielectrics reduces the Equivalent Oxide Thickness (EOT), allowing enhanced gate capacitance with minimal leakage. The model is derived by solving the 2D Poisson equation in cylindrical coordinates, using a parabolic approximation for the radial potential profile. Closed form expressions are obtained for surface potential, threshold voltage, and drain current. The framework incorporates natural length theory, velocity saturation, and mobility degradation for improved accuracy at Nano scale dimensions.

Keywords: Cylindrical GAA-MOSFET, High-k Dielectrics, HfO_2, Si_3N_4, Drain Current Modeling, Multichannel Architecture, Poisson's Equation, Electrostatic Control, Short-Channel Effects, Threshold Voltage, TCAD Simulation, Low-Power VLSI, Nanoscale Devices, Analytical Model.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

RISK PREDICTION FOR MULTIPLE OCCURANCES OF CARDIAC DISEASE IN PATIENTS USING MACHINE LEARNING

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Abstract:- Since cardiovascular diseases (CVDs) are a major cause of death globally, it is imperative to assess risk early and take prompt action to avoid serious consequences, such as a recurrent heart attack. In order to evaluate CVD risk and identify the probability of a recurrent heart attack in patients with a history of cardiac events, this study creates a predictive model based on machine learning. The model accurately predicts primary and secondary cardiovascular risks by combining a variety of patient variables, such as demographics, clinical biomarkers, electrocardiogram (ECG) readings, and medical history. Patients are classified into risk groups using advanced machine learning techniques, including decision trees, random forests, and support vector machines (SVM). These methods are extensively applied in data analysis and facilitates real-time risk assessment for improved management of cardiovascular health.

INDEX TERMS: Support Vector Machines (SVM), Random Forest, Decision Trees, Machine Learning, Heart Attack Recurrence, Cardiovascular Diseases (CVDs)

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Heart disease prediction: a constructive analysis of multiple machine learning algorithms and interpretation using explainable AI.

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Abstract— This study aids in the pre-detection of heart disease by integrating machine learning algorithms, including support vector machines (SVM), Naïve Bayes (NB), and K-nearest neighbors (KNN), along with hyperparameter tuning and explainable artificial intelligence (XAI) techniques. Through comparative analysis, boosting algorithms and the incorporation of XAI methods, such as SHAP values and LIME, provide insights into feature importance and individual predictions, elevating model interpretability. The significance of this research lies in its potential to predict heart disease with precision, accuracy, and transparency. The amalgamation of machine learning classifiers, normalization processes, and XAI techniques contributes to advanced screening tools, fostering trust in both the medical and research fields.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

Deep Learning-Based Multilevel Classification of EEG Signals for Seizure Detection

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Abstract- Electroencephalography (EEG) is a key diagnostic tool for monitoring brain activity, particularly in patients with epilepsy. Accurate classification of EEG signals into different seizure phases—normal, preictal, and postictal—is crucial for effective diagnosis and early intervention. This paper proposes a deep learning-based framework to classify EEG signals using both time-domain and frequency domain features. Advanced signal decomposition techniques such as Empirical Wavelet Transform (EWT), Maximal Overlap Discrete Wavelet Transform (MODWT), and Variational Mode Decomposition (VMD) are employed to extract meaningful features from non-stationary EEG data. The extracted features are then fed into four different models—Convolutional Neural Network (CNN), K-Nearest Neighbors (KNN), Long Short-Term Memory (LSTM), and Bidirectional LSTM (BiLSTM)—to evaluate classification performance. The study aims to identify the most effective model in terms of accuracy and robustness while also exploring the potential for real-time application. The proposed method holds promise for improving automated seizure detection and enhancing patient-specific treatment strategies.

Keywords-Electroencephalography (EEG), Deep Learning, Seizure Classification, Convolutional Neural Network (CNN), LSTM, Signal Processing

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Scientific Paper Recommendation System

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Abstract— The rapid growth in scientific literature makes it increasingly difficult for researchers to find relevant papers. This paper presents a novel hybrid approach to scientific paper recommendation that combines graph-based metadata relationships with semantic similarity from abstract embeddings. Unlike existing systems that require full-text extraction or citation networks, our approach leverages readily available metadata (authors, categories) and paper abstracts to create an effective recommendation engine. We implement a configurable weighting system that allows adjusting the balance between graph-based and embedding-based recommendations, demonstrating that a combination of both signals outperforms either approach alone. Our experiments with ArXiv papers show that the optimal embedding weight is approximately 0.7, with our system achieving an average category overlap of 0.78 and author overlap of 0.41 across recommendations. We also introduce a user-friendly web interface that enables researchers to get instant recommendations based on either paper IDs or text queries. This approach offers a practical solution for scientific paper recommendation when full-text extraction or citation data is limited or unavailable.

Keywords— Recommendation System, Scientific Papers, Knowledge Graphs, Embeddings Similarity, Hybrid Recommendation

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Predicting Rice Genotypes from Phenotypic and Agronomic Data Using Neural Networks: A Feasibility Study

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Abstract: Understanding the intricate relationship between an organism's genetic makeup (genotype) and its observable characteristics (phenotype) is fundamental in modern biology, particularly in crop breeding where it can enhance yield, quality, and stress tolerance. While Genomic Selection (GS) models typically predict phenotypes from genotypes (G2P), this study explores the inverse: predicting rice genotypes from phenotypic and agronomic data (P2G inference) using neural networks (NNs). With 12 measured agronomic traits supplemented by 100 simulated traits, we aim to reconstruct genotype strings from phenotype profiles. This novel approach tackles the complex, many-to-many mapping inherent in genotype-phenotype relationships, complicated by environmental influences and genetic interactions. Custom encoding/decoding schemes were developed, and model performance was assessed through binary accuracy, correlation metrics, and the Modified Akaike Information Criterion (MAIC).

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AI-DRIVEN APPROACHES FOR VLSI DESIGN

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ABSTRACT

The rapid advancement of artificial intelligence (AI) technologies is revolutionizing the field of VLSI (Very Large Scale Integration) design, enabling new methodologies that enhance efficiency, performance, and reliability. This paper explores various AI-driven approaches that streamline key processes in VLSI design, including design automation, verification, placement and routing, and power optimization. By leveraging machine learning algorithms and advanced computational techniques, designers can achieve significant improvements in layout generation and logic synthesis, as well as adaptive optimization strategies that respond dynamically to design constraints. Furthermore, AI enhances verification processes through predictive modeling and automated test generation, ensuring higher quality and robustness in final products. The integration of these AI-driven methodologies not only accelerates the design cycle but also facilitates the exploration of complex design spaces, enabling customized solutions tailored to specific applications. As the demand for more sophisticated VLSI designs continues to grow, the adoption of AI technologies will play a pivotal role in shaping the future of semiconductor design and manufacturing.

Key points: AI-driven approaches, Leveraging machine learning algorithm, Adaptive optimization strategies, automated test generation.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Automated Identification of Lung Cancer Using Enhanced YOLOv9 Deep Learning Framework

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Abstract— The prompt identification of lung cancer is crucial is at the forefront of reducing the acute mortality rate of the disease. The global effort of lung screening promotes the use of positron emission tomography (PET)and computed tomography(CT) scans among older at-risk populations for the purposes of increasing early detection rates. Despite The implementation of invasive methods, Symptoms might not manifest until the disease progresses, and it becomes challenging for the radiologist to identify lesions. If the goal is to reduce the high death rate from lung cancer, early detection is crucial. In order to increase the early detection rate, the worldwide lung screening program recommends visualizing computed tomography (CT) and positron emission tomography (PET) exams among the majority of age groups at risk. Although use of invasive techniques, symptoms hardly appear until disease is advanced making it difficult for radiologist to identify lesions. This paper introduces an advanced method for lung cancer subtype classification and detection using the latest version of YOLO, Regrettably, the outlook for individuals with a diagnosis of lung cancer at advanced stages is bleak, with a five-year rate of survivability of only 17.8%.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

A RISC-V BASED SOLDIER HEALTH MONITORING SYSTEM

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ABSTRACT — In high-altitude and risk-prone regions, monitoring the soldier's health and safety is both important and challenging. Real-time monitoring of soldiers is essential. Our system consists of a VSD Squadron Mini microcontroller, a GPS Neo 7M module, a pulse sensor, SIM800L. Our system transmits useful information in real-time to far away regions. A RISC-V microcontroller helps in low power consumption and faster execution of tasks. Military health and safety teams communicate with soldiers through wireless communication technology. Effective integration of devices is important for proper working and avoiding unusual breakdowns. To win wars against enemies, it is important to adopt and utilize the technologies that are futuristic.

Keywords- VSD Squadron Mini, GPS Neo 7M module, Pulse sensor, SIM800L.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

RISK-AVERSE PORTFOLIO OPTIMIZATION USING ARTIFICIAL INTELLIGENCE: A STUDY ON STOCK MARKET PERFORMANCE

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Abstract— With the rapid integration of artificial intelligence in financial systems, AI-driven portfolio optimization has emerged as a transformative approach for risk-adjusted investment decision-making. This paper introduces a comprehensive system that combines machine learning algorithms, clustering techniques, and sentiment analysis to optimize stock portfolios. By leveraging real-time financial data and market sentiment from diverse news sources, the model effectively clusters stocks, assesses associated risk levels, and provides allocation recommendations based on volatility and sentiment scores. Additionally, the study incorporates reinforcement learning techniques to continuously improve allocation efficiency over time, adapting to shifting market dynamics. The model's performance is compared with traditional portfolio optimization methods, showcasing its superior ability to balance return and risk while adapting to market fluctuations. Keywords — Portfolio Optimization, Stock Market, Clustering, Sentiment Analysis, Reinforcement Learning, AI, Deep Learning.

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DECENTRALIZED DATA VAULT: BLOCKCHAIN BASED SECURE STORAGE SOLUTION

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Abstract- With the growing reliance on cloud storage, concerns about data security, privacy, and centralized control have intensified. Traditional cloud storage depends on third-party auditors , making it vulnerable to breaches, single points of failure, and unauthorized access. This project proposes a blockchain-based decentralized storage solution that leverages the InterPlanetary File System (IPFS) for distributed file storage and blockchain for secure metadata management. Built using Flask, IPFS, and a custom blockchain, the system ensures data immutability, transparency, and security. IPFS provides a content-addressable storage model that enhances availability and fault tolerance, while blockchain maintains tamper-proof metadata records, ensuring integrity and traceability. This approach eliminates reliance on centralized authorities, reducing security risks and optimizing storage efficiency. The system is especially beneficial for industries like healthcare, finance, IoT, and legal document management, where data integrity and security are critical.

Index Terms- Blockchain, Decentralized Storage,
InterPlanetary File System (IPFS), Proof of Authority (PoA)

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

IOT BASED WATER QUALITY MONITORING FOR ENVIRONMENTAL CONSERVATION

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This project focuses on developing an IoT-based water quality monitoring system using the ESP32 and ESP8266 microcontrollers, integrated with the Blynk platform for real-time data visualization and analysis. The system is designed to measure essential water quality parameters, including Total Dissolved Solids (TDS), temperature, pH, and turbidity. These parameters are crucial indicators of water quality and directly impact the safety and cleanliness of water sources.Using sensors connected to the ESP32 and ESP8266, the system continuously monitors water quality. The collected data is processed and transmitted to the Blynk platform, where users can view and analyze real-time water conditions through a user-friendly interface..The system plays a significant role in supporting water treatment processes by providing accurate and continuous data, making it an invaluable tool for environmental monitoring. By ensuring that water quality standards are maintained, this IoT-based solution helps prevent environmental degradation and promotes the sustainable use of water resources.In addition to environmental benefits, the system improves the management of water resources by providing data-driven insights, allowing for more informed decision-making in water conservation efforts. This technology helps mitigate the negative effects of water pollution, contributes to maintaining ecological balance, and supports public health by ensuring access to clean water. The continuous monitoring and real-time capabilities of the ESP32, ESP8266, and Blynk-based system ensure that water quality management is more efficient, accurate, and responsive, making it a powerful tool in modern water conservation strategies.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

HealthLink: An Inclusive AI-Powered Hospital Appointment Application for Accessible Healthcare Management

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ABSTRACT:

HealthLink is an AI-enabled hospital appointment and healthcare management mobile application designed to simplify and enhance the way patients connect with hospitals. The app addresses major challenges in the healthcare system such as long wait times, inefficient appointment scheduling, and lack of accessibility for people with disabilities, the elderly, and those who are illiterate.By integrating Artificial Intelligence, HealthLink offers features such as smart doctor recommendations, voice-based appointment booking, and personalized reminders. The app supports voice commands using Natural Language Processing (NLP) and text-to-speech technology for visually impaired users. It also provides vibration and visual feedback for users with hearing impairments and a simple icon-based interface for those who are illiterate or mute.The application is developed using modern technologies including Flutter, Firebase, and AI modules for personalization and accessibility. HealthLink ensures data security, easy access to medical records, and a clean, responsive UI/UX tailored for all types of users.With a vision for inclusive digital healthcare, HealthLink aims to bridge the gap between technology and humanity by making healthcare accessible, smart, and patient-friendly.

Automated Glycemic Control Monitoring Through Retinal Image Processing

ABSTRACT:

Diabetic retinopathy (DR) is one of the most severe microvascular complications of diabetes, resulting in uninterrupted vision loss if not detected early. Glycemic control plays an important role in preventing DR progress, and timely diagnosis is important for effective diabetes management. This research presents a novel for glycemic control monitoring by analyzing retinal funds images using advanced image processing and machine learning techniques. The system supports vector machines (SVMs) and decision tree classifiers to detect and classify retinal abnormalities - especially in different stages of microaneurysms, hemorrhages, and exudates - in different stages of diabetic retinopathy. The high-resolution funds images undergo a rigid preprocessing pipeline, including the adverse increase, noise, and the facility extraction using the aged algorithm. These features are then used to train the classification model that gain high accuracy in differences between the stages of DR. Unlike traditional clinical methods relying on manual inspection, the proposed system provides an automatic, coordinated and scalable solution that quickly detection and increase interference.By combining retinal image processing with machine learning, the system provides a scalable, cost-effective equipment to improve the patient's results and pursue active diabetes care.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AI-DRIVEN SKIN DISEASE DETECTION USING STACKED ENSEMBLE LEARNING AND MATLAB PREPROCESSING

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ABSTRACT:

Skin disease is an important global health anxiety, time required and accurate diagnosis to ensure effective treatment. Traditional clinical methods relying on visual in section is often subjective, time consuming and prone error, especially in resource-limit settings. This research presents one Automatic system for recognition of dermatological issues using a stacked ensemble learning , Integrating models, XG Boost and Light GBM algorithms.Takes advantage of the system Dermo scopic image analysis, starts with strong pre processing in mat lab to increase the quality of the image through noise, reduction in noise, adverse increase, and through Generalization. Extensive facility is extracted to capture the required color, the characteristics of the texture, and the shape of the wounds. These features a reused to train classifier with a stacked model, mixing their predictions improve generalization and Clinical performance. Evaluation is conducted using acurated dataset of dermo scopic images involving various skin conditions including melanoma, basal cell carcinoma and seborrheic keratosis. System receives high Classification accuracy and F1-score of 93.5% to 92.8% performing better than traditional classifier such as SVM and Random Forest.

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DESIGN OF LIGHT WEIGHT ALGORITHM FOR PRIVACY IN VANET

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ABSTRACT:

With the increasing use of Vehicular Ad Hoc Networks (VANETs), securing user privacy and ensuring efficient communication is essential. This paper presents a lightweight privacy-preserving algorithm for VANETs that enhances data security while minimizing resource usage. This system integrates Elliptic Curve Cryptography (ECC) with pseudonym-based identity protection to anonymize vehicles in high-mobility environments. Real-time data is transmitted over authenticated channels, supporting identity revocation without affecting system performance. The proposed approach improves speed, energy efficiency, and memory consumption compared to traditional cryptographic methods. Simulation results validate its resistance to Sybil attacks, location tracking, and eavesdropping. It also ensures low latency in vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications. This algorithm contributes to secure intelligent transportation and promotes safer urban mobility through privacy-focused VANETs.

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LUNG PARENCHYMA SEGMENTATION BASED ON U-NET FUSED WITH SHAPE STREAM AND ENHANCED BY ALEX-NET

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ABSTRACT:

Parenchyma division of the lungs is important for diagnosis and treatment of pulmonary diseases such as pneumonia, tuberculosis and lung cancer. Traditional methods often fail due to variation in X-ray image quality, causing incorrect division. The project proposes an integral learning-based approach integrating U-Net with Alexnet-Optious Features to improve partition partition accuracy. The U-Net ensures accurate pixel-war-wise segmentation, while Alexnet increases feature extraction. Applied in Matlab, the preprosying pipeline involves the opposite increase and noise decrease to customize input data quality. The model is trained and validated with anotate ground trousing mask on a lung X-ray dataset. Performance evaluation is conducted using Dice coefficient, union (IU) at the intersection, and accurate-ricol curves,.

ADAPTIVE FAULT TOLERANCE TASK SCHEDULING WITH GENETIC ALGORITHM AND NODE LEVEL OPTIMIZATION FOR CLOUD ENVIRONMENTS

ABSTRACT:

This project introduces an innovative task scheduling approach for cloud computing systems, designed to optimize resource utilization and enhance fault tolerance in high-demand environments. By integrating neighboring reservations and leveraging intelligent algorithms like Genetic algorithm and NODE LEVEL optimization, the system improves resource allocation, reduces fragmentation, and ensures dynamic load balancing. With built-in redundancy and failover mechanisms, it minimizes fault impacts and predicts real-time resource needs for accurate allocation. This solution aims to boost system performance, reliability, and scalability, making it ideal for large-scale, high-performance applications requiring robust fault tolerance and efficient resource management.

KEYWORDS:

Task Scheduling, Cloud Computing, Resource Utilization, Fault Tolerance, High-Demand Environments, Genetic Algorithm, Node Level Optimization, Resource Allocation, Dynamic Load Balancing, Redundancy and Failover Mechanisms, Real-time Resource Prediction, System Performance, Reliability, Scalability

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

LUNGS WATER LEVEL MONITORING USING MATLAB

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ABSTRACT:

Lung water accumulation, medically known as pulmonary edema, is a critical condition that can lead to severe respiratory complications if not diagnosed early. This project presents a MATLAB-based image processing system designed to detect and estimate the water level in lungs using chest X-ray images. The system aims to provide a cost-effective, non-invasive, and automated diagnostic tool suitable for both clinical and rural healthcare settings. The process begins with the acquisition of chest X-ray images, which are then preprocessed using techniques such as grayscale conversion, Gaussian filtering for noise reduction, and adaptive histogram equalization for contrast enhancement. Edge detection and Otsu's thresholding methods are employed to segment potential fluid-affected regions. Morphological operations are applied to refine the segmentation and eliminate noise. By analyzing the segmented areas using MATLAB's region properties functions, the system calculates the fluid-affected area as a percentage of the total lung region. This percentage is compared against a predefined medical threshold to classify the patient's lung condition as either normal or affected.

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PROGRAMABLE BELL SCHEDULAR

S SAILASHREE

ABSTRACT:

The Arduino automatic college bell ringing system utilizes microcontroller technology to optimize time management within schools. With the use of an Arduino Uno, an RTC (Real-Time Clock) module, and a speaker, the system provides timely and precise bell notifications to mark the start and end of class hours, breaks, and school sessions. Optimized for efficient usage, this system can be used to personalize daily schedules for Monday through Saturday, such as period lengths and break intervals. The incorporation of IoT elements like the Aurduino facilitates remote control using web or mobile interfaces, making the bell system flexible and easy to use. Other functionalities are provided by a 16x2 LCD for real-time display, a voice module for announcing class changes aloud, and a buzzer for audible alerts. This project eliminates manual scheduling problems often encountered in institutions such as MTs BabussalamSimandolak, where manual bell operation and inconsistent data management frequently interrupt academic progress. By virtue of automation, real-time adjustment, and computerized reporting, this solution not only maximizes punctuality but also alleviates the teaching staff workload while ensuring a technologically driven, uninterrupted school system.

Keywords: Arduino, RTC, Speaker, College Bell Automation, IoT School Bell, Timetable Management System

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IMPROVING THE EFFICIENCY OF MULTI-LEVEL CHECKPOINTING FOR DISTRIBUTED DEEP LEARNING ACTIVITIES ON CLOUD SPOT VIRTUAL MACHINE CLUSTERS

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ABSTRACT:

A Spot Virtual Machines (Spot VMs) provide access to idle computer resources at steep savings—up to 90% off standard on-demand pricing in some cases. Using clusters of Spot VMs is a cost-effective method for training large-scale distributed deep learning (DDL) models for enterprises on a tight budget. Nonetheless, there is a danger associated with cloud providers preemption, which can lead to the loss of locally stored and memory-stored unsaved data. Networked storage systems can be used as checkpoints to reduce this risk, however training may be slowed significantly by their low write throughput. Traditional checkpointing methods incur high overhead due to frequent full-state saves, leading to increased training time and resource wastage. We introduce incremental checkpointing to reduce I/O bottlenecks and a dynamic checkpoint interval scheduler that adapts to VM preemption risks. Experimental evaluations on AWS Spot Instances demonstrate that our framework reduces checkpoint overhead by 42% compared to full-state check pointing while maintaining sub-minute recovery times.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

RAIN WATER HARVESTING AND CROP PROTECTION

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ABSTRACT:

Sustainable water and crop management are vital for ensuring food security, environmental protection, and efficient resource utilization. This work outlines an integrated approach encompassing water optimization, automated pumping systems, insect control, crop protection using ultrasonic technology, and nutrient management through NPK sensing. Efficient water usage is promoted via smart and drip irrigation, rainwater harvesting, and leak detection systems, minimizing waste and maximizing efficiency. Automated water pumping leverages sensor-based control, and IoT integration for real-time monitoring and reduced manual effort. Insect control methods—including physical barriers, biological agents, chemical treatments, and environmental management—help maintain clean water sources and healthy crops. Ultrasonic technology further enhances crop protection by repelling pests and birds, preventing disease, monitoring growth, and reducing labor, all while preserving beneficial pollinators. Nutrient management is supported by NPK sensors, which detect nitrogen, phosphorus, and potassium levels in soil, enabling precise fertilizer application and improving crop yield. Additionally, rainwater harvesting contributes to water conservation, groundwater recharge, flood mitigation, cost reduction, and improved water quality. By integrating these advanced technologies and eco-friendly practices, the approach aims to optimize agricultural productivity, promote environmental sustainability, and support resilient farming systems in both urban and rural settings.
Keyword: pest detection, rainwater harvesting, high crop yield, crop protection.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

REAL TIME SIGN LANGUAGE TRANSLATION USING CNN-LSTM HYBRID ARCHITECTURE FOR SPATIAL TEMPORAL GESTURE SYNTHESIS AND GRAMMAR REFINEMENT

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ABSTRACT:

This state-of-the-art Sign Language Translator streamlines communication between people who use sign lan- guage and those who do not by combining deep learning, computer vision, and natural language processing. The system analyzes real-time video frames obtained by OpenCV to classify hand gestures using MediaPipe for 3D hand landmark extraction and TensorFlow/Keras for training the models. Driving the sys- tem, the Long Short-Term Memory (LSTM) network efficiently records temporal dependencies in the input to find sequential hand gesture data. To lower the model loss and guarantee accuracy and robustness in practical applications, the network is trained with categorical cross-entropy on a vast collection of la- beled gesture sequences. The system improves usability by means of grammar correction component using language tool python, thereby improving output into appropriate sentences grammat- ically. Performance tests show the system performs quite well in real-time identification. The flexible design of the system guarantees effective use over a spectrum of computing platforms by allowing support of CPU as well as GPU hardware. This approach is easily accessible for application in research and real- time human-computer interaction since it offers a useful way of translating communication that uses signs and gestures.

Keywords: Sign Language Translation, Deep Learning, Gesture Recognition, LSTM, Tensor Flow, Real-Time Processing

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

DRUG RECOMMENDATION SYSTEM IN MEDICAL EMERGENCIES USING MACHINE LEARNING

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Abstract: Online recommender systems are becoming increasingly popular in the medical field, assisting hospitals, healthcare professionals, and patients with drug-related decisions. Nowadays, many individuals turn to the internet for suggestions on prescriptions before consulting their doctors. These systems are especially beneficial during emergencies like pandemics, floods, or cyclones. With the advancement of Machine Learning (ML), such systems offer more accurate and dependable clinical insights while minimizing resource. A medicine recommendation system provides essential details to patients, including the name of the medicine, correct dosage, and possible side effects. Recommendations are made based on various patient parameters such as symptoms, bloodpressure, diabetes levels, and body temperature. These systems not only enhance decision-making by offering timely and precise information but also ensure data security and reliability. Among various ML models, the decision tree algorithm is found toyield the most accurate outcomes. Incritical situations, drug recommendation systems are valuable tools for guiding patients toward safe medication options.

Keywords— Machine Learning, Decision Tree,

Recommender Systems, Drug Suggestions

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ADAPTIVE PLL FOR DYNAMIC VOLTAGE AND FREQUENCY SCALING FOR POWER-MANAGED SOCS

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ABSTRACT:

In today's System-on-Chip (SoC) architectures, power economy and performance optimization are essential criteria, particularly for portable and high-performance computing systems. A popular method for reducing power consumption is dynamic voltage and frequency scaling (DVFS), which alters the supply voltage and clock frequency in real time in response to workload needs. This study describes the implementation of an Adaptive Phase Locked Loop (PLL) on power-managed SoCs that is optimized for DVFS applications. The proposed Adaptive PLL architecture efficiently tracks voltage variations and dynamically adjusts the output frequency, ensuring stable and low-jitter clock signals across a wide operating range. The Phase Detector, Charge Pump, Loop Filter, and Voltage-Controlled Oscillator are among the PLL blocks that are carefully simulated for increased adaptability and power efficiency utilizing Cadence design tools. The system optimizes power usage while preserving performance integrity by utilizing adaptive feedback techniques.
When compared to traditional PLL systems, simulation results show notable power savings and enhanced frequency stability. In power-constrained applications, this adaptive method not only improves energy economy but also adds to the overall performance reliability of SoCs.

Keywords— Adaptive PLL, Dynamic Voltage and Frequency Scaling (DVFS), Power-Managed SoC, Phase Locked Loop Design, Energy Efficiency, Cadence Simulation.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

DESIGN AND DEVELOPMENT OF NAVIGATION SYSTEM FOR VISUALLY IMPAIRED USING ARDUINO

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ABSTRACT:

The visually impaired suffer enormous difficulties in reaching their surroundings unaided and safely. Even though there is assistive technology, many prove to be pricey or of non-practical applicability. The proposed project develops a low-cost navigation system through Arduino that has been specially developed for the visually impaired.Ultrasonic sensors are used for sensing obstacles within the user's path and used for telling the user of hazards ahead.Sensor data is processed in real-time by the Arduino microcontroller to initiate signals.It can be used comfortably and incorporated into a belt or shoes, offering user convenience and hands-free use.It increases spatial awareness and enhances mobility, enabling users to navigate confidently in unfamiliar spaces.The hardware and software elements are basic, low-cost, and easy to program.Arduino IDE is employed for development, and Embedded C/C++ is the main programming language. The system is portable, lightweight, and suitable for indoor and outdoor applications.It can sense obstacles at different distances.

Keywords: Visually Impaired, Low-Cost Navigation System, Arduino, Ultrasonic sensors andembedded systems.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

SMART STREET LIGHT WITH WEATHER MONITORING SYSTEM

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ABSTRACT:

The Smart Eco-Street Lighting and Environmental Monitoring System is a cutting-edge, solar-powered solution that detects rain, controls street light intensity based on movement, and continuously monitors air quality to improve urban infrastructure. This system, which is installed on every fifth street light, improves safety and environmental monitoring while lowering carbon footprints and electricity consumption. It provides useful data for in-the-moment decision-making by integrating with weather apps and services. This system encourages sustainability and energy efficiency in cities by leveraging motion sensors, solar energy, and smart technology. The project supports the growth of smart cities and adds to India's eco-friendly initiatives.

Keywords-Eco- Street lighting, Solar powered, Motion sensor, Air quality, Eco-friendly.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AI-Powered Educational Chat-bot: A Smart Learning Companion for Academic Success

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ABSTRACT:

The integration of application programming interfaces (API s) and artificial intelligence (AI) has completely transformed the way conversational systems function, paving the way for an AI-powered educational chat-bot that takes learning to the next level with tailored, real-time engagement. .The goal of this project is to design and build a chat-bot that uses API s to access educational platforms, retrieve data from outside sources, and provide a completely enhanced experience. Fundamentally, the chat-bot utilizes state-of-the-art language models such as Open AI's GPT or a comparable sophisticated model.The first step in the process is determining the purpose of the chat-bot and developing it to meet the needs of its users, in this case students. It might be there to answer their questions, hand out study resources, or even help with administrative stuff like scheduling or enrollment. To make sense of natural language, we'd pick a solid NLP API, something like Google dialog flow or IBM Watson, so it can understand and reply to students naturally.

Keywords— Artificial intelligence, Chat-bot , Real time interaction, Vocabulary acquisition, Response Generation.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

ENHANCED DATA SECURITY USING DISTRIBUTED FILE STORAGE SYSTEM

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ABSTRACT:

Secure data management is a major challenge in today's fast growing digital world, particularly in the face of increasing cyber threats and reliance on centralized infrastructures. Conventional storage systems, based on centralized servers, are exposed to various risks such as intrusions, data loss, and service interruptions. In order to approach a solution for these challenges, this paper explores the integration of a distributed storage system, using the IPFS (InterPlanetary File System), which is based on a decentralized peer-to-peer model similar to a Torrent concept. The proposed approach involves allowing the user to upload a file through a web interface. The file is first compressed in size, then encrypted to narrow accessibility of it. The Encrypted data file is then uploaded onto the IPFS network, where it is chunked and stored with multiple peers possessing a unique identifier leaded by its CID (Content Identifier). When user wishes to access the file, he can locate it using its CID which in turn triggers a reverse process. The downloaded file from the IPFS network is decrypted and then decompressed.

Keywords:

Secure Data Management, Decentralized Storage, IPFS, P2P network, Encryption, Decryption, Content Identifier (CID), Fault Tolerance, Data privacy, Distributed File Storage, Data Redundancy.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AI BASED EMERGENCY VEHICLE DETECTION AND TRAFFIC LIGHT CONTROL SYSTEM

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ABSTRACT:

This paper presents an intelligent, adaptive traffic light control system that integrates real-time traffic analysis, emergency vehicle detection, and dynamic signal management using computer vision and embedded hardware. The system employs a YOLOv5-based object detection model implemented through OpenCV to accurately assess traffic density at intersections using live camera feeds. An Arduino microcontroller interfaces with an LCD to visualize traffic status and control signal timing based on real-time data. The proposed approach introduces a priority-based decision mechanism that identifies emergency vehicles—such as ambulances and fire trucks—and dynamically adjusts traffic signals to provide immediate right-of-way. Unlike traditional systems that rely on static timers, this adaptive model modifies signal durations according to vehicle accumulation, thereby optimizing traffic flow and reducing overall congestion. The hardware-efficient design eliminates the need for additional sensing modules by utilizing existing visual input for both traffic and emergency detection. The result is a cost-effective, scalable, and intelligent traffic control system capable of enhancing urban mobility and ensuring timely emergency response.

Keywords- Artificial Intelligence, Traffic Light Signals, Traffic Density, Arduino, YOLOv5, Vehicle Detection.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

IMPLEMENTATION OF MULTI-FUNCTION DRONE USING KK2.1.5 CONTROLLER

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ABSTRACT:

Unmanned Aerial Vehicles (UAVs) have become essential tools in present-day applications such as surveillance, logistics, delivery and emergency response. The conventional drones have certain limitations in terms of mobility, adaptability and real-time data acquisition for an immediate response. The traditional drones have constraints in navigating complex terrains and rapid change in operational contexts. These hindrances become exceptionally evident in scenarios like pandemic responses and military operations, where human interactions are to be minimized crucially. To address these challenges, a need for a unified solution is highlighted. This next-generation hybrid drone system integrates both aerial and terrestrial mobility. Experimental evaluations conducted in simulated mission environments demonstrate significant improvements in operational flexibility, data acquisition accuracy, and mission completion time when compared to traditional single-mode UAVs. The results validate the proposed platform's effectiveness in addressing current limitations, offering a robust, multifunctional solution for next-generation unmanned systems in critical field applications.

Keywords—Hybrid drone, Unmanned aerial vehicles (UAVs), Controllers, Imaging sensors, Surveillance, Transition, Multifunction, Unified.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

PORTABLE CHARGING SYSTEM FOR EV USING MATLAB

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ABSTRACT:

With the growing shift toward electric mobility, the need for adaptable and accessible EV charging infrastructure has become critical. This study introduces a MATLAB/Simulink-based design and analysis of a portable charging system specifically intended for electric vehicles. The proposed system is modeled in two stages. The first model emphasizes rapid simulation and efficient power delivery using a PID-controlled DC-DC converter. The second model expands on this by incorporating thermal behavior and a simplified battery management system to better represent real-world scenarios. Through simulation, key metrics such as State of Charge (SOC), charging current, and output voltage are monitored to validate performance. The results confirm that the system delivers reliable and stable charging, demonstrating its potential for compact and portable EV charging applications.**Keywords**— Electric Vehicle (EV), Portable Charger, MATLAB/ Simulink, Battery Management System (BMS), DC-DC Converter, State of Charge (SOC), Pulse Width Modulation (PWM), Thermal Modeling, Power Electronics, PID Controller.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

SMART SAFETY SYSTEM FOR FISHERMEN AND TOURIST BOATS

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ABSTRACT:

The Smart Safety System for Fishermen and Tourist Boats is an innovative solution designed to enhance the safety and operational efficiency of boats by leveraging IoT and sensor technology. The system is built around the ESP32 microcontroller, which integrates multiple functionalities such as geofencing based border management, weight monitoring, crack detection and real-time environmental data transmission. Before the boat departs from the port, a load cell measures the boat's weight to ensure it is within permissible limits, preventing overloading. The system employs a flux sensor for crack detection, a UV sensor for object detection around the boat, and a DHT11 sensor to monitor temperature and humidity during voyages. This is designed to be a reliable and cost-effective solution, it addresses the critical safety challenges faced by fishermen and tourists boats, ultimately aiming to reduce accidents and improve response times during emergencies.

Keywords--- *Sensor technology, Zigbee Communication, Cloud technology, ESP32 Microcontroller, IoT.*

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

POWER GENERATION BY FOOTSTEP USING ARDUINO

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ABSTRACT:

The aim of this research is to investigate the possibility of generating electricity from footsteps using piezoelectric technology. It presents the design, development, and performance assessment of a system that converts human kinetic energy into usable electrical power. In view of the rapidly growing energy demands of the global community, the project highlights the significance of sustainable and renewable energy options. The system proposed is based on the use of motion from steps of the human to activate piezoelectric components that produce electricity. Thus, this paper presents a novel design of an integrated piezoelectric sensor, power management circuit and energy storage unit to harness the footstep energy effectively.

Keywords—*Piezoelectric sensor, Arduino, Footstep, Energy Storage*

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

REAL-TIME PEATLAND GROUNDWATER DETECTION USING MACHINE LEARNING AND SATELLITE DATA

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ABSTRACT:

Peatlands are vital ecosystems that store vast amounts of carbon and play a key role in maintaining ecological balance. Monitoring groundwater levels in peatlands is essential to prevent degradation and support sustainable land management. This study proposes a real-time groundwater detection framework for peatland areas by integrating satellite remote sensing data with machine learning, specifically using the Extreme Gradient Boosting (XGBoost) algorithm. Satellite datasets from sources such as Sentinel-1, Sentinel-2, and MODIS are utilized to extract features including vegetation indices (NDVI, EVI), surface reflectance, soil moisture proxies, and climatic variables. These features are used to train and validate an XGBoost model against ground truth hydrological data. The model demonstrates high predictive accuracy and robustness in estimating groundwater levels across various peatland types and climatic conditions. XGBoost's ability to handle nonlinear relationships, missing data, and feature importance ranking enhances both model performance and interpretability. This approach enables scalable, cost-effective, and real-time groundwater monitoring, offering valuable insights for peatland conservation and climate change mitigation strategies.

Keywords*:* Peatland, Groundwater Detection, Real-Time Monitoring, XGBoost, Machine Learning, Satellite Remote Sensing**.**

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

DESIGN AND IMPLEMENTATION OF SMART HEALTHCARE SYSTEM

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ABSTRACT:

In recent years, the integration of artificial intelligence into healthcare systems has revolutionized the delivery of medical assistance. This study presents the design and implementation of a smart healthcare system that utilizes machine learning to provide personalized medical recommendation based on user-input symptoms. The system was developed as a web-based application using the Flask framework, offering users an intuitive interface for symptoms entry and delivering accurate disease predictions using a Support Vector Classification (SVC) algorithm. SVC, known for its effectiveness in high-dimensional spaces, enables the reliable classification of diseases by learning from medical symptoms datasets. This research demonstrates the potential of combining intelligent algorithms with a user-centric design to create an accessible, reliable, and efficient health support tool aimed at empowering individuals to take proactive control of their health.

Keywords: Machine Learning, Support Vector Classification (SVC), Disease Prediction, Flask Web Application, Personalized Recommendation, Medical Diagnosis, Health Monitoring, Symptom Analysis, Data Privacy.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AUTONOMOUS SPIDERBOT FOR BORDER SAFETY AND THREAT DETECTION

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ABSTRACT:

In many domains such as astronomy, geology, and military operations, acquiring data from locations that are difficult or impossible for humans to access is critical. To address this need, advanced technologies have been developed to facilitate remote data collection. Our research presents one such innovation—a bio-inspired quadruped robot modelled after a spider, featuring three degrees of freedom per leg. This design offers excellent maneuverability on uneven terrain, closely mimicking the movement and adaptability of a spider. The robot is particularly effective in hazardous environments, including war zones, post-disaster areas such as those affected by earthquakes or volcanic eruptions, and regions inhabited by dangerous wildlife. It can be employed for remote sensing, search and rescue operations, and surveillance, providing a reliable solution where direct human involvement is risky or unfeasible.

Keywords: Bio-inspired robot, Quadruped walker, Spider-like design, Biomimicry, Hazard navigation, Remote exploration

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AUTOMATED TIMETABLE GENERATOR SYSTEM

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Abstract— The increasing complexity of academic scheduling in educational institutions often leads to inefficiencies and conflicts in manual timetable creation. This project proposes an Automated Timetable Generation System based on Android technology, designed to streamline and simplify the scheduling process for administrators, faculty, and students. The system allows the admin to input key academic data such as faculty, subjects, departments, and availability, and then automatically generates conflict-free timetables for both students and lecturers. The Android interface offers user-friendly access to the timetable, enabling real-time viewing and downloading in PDF format. This system not only minimizes human effort but also ensures accuracy, reduces scheduling conflicts, and enhances overall institutional productivity. The integration of mobile technology ensures accessibility and ease of use for all stakeholders involved.

Keywords— Automated Scheduling, Timetable Generation, Android Application, Conflict-Free Scheduling, Academic Management System, Faculty Allocation, Student Portal, Mobile Timetable Viewer, Education Technology, Real-time Schedule Access.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

AI-Driven Illness Identifier

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Abstract— The swift progress in Artificial Intelligence (AI) has profoundly influenced the healthcare industry, especially in the areas of disease identification and diagnosis. AIdriven systems utilize machine learning (ML) and deep learning (DL) techniques to examine extensive medical data, facilitating early disease recognition with remarkable precision. This paper outlines the creation of an AI-based system for disease detection that can identify various conditions by analysing medical images, patient symptoms, and clinical records. The proposed framework employs convolutional neural networks (CNNs) for diagnostics based on images and natural language processing (NLP) for the analysis of symptoms

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

Leveraging Federated Learning, Deep Learning and Generative AI for Privacy-Preserving Pollution Data Analysis

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Abstract— Air pollution poses a significant threat to global health, contributing to millions of deaths annually due to its impact on respiratory and cardiovascular systems. Nitrogen-based pollutants such as nitrogen monoxide (NO), nitrogen dioxide (NO_2), and nitrogen oxides (NO_x) are among the most prevalent and harmful air contaminants, particularly in urban environments. This study presents a comparative analysis of NO, NO_2, and NO_x levels across five capital cities in the southern states of India. The research integrates both real-world datasets and synthetic data generated using a diffusion-based generative AI model. Preprocessing techniques, including outlier removal and data visualization through heatmaps, are employed to enhance data quality and interpretability. To facilitate decentralized and privacy-preserving analysis, federated learning is implemented using the Flower framework, with time series deep learning models deployed across the cities. Model performance is evaluated using MSE, RMSE, MAE, and R^2 metrics. The study aims to reveal pollution trends across regions, assess the efficacy of synthetic data in modelling real-world scenarios, and demonstrate the potential of federated learning in environmental monitoring.

Keywords—Air pollutants, NO, NO2, NOx, Generative AI, Diffusion model, Federated learning, Deep learning models.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

Precision Diagnostics: Deep Learning-Driven Liver Tumor Detection and Classification from CT Images

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ABSTRACT

Liver cancer continues to rank among the leading causes of cancer-related deaths worldwide, underscoring the urgent need for more efficient and accurate diagnostic solutions. This paper proposes a computer-aided detection framework for liver tumor segmentation and classification, combining deep learning with advanced image processing techniques. At the core of the system is a Convolutional Neural Network (CNN)-based U-Net architecture, enhanced with dilation layers to effectively capture complex tumor boundaries. The model is trained on a curated dataset of liver images and corresponding segmentation masks, which are preprocessed, normalized, and augmented to improve generalizability across diverse medical imaging conditions. The segmentation model is optimized using the Dice Coefficient Loss function to ensure precise boundary detection with minimal errors. A user-friendly graphical user interface (GUI) developed with Python's Tkinter library streamlines the process of data input, visualization, and model execution for medical professionals. The system's performance is evaluated using key metrics—accuracy, sensitivity, specificity, and precision—demonstrating high effectiveness in aiding early tumor diagnosis. The proposed method offers a scalable and practical approach to enhancing diagnostic accuracy and supporting clinical decision- making in liver cancer treatment.

Keywords: Liver tumor, Deep Learning, CNN, U-Net, Medical Imaging, Image Processing, Tkinter GUI

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Autonomous Farming Robot with Integrated CNN-Based Leaf Disease Recognition and IoT Monitoring

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Abstract

Agriculture remains a vital sector globally, with a significant portion of the population relying on it for livelihood—particularly in India, where it is often referred to as the "Backbone of the Nation." Despite advancements in technology, many farmers continue to depend on traditional agricultural practices, resulting in increased labour and decreased efficiency. A major challenge in crop cultivation is the timely and accurate identification of plant diseases, which, if undetected, can significantly reduce yield and quality. This research presents a comprehensive solution combining both hardware and software systems to modernize agricultural operations and enhance disease detection. The hardware component involves a multifunctional agricultural robot capable of performing tasks like soil moisture detection, checking temperature and humidity, water spraying, collision detection and leaf disease detection autonomously. On the software side, a machine learning-based image processing model is employed to identify plant diseases from leaf images using a Faster R-CNN architecture implemented via Tensor Flow's object detection API. The model is trained on a curated dataset of plant diseases to ensure high accuracy and confidence in predictions. Together, the integrated system offers a robust, automated approach to precision agriculture, aiming to reduce manual effort, improve crop health monitoring, and provide timely interventions for disease management.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

DYNAMIC BUS ROUTE ALLOCATION BASED ON PASSENGER VOTING USING LoRa AND GSM TECHNOLOGIES

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Abstract— In order to optimize public transportation, this study introduces the Smart Bus Route Management System (SBRMS), which routes buses dynamically according to passenger demand in real time. Through a voting process, the system allows passengers at bus stops to identify their favorite routes by combining LoRa and GSM communication technologies. Real-time analysis of the gathered data makes it possible to reroute underutilized buses to routes with strong demand. When compared to traditional GPS or RFID-based systems, experimental results show a considerable reduction in passenger wait times and an improvement in operational efficiency.

Keywords— Smart Transport, Arduino, LoRa, Dynamic Bus Allotment, Public Transport Management,GSM.

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Chat Sphere: A Real-Time Java Chat Application Using Socket Programming

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Abstract—Chat Sphere is a desktop-based real-time chat application developed using Java, focusing on enabling smooth and responsive communication between users over a network. The project is aimed at building an enhanced version of a socket-based messaging system using a multi-threaded server-client model. This research work centers around delivering efficient real-time communication with simultaneous message handling, ensuring stability and usability. Users simply launch the application and connect using a designated IP address and port number. Once connected, participants are able to send and receive messages through a graphical user interface. Each user connection is managed through threads, allowing multiple users to communicate without interference. The interface is designed for clarity and performance, and all messages are routed through the server, which handles broadcasting. To ensure reliability, the system utilizes TCP/IP sockets, providing message delivery assurance and minimizing loss. Chat Sphere is particularly suited for educational or internal organizational use, where structured, lightweight, and secure messaging systems are needed.

Keywords—Socket Programming, Real-Time Communication, Java Networking, Client-Server Architecture, TCP/IP Protocol, Multithreading, Chat Application**.**

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Enhanced Data Security using Distributed File Storage System

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Abstract –

Secure data management is a major challenge in today's fast growing digital world, particularly in the face of increasing cyber threats and reliance on centralized infrastructures. Conventional storage systems, based on centralized servers, are exposed to various risks such as intrusions, data loss, and service interruptions. In order to approach a solution for these challenges, this paper explores the integration of a distributed storage system, using the IPFS (InterPlanetary File System), which is based on a decentralized peer-to-peer model similar to a Torrent concept.The proposed approach involves allowing the user to upload a file through a web interface. The file is first compressed in size, then encrypted to narrow accessibility of it. The Encrypted data file is then uploaded onto the IPFS network, where it is chunked and stored with multiple peers possessing a unique identifier leaded by its CID (Content Identifier). When user wishes to access the file, he can locate it using its CID which in turn triggers a reverse process. The downloaded file from the IPFS network is decrypted and then decompressed. This ensures that only authorized individuals with the necessary keys can view the original content.

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

AI POWERED PATIENT REGISTRATION & DATA OPTIMIZATION

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Abstract:

Artificial intelligence (AI) is a powerful and disruptive area of computer science, with the potential to fundamentally transform the practice of medicine and the delivery of healthcare. In this review article, we outline recent breakthroughs in the application of AI in healthcare, describe a roadmap to building effective, reliable and safe AI systems, and discuss the possible future direction of AI augmented healthcare systems.

Keywords: AI, digital health

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ENHANCING CREDIT CARD FRAUD DETECTION USING ADAPTIVE LEARNING AND IMBALANCED DATA SAMPLING TECHNIQUES

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Abstract—Credit card fraud results in substantial financial losses globally, necessitating the development of robust and efficient fraud detection systems. Modern detection techniques increasingly incorporate advanced machine learning algorithms to support fraud analysts. However, several challenges complicate the design of effective solutions, including the non-stationary nature of transaction data, extreme class imbalance, and limited availability of labeled fraudulent instances. Furthermore, access to real-world datasets is often restricted due to confidentiality concerns, leaving gaps in the understanding of optimal detection strategies.This work addresses these challenges by examining key aspects of fraud detection in real-world settings:

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

HELMET AND NUMBER PLATE DEDUCTION USING DEEP LEARNING

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Abstract:

In recent years, road safety has become a significant concern, especially in urban areas where two-wheeler usage is prevalent. One of the most critical safety measures for motorcyclists is wearing a helmet. However, enforcement of helmet rules remains a challenge due to the manual effort required. This project proposes a deep learning-based system for automated helmet detection and vehicle number plate recognition to assist traffic enforcement authorities. Leveraging state-of-the-art convolutional neural networks (CNNs), the system first detects whether the rider is wearing a helmet. If a violation is detected, the system automatically identifies the vehicle's number plate using Optical Character Recognition (OCR) techniques. The entire pipeline integrates object detection models like YOLO (You Only Look Once) or SSD (Single Shot Detector) for real-time performance and accuracy. The proposed system can be deployed in surveillance cameras to monitor traffic violations without human intervention, contributing to safer roads and more efficient law enforcement.

Keywords - Helmet Detection, Number Plate Recognition, Convolutional Neural Networks (CNN), Object Detection, YOLO (You Only Look Once)

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AI BASED REMOTE CONTROL FOR PARALYZED PERSONS

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***Abstract*—**This project, which is fully written in Python, presents a revolutionary method of controlling the cursor via face and eye movements. The system uses a variety of Python tools to allow users to make eye motions and facial expressions to naturally move the pointer on a computer screen. The technology provides a smooth and intuitive interaction experience by precisely translating the user's eye motions into cursor movements. The project also incorporates functionality that allows people with restricted movement to conduct mouse clicks with just an eye blink, improving accessibility and usability. The technology's adaptability and prospective applications in other disciplines, such as assistive technology and human-computer interaction, are demonstrated by its unique control methods coupled with its Python-based implementation.

Index Terms—Cursor control,Accessibility ,Mouse click , Human-computer interaction , Eye and face tracking ,Gesture recognition , Assistive

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RASPBERRY-PI-BASED WEATHER STATION

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Abstract— This project proposes real-time, low-cost weather monitoring system using Raspberry Pi and a suite of environmental sensors. The system can measure temperature, humidity, wind speed, wind direction, rainfall, and particulate matter (PM2.5 & PM10). These values are collected, processed, and uploaded to a cloud server, with a user-friendly web interface for data visualization. System is aimed at enabling accurate and accessible meteorological monitoring, particularly in remote or elevated regions. The final prototype demonstrates reliable data acquisition and transmission, presenting a scalable solution for real-world deployment.

Keywords— Weather Station, Raspberry Pi, Real-Time Monitoring, Environmental Sensors, IoT-based System

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SOLAR POWERED CHARGING SYSTEM WITH MPPT AND SUPERCAPACITOR INTEGRATION

Abstract

This research investigates an improved solar-powered charging architecture that combines Maximum Power Point Tracking (MPPT) with supercapacitor energy storage. The goal is to increase solar charging solutions are reliable, efficient, and responsive in real-time power applications. MPPT algorithms are used to continuallyo ptimize energy extraction from photovoltaic (PV) panels, while supercapacitors buffer transient loadf luctuations and sustain peak energy needs. Simulation models and real hardware implementations are used to analyze the system's performance under dynamic climatic circumstances and energy-demand situations.

Keywords: Solar energy, MPPT, supercapacitor, hybrid energy storage, wireless power transmission, IoT monitoring, energy efficiency, battery protection.

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PREDICTION OF HEART DISEASE IN A SYSTEM USING DATA MINING

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Abstract : The project focuses on applying data mining techniques to retail datasets to derive actionable insights. It aims to benefit retailers by enhancing decision-making in product placement, inventory management, and targeted promotions. Retailers often struggle to optimize product placement, inventory management, and marketing strategies due to a lack of insight into customer purchasing behavior. Understanding hidden patterns in transactional data is essential for enhancing customer experience and driving sales efficiency.

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DETECTION OF FRESH/ROTTEN FRUITS USING MACHINE LEARNING

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Abstract— India has a tropical environment, allowing for the easy growth of fruits and vegetable plants there. Fruits are packed with vitamins, proteins, and other beneficial components. However, there is a time frame within which the fruit is still considered to be fresh. Many fruit suppliers continue to supply fruit that is unfit for ingestion at this time due to errors made during the sorting process when the fruit is removed from the plantation and the inclusion of other fruits in the wrong packaging. As a result, it is critical to identify food rotting from the production stage through consumption. Therefore, we propose a design of computer vision based technique using deep learning with the Convolutional Neural Network (CNN) model to detect.

Keywords— Convolutional Neural Network (CNN), Deep Learning

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FLOATING WASTE COLLECTING ROBOT FOR WATER BODIES

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ABSTRACT

In developing countries, accumulation of floating waste such as plastic scraps, foam scraps or tree leaves on city canals or ponds can block water drainage and also cause pollutions. Cleaning water surface is therefore an essential routine task. In India water pollution is increasing day by day so this is becoming a serious problem for rivers, ponds etc. This mainly consist of impurities like waste water debris, plastics, garbage on floating water surface. These impurities mainly affect on health of human being and also affect on life of aquatic animals. This project focuses more on "Remote Operated and automatic, Floating and stagnant water cleaning using sensors to detect the weight of waste materials obtained, and to provide motion to the waste remover to indicate any kind of obstacles on its path of movement using an app to monitor." Wireless sensor networks represent a promising technology for water quality monitoring and management. The use of wireless sensor networks facilitates the improvement of current centralized systems and traditional manual methods, leading to decentralized smart water quality monitoring systems adaptable to the dynamic and heterogeneous water distribution infrastructure of cities. It helps to reduce the water pollution on floating and stagnant bodies. The Project aims to provide a non-polluted water body which can be used for living purposes and a cleaner environment for aquatic animals. It is cost saving in the long run, environmentally friendly and user-friendly with easy maintenance.

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IOT-BASED AMBULANCE TRACKING AND HEALTH STATUS MONITORING SYSTEM

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Abstract: The proposed IOT-based ambulance patient monitoring and reporting system designed to enhance emergency medical services (EMS) through real-time health data acquisition, secure transmission, and optimized response coordination. The system integrates biomedical sensors, including heart rate monitors, temperature sensors, pulse oximeters (SpO2), and blood pressure sensors, to continuously track patient vitals during transit. The collected physiological data is securely transmitted to a centralized server utilizing efficient communication protocols such as MQTT and HTTP. The server employs intelligent data processing techniques to process the received data, identify the nearest suitable healthcare facility, and relay critical updates to ambulance personnel, enabling informed decision-making. It incorporates GPS technology to provide precise ambulance location tracking, ensuring optimized route planning and reduced emergency response times. This comprehensive solution effectively combines IOT integration, real-time data analytics, and secure communication to improve emergency response outcomes and overall patient care.

Keywords: IOT, Emergency Medical Services , Real-time Patient Mointoring ,

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REVOLUTIONIZING GREENHOUSE FARMING WITH LORA POWERED AUTOMATION

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ABSTRACT

The process of greenhouse management requires regular environmental assessments for plant success. The basic monitoring work of temperature, humidity and sunlight by farmers turns out to be strenuous and demanding due to its daily frequency. Our automated smart greenhouse system tracks the essential variables alongside their wireless long-distance data transmission for convenience purposes. A primary functionality of our system consists of an automatic roof control system. The rooftop mechanism functions as a natural watering system which opens to water the plants during rainfalls until it reaches targeted soil moisture levels. The controlled process guarantees proper water delivery without causing excessive moisture. The system controls both internal temperature fluctuations by extending when heat increases and retracting during cold temperature descents. Under sunny conditions the roof protects plants from harmful ultraviolet rays which establishes a protected space for their development. Additional functions of this system encompass activation of irrigation pumps together with temperature cooling fans while also regulating outdoor lighting. Through automatic processes farmers need to check and modify environmental factors less frequently. The automated system maintains a secure plant environment which both saves time and reduces manual labour while improving yield production apart from decreasing farmers' workloads, also this system enables the cultivation of healthier plants through more efficient methods.

Keywords: Smart greenhouse, LoRa technology, Sensor-based farming, Automatic irrigation, Real-time monitoring, Automated roof top opening.

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Early Detection Of Landslide Using IOT

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Abstract—Landslides are one of the most dangerous and unpredictable natural disasters, often resulting in severe loss of life, damage to infrastructure, and environmental degradation. Traditional methods of landslide detection are typically reactive, expensive, and lack real-time monitoring capabilities. This paper presents a low-cost, real-time, IoT-based system for the early detection of landslides by continuously monitoring key environmental and geotechnical parameters such as soil moisture, ground vibration, slope angle, and rainfall. The system employs a wireless sensor network (WSN) integrated with microcontrollers and cloud-based data processing to track changes in these parameters. When abnormal conditions are detected based on predefined thresholds, the system automatically triggers alerts via SMS or mobile applications.

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EARLY PREDICTION OF BREAST CANCER USING HYBRID MACHINE LEARNING AND DEEP LEARNING MODEL WITH DATA INTEGRATION

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ABSTRACT - Breast cancer remains one of the most prevalent and life-threatening diseases affecting women worldwide. Early detection significantly improves survival rates, with mammogram imaging serving as a primary diagnostic tool. However, relying solely on mammogram images may not yield the highest accuracy, as it overlooks critical personalized risk factors such as genetic predisposition, family history, and lifestyle. This project aims to predict breast cancer with more accuracy by integrating mammogram image analysis with patient-specific data, including genetic information, family history, and personal health metrics. The proposed system leverages advanced machine learning algorithms to analyze both image-based and structured data, ensuring a more comprehensive and precise diagnostic approach. Convolutional Neural Networks (CNNs) are utilized for feature extraction from mammogram images, while complementary algorithms process structured clinical data, collectively improving predictive performance. By combining deep learning with traditional machine learning techniques, this project seeks to develop a robust and holistic breast cancer prediction system. The integration of diverse data sources enhances reliability and contributes to personalized healthcare, paving the way for more effective early detection and tailored treatment strategies.

Keywords- Breast Cancer Prediction, Deep Learning, Convolutional Neural Network, Machine Learning, Data Integration, Mammogram Analysis, Personalized Healthcare.

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

FACE SYNC ATTENDANCE SYSTEM

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Abstract : Deep learning, a subset of machine learning, has revolutionized fields such as image classification, natural language processing, and autonomous systems. Neural networks, particularly deep neural networks (DNNs), are at the core of this revolution. These models consist of multiple layers that learn hierarchical features from raw data, making them capable of tackling complex tasks with minimal feature engineering. However, as the field evolves, several challenges persist, including model complexity, computational efficiency, and real-time application constraints

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ENHANCED DESIGN AND DEVELOPMENT OF 2×2 MICROSTRIP PATCH ANTENNA ARRAY AT 2.85 GHZ FOR DEFENCE APPLICATIONS

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ABSTRACT

This paper presents the enhanced design and simulation of a 2×2 microstrip patch antenna array specifically engineered to operate at 2.85 GHz, targeting modern defence communication systems that demand high performance, compactness, and reliability. Initial evaluations using 1×1 and 2×1 antenna configurations yielded unsatisfactory results in critical performance metrics such as gain, directivity, return loss, and VSWR. These limitations necessitated the transition to a 2×2 square patch array to improve radiation characteristics and overall efficiency. The antenna array was designed using an FR4 substrate with a dielectric constant of 4.4 and a thickness of 1.6 mm, chosen for its affordability, ease of fabrication, and suitable dielectric properties. A centre-fed structure was implemented to ensure uniform excitation and symmetrical current distribution, thereby enhancing radiation performance. The simulation and optimization processes were carried out using ANSYS HFSS R24 Student Version, a powerful electromagnetic simulation software widely used for antenna analysis. The optimized 2×2 array achieved a peak gain of 10.8 dB, return loss of -19.2 dB, VSWR of 1.23, and a bandwidth of approximately 120MHz. These results indicate strong impedance matching, efficient radiation, and wide frequency coverage—making the antenna highly suitable for mobile defence units, UAVs, embedded RF modules, and tactical communication equipment. The structure is compact, robust, and lightweight, ensuring easy integration into space-constrained platforms without compromising on performance. In conclusion, this study demonstrates that a 2×2 microstrip patch antenna array offers a significant enhancement over smaller configurations and is well-suited for next-generation defence-grade RF systems operating at the 2.85 GHz frequency band.

Keywords Microstrip patch antenna, 2×2 array, FR4, centre-fed, HFSS, VSWR, S_{11}, defence-grade communication, 2.85 GHz.

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CHATBOT CREATION: A MODULAR AND CUSTOMISABLE FRAMEWORK FOR ADAPTIVE CONVERSATIONAL AI

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Abstract— The use of chatbots has grown across industries, yet the demand for context-aware and adaptable chatbot systems remains a challenge. This paper introduces a *Customisable Chatbot Framework* designed with modularity and extensibility in mind. It enables users to define unique personalities, domains, and behavior rules without altering core logic. Leveraging NLP models and a configuration-driven backend, the system ensures rapid deployment and seamless integration across platforms. We demonstrate its applicability in education, customer service, and healthcare, and present a comparative study highlighting enhanced user satisfaction and task efficiency.

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MALWARE DETECTION USING MACHINE LEARNING TECHNIQUES

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Abstract—Malware has become a major cybersecurity threat, evolving beyond the capabilities of traditional signature-based detection systems. Many existing approaches attempt to optimize machine learning (ML) training by reducing dataset size while maintaining accuracy. However, such compact data techniques risk losing critical feature information, making them less effective against sophisticated malware attacks.In this study, we present a comprehensive malware detection system utilizing multiple machine learning models—Decision Tree, Random Forest, K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Gradient Boosting (GBDT), Convolutional Neural Network (CNN), and Incremental Stochastic Gradient Descent (ISGD). Unlike dataset reduction approaches, we retain the full feature space while applying feature selection, outlier removal, and data normalization to optimize performance.We evaluate our models on a 100,000-record malware dataset with 35 system-level features. Our results demonstrate that Decision Tree, Random Forest, and KNN achieve near 100% accuracy, outperforming traditional compact data techniques. CNN achieves 97.79% accuracy, showing deep learning's potential in malware classification.

Index Terms—Malware Detection, Machine Learning, Feature Selection, Data Preprocessing, Decision Tree, Random Forest, CNN, Gradient Boosting, Support Vector Machine, Incremental Learning, Cybersecurity, Malware Classification, Model Evaluation, Execution Time Analysis, Data Normalization, Outlier Removal, Cyber Threat Detection, AI-driven Security.

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RULES BASED CHATBOT

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Abstract

Chatbots are revolutionizing the way businesses interact with their customers, providing instant, automated responses across a variety of channels. Leveraging advancements in artificial intelligence and natural language processing, chatbots have evolved from basic rule-based systems to more advanced conversational agents capable of handling complex inquiries. This paper explores the concept of chatbots, focusing on their definition, development, and integration in different industries. The paper further examines the advantages and disadvantages of chatbots, shedding light on their potential to enhance user experience while also discussing their limitations and challenges. By understanding both the benefits and drawbacks, businesses and developers can make informed decisions on how to effectively implement chatbots for optimal user engagement and business efficiency.

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STUDENT ENGAGEMENT PREDICTION IN CLASSROOM USING IMAGE PROCESSING

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Abstract—Student engagement plays a vital role in enhancing learning outcomes and classroom experiences. It involves emotional, behavioral, and cognitive aspects contributing to active participation in the learning process. Effective engagement assessment allows educators to improve teaching strategies, but traditional methods like surveys and observations are often subjective, time-consuming, and lack real-time feedback. This paper presents a deep learning-based framework aimed at predicting student engagement through the analysis of facial expressions, body language, and attentiveness using image processing techniques. The system captures live video feeds, processes them into 48x48 grayscale images, normalizes pixel values, and employs Convolutional Neural Networks (CNNs) to extract features and classify engagement levels accurately. The objective is to provide educators with timely feedback, enhancing student involvement and comprehension. This automated approach bridges the gap between conventional assessment techniques and AI-based solutions, offering a scalable and efficient alternative. Preliminary results indicate the potential effectiveness of the model in delivering accurate engagement predictions, contributing to improved classroom interactions and learning experiences**.**

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TRANSFER LEARNING BASED EARLY DETECTION OF AUTISM SPECTRUM DISORDER

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Abstract: Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition that affects communication, behavior, and social interaction. Early and accurate diagnosis is crucial to ensuring timely interventions and support, yet traditional screening methods are often time-consuming, expensive, and subjective. To address these limitations, this research presents a comprehensive, multimodal ASD detection system powered by machine learning and deep learning techniques. The proposed solution integrates multiple diagnostic modules, including behavioral quiz analysis and facial image classification, into a unified, user-friendly web interface built using Streamlit. All predictions are fused through a central Integration and Decision Engine that leverages ensemble learning techniques for holistic and reliable ASD classification. This fusion enhances robustness, reduces diagnostic bias, and provides users with a detailed breakdown of factors contributing to the prediction.

Keywords:Autism Spectrum Disorder (ASD), Multimodal Machine Learning, Behavioral Screening, Facial Image Recognition, , Deep Learning, LSTM, CNN, ResNet50,ASD Detection System.

Eye Cancer Prognosis and Stage Classification Using Image Preprocessing and Machine Learning Technique

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Abstract— Eye cancer remains a significant health challenge due to its often late diagnosis and diverse clinical presentation. Early detection is crucial for improving treatment outcomes and preventing vision loss. However, the manual interpretation of histopathological images is time consuming and subject to interobserver variability, leading to potential inconsistencies in diagnosis. In recent years, advancements in digital pathology and image pre-processing techniques have paved the way for more efficient and automated cancer detection. This study aims to enhance the predictive accuracy of eye cancer by integrating advanced image pre-processing techniques. A comprehensive dataset of digital histopathological images is utilized, undergoing a An organized set of pre-processing operations was implemented to elevate data reliability and ensure uniform structure throughout the dataset. These steps include RGB-to-grayscale conversion, thresholding, image sharpening, segmentation, noise reduction, contrast stretching, histogram modification, and feature extraction. These techniques help refine image clarity, enhance critical features, and reduce artifacts, ensuring optimal input for machine learning models.

Keywords—Eye Cancer, Convolutional Neural Networks, Histopathological Images, Prediction.

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Design, Simulation, and Radiation Hardening Assessment of a CBRAM Cell for Space and High-Reliability Applications

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Abstract— The growing demand for high-density, low-power non-volatile memory has positioned Conductive-Bridge RAM (CBRAM) as a promising candidate, leveraging resistive switching via metallic filament formation/dissolution between low- (LRS) and high-resistance (HRS) states. However, radiation-induced failures hinder its adoption in aerospace, defense, and other critical environments. To overcome this limitation, we propose a radiation-hardened CBRAM cell design incorporating Triple Modular Redundancy (TMR) for fault tolerance. The design employs a 1T1R (one transistor, one-resistor) architecture for controlled switching and a 4×4 array to assess scalability. Using a Verilog-A model in Cadence Virtuoso we simulated SET/RESET operations under transient conditions, demonstrating that TMR with majority voting achieves 100% fault coverage, effectively mitigating single-cell upsets. While the design significantly enhances radiation tolerance, challenges suchas leakage currents and power overhead require further optimization. This work establishes TMR-enhanced CBRAM as a viable radiation-hardened solution for space, aerospace, and
high-reliability applications.

Keywords—CBRAM, radiation hardening, Triple Modular Redundancy (TMR), resistive switching memory, non-volatile memory)

ICETCES 2025	International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025

IoT-Based Greenhouse Management and Rainwater Harvesting System

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Abstract— The current system is capable of but not yet capable of maintaining indoor humidity. Green House Monitoring and Controlling is an entire system that has the capability of monitoring and regulating humidity within a green house. This software relies on an Android mobile phone, which communicates with a central server via Wifi. This server interfaces with a microcontroller via serial communication as well as to a humidity sensor. It displays that the condition in sensor's datasheet and system in real life is proper. The obtained test result concludes that the system is functioning in the right way. Rainwater harvesting is utilized to store the rainwater for any future need. By integrating a smart water management system, rainwater harvesting will acquire the capability of storing the excess water in a smarter fashion by making use of new technology, which addresses the modules such as sensors, Arduino processors, etc. In this project, the water is stored in the top of the roof or catchment, and then it is lowered down in pipes by guttering and a stent-down process to store in a container. The gathered unfiltered water can be utilized for irrigation and various uses other than our daily needs, such as drinking water and livestock. Rather than getting the water tainted by overflow of rainwater, it can be stored and utilized for irrigation and many more things like underground rock storage [3-6]. Using the various sensors for various applications such as water level, distance control, water pumping, filters, etc., the rainwater in filters, etc., the etc. The rainwater in this model is utilized properly.

Keywords: IoT, greenhouse management, rainwater harvesting, sustainable agriculture, smart farming.

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Three Stage Approach For Water Logging In Cabel Tunnel

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Abstract: Rapid urbanization in recent years has intensified infrastructure challenges, particularly concerning recurrent waterlogging in underpasses during heavy rainfall. These flooding incidents not only disrupt vehicular movement but also pose serious safety risks due to inadequate drainage systems and poor rainwater management. To address these critical issues, this study introduces an Internet of Things (IoT)-enabled monitoring and control system designed to mitigate underpass flooding and its associated impacts. The proposed framework employs real-time water level tracking through networked sensors, enabling automated warning systems and dynamic traffic regulation. By harnessing IoT connectivity, the system facilitates instant flood detection and activates preventive measures, including automated pumping and adaptive traffic signalling, to minimize water accumulation and maintain smooth traffic flow.

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EXPLORING DEEP REINFORCEMENT LEARNING FOR STOCK TRADING: A COMPARATIVE STUDY OF INTELLIGENT STRATEGIES

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Abstract: This study explores the application of deep reinforcement learning (DRL) algorithms to stock trading by implementing and comparing three advanced models: Deep Q-Network (DQN), Double DQN, and Dueling Double DQN. The goal is to develop an automated trading strategy that maximizes profits based on historical stock price data. A custom trading environment simulates stock trading actions (buy, sell, or hold) using a sliding window of price changes and the current portfolio value as inputs. The reward structure incentivizes profitable trades and discourages unnecessary actions. DQN serves as a baseline, while Double DQN addresses the overestimation bias common in Q-learning. Dueling Double DQN enhances the learning process by estimating state values and action advantages separately. The research implements sophisticated risk management techniques and transaction cost considerations to create a more realistic trading simulation. Each model undergoes extensive training across multiple market conditions, including bull, bear, and sideways markets, to ensure robustness. The study also incorporates various technical indicators such as moving averages, relative strength index (RSI), and volatility measures as additional input features to enhance the models' decision-making capabilities. Hyper parameter tuning, experience replay, and target network updates stabilize the learning process.

Women Cab Security System

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Abstract—Women's safety in public and private transportation is critical and requires reliable security solutions. We propose an AI-based Women Cab Security System (WCSS) for real-time monitoring, anomaly detection, and emergency response. The system incorporates GPS tracking, AI driver analysis, facial recognition, and biometric authentication for secure transportation. A smart distress alert uses voice commands, gesture recognition, and panic button activation for immediate emergency responses. Machine learning analyses real-time driving patterns for anomalous behaviour, while cloud storage and blockchain encryption ensure data integrity and security. The system is a mobile and web app, enabling seamless communication between passengers, law enforcement, and emergency contacts. Experimental results show reduced response times, threat prevention, and increased safety. This research demonstrates AI and IoT's transformative impact on women's transportation security, promoting safer urban mobility. The Women Cab Security System is a transportation safety innovation that safeguards women passengers from threats in urban transport. It uses GPS and GSM to track cabs in real-time and send emergency alerts. A mobile app lets women book rides easily, send distress signals, and connect with local authorities with a tap. Efficient driver vetting increases trust and safety. Data analytics identifies incident patterns to improve safety. This research assesses the system's effectiveness in reducing travel violence against women, empowering them, and increasing urban security. It meets immediate safety needs and supports women's rights and public safety in transportation.

Keywords—Women Safety, Cab Security, GPS Tracking, GSM, AI Based Threat Detection, IoT, Emergency Alert System

ICETCES 2025	**International Conference on Emerging Trends in Computing and Engineering Systems- May 9th &10th 2025**

ARDUINO BASED SMART DEFORESTATION MONITORING SYSTEM

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Abstract: Deforestation can be considered as most critical environmental challenges which leads to biodiversity loss and habitat destruction. Traditional method of manually monitoring the forests is labour intensive and inefficient, hence this paper aims to detect the unauthorized activities namely illegal logging, fire outbreaks and smuggling using an Arduino based IOT system. This system consists of multiple sensors namely fire, vibration, metal and pH sensor for real time monitoring. The fire sensor detects the fire at the surrounding through the heat and temperature, while the vibration and metal sensors identify the tree cutting. To detect the contamination in water we use pH sensor to monitor the water quality. The Data gathered from the sensors are transmitted to a cloud based monitoring system called as Things Board Platform and the alerts are transmitted through email to the respective authorities. An alarm buzzer beeps to notify the on-site personnel. This proposed model provides a real-time and automated detection of potential threats, aiming to reduce the manual patrols.

Keywords: Arduino Uno, Deforestation, Sensor-based Detection, Tree cutting, Fire outbreaks.

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Smart Eye Glass for Visually Impaired Individuals

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Abstract: The increased number of individuals who are visually impaired globally necessitates the development of innovative technologies aid the individuals. This research paper presents a Smart eye glass which is designed to visually aid the impaired people in navigation and obstacle detection. The proposed system developed to design an smart eye glass integrates the ultrasonic sensors, Atmega328P microcontroller, GSM module, SD card and an emergency alert system to enhance the safety and mobility. The ultrasonic sensors detect the obstacle that can be caused within a range of 5 meters and a real time voice feedback can be provided via a headphone. A emergency system using a push-button enables the person to send an SMS which contains the location, time and temperature data to the guardian in the case of distress. To ensure the safety in low-light conditions, the system also incorporates an LED indicator for the night time visibility. The above prototype was tested in different environments, which indicates the device to effectively detect the obstacle and provide the timely alerts.

Keywords: Wearable smart glass, Ultrasonic sensors, Assistive Technology, Obstacle Detection, Visually impaired Navigation.

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CODE-SWITCHED SPEECH AS A TRANSFORMER FOR BILINGUAL AUTOMATED SPEECH RECOGNITION

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Abstract

The traditional bilingual Transformer neural network architecture has trouble accurately translating conversations that smoothly switch between languages in a bilingual and linguistically diverse nation like India, where a sizable section of the populace speaks multiple languages fluently. The need for more advanced language models is highlighted by this translation accuracy restriction. The Generative Pre-Trained Transformer (GPT) model, a potent deep learning architecture inside the transformer framework, is used in the suggested approach. The GPT model shows improved language recognition and generation abilities after being unsupervised trained on large amounts of text data. GPT can accurately predict and produce coherent text by learning to grasp the complexities of syntax, semantics, and contextual nuances through pre-training on a variety of datasets. We experimented on Tamil-English data and found that the Generative Pre-Trained Transformer model can achieve an 84.37% relative accuracy rate even for short sentences and 73.98% relative accuracy rate for lengthy sentences in bilingual ASR performance. The adaptability of GPT to various downstream tasks, context-aware approach to language processing in linguistically diverse environments. Index Terms—Generative Artificial Intelligence, Speech Recognition, Generative Pre- Trained Transformer (GPT), Bilingual.

Keywords: The Generative Pre-Trained Transformer, Code-switching, Automated speech recognition, Byte pair encoding, and Byte-level BPE, Convolutional neural networks

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Enhancing Medical Images Using Advanced DIP Techniques and Cloud Computing

Abstract—The intersection of cloud computing and advanced image processing has transformed the landscape of healthcare, particularly in the development of large-scale, secure, scalable, and cost-effective electronic health records (EHR) systems and imaging platforms. This paper serves two primary purposes: first, to systematically review related methodologies; and second, to propose a secure and automated pipeline for medical image management. Timely medical image analysis is a critical component of patient care. The proposed system leverages cloud computing via Dropbox for efficient storage and distribution. Medical images are captured locally and then processed using non-linear image enhancement techniques to remove noise, improve contrast, and apply edge-preserving filters. These enhanced images are uploaded to patient-specific folders in Dropbox, providing attending physicians with immediate access. Physicians can easily retrieve images using a unique patient ID, review the findings, and, if in agreement, document clinical recommendations based on the enhanced image analysis. This framework demonstrates the synergy between cloud computing and digital image processing, offering healthcare organizations a robust solution to integrate digital technologies into clinical workflows—ultimately aiming to improve health outcomes for the patients they serve.

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MediGuide: A HealthCare Navigation System

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Abstract: In today's increasingly complex healthcare environment, timely and reliable access to accurate medical information is essential for informed decision-making. To address this need, this paper presents *MediGuide*, an advanced healthcare navigation system designed to centralize and streamline access to key information about medical services and facilities.MediGuide offers users detailed insights into hospital locations, treatment options, and profiles of medical professionals categorized by specialization. The platform also includes information on consultation fees, enabling users to make cost-conscious healthcare choices. By consolidating such comprehensive data, MediGuide empowers patients and caregivers to navigate the healthcare landscape with greater clarity and confidence.One of the system's core features is its emergency management module, which provides essential guidance on symptoms, causes, preventive strategies, and treatments for a variety of urgent medical conditions. Additionally, the platform includes a dietary recommendation component that delivers condition-specific nutritional guidelines, supporting both preventive care and chronic disease management.

Keywords—Hospital Information Systems, Healthcare Data Integration, Medical Decision Support, Emergency Response, Patient Education

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Sentiment Analysis using Machine Learning

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Abstract: Sentiment analysis, or opinion mining, has become increasingly important with the rise of user-generated content across online platforms. This research explores sentiment classification using machine learning, comparing three models: VADER (Valence Aware Dictionary and sentiment Reasoner), RoBERTa (Robustly Optimized BERT Pretraining Approach), and a Multilingual BERT-based model. The study evaluates their effectiveness in classifying sentiments from textual data, highlighting their strengths and limitations. A dataset of user reviews is analysed to assess sentiment classification performance, leveraging both lexicon-based and transformer-based deep learning techniques. The findings reveal variations in accuracy, particularly in handling contextually complex and ambiguous text. Additionally, the study examines the influence of dataset size, model architecture, and preprocessing on classification results.By conducting detailed experiments and using visual analysis, this study explores how dependable the models are when applied to real-world scenarios, including areas like monitoring social media or analysing customer reviews. In wrapping up, it also looks ahead at potential improvements in sentiment analysis, highlighting the role of hybrid methodologies and more advanced NLP techniques to boost precision and better capture context.

Keywords—Sentiment Analysis, Natural Language Processing, RoBERTa, VADER, Multilingual BERT, Machine Learning.

Two-Stage CMOS Operational Amplifier Designed in Cadence Virtuoso 90nm Technology

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Abstract: This paper presents the design and simulation of a high-performance two-stage CMOS operational amplifier (op-amp) using 90nm CMOS technology, implemented in the Cadence Virtuoso design environment. The amplifier architecture consists of a PMOS differential input stage followed by an NMOS common-source gain stage, effectively combining high input impedance, good common-mode rejection, and significant voltage amplification. To ensure closed-loop stability, Miller compensation is employed, incorporating a compensation capacitor and series resistor to enhance the phase margin and frequency response by converting the right-half-plane zero to a left-half-plane zero.Transient simulation results indicate a slew rate of 70 V/µs, confirming the circuit's suitability for high-speed analog signal processing applications. The amplifier's performance was rigorously verified using DC, AC, and transient simulations in Cadence Spectre, ensuring accurate modeling of steady-state, frequency-domain, and time-domain behavior.

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AI–Augmented Multi-Gas Monitoring and Emission Control System

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The increasing impact of industrial and vehicular emissions on environmental degradation and climate change necessitates advanced systems for real-time gas monitoring and emission control. This paper presents an AI-augmented multi gas monitoring and emission control system designed to detect, analyze, and mitigate the release of harmful gases such as CO, CO_2, NH3, VCOs, SO_2 and CH_4. The system integrates a network of gas sensors with edge computing units to collect and preprocess atmospheric data. Using machine learning algorithms, it identifies emission patterns, predicts pollutant levels, and triggers automated control mechanisms to reduce harmful outputs. The AI component enhances system adaptability by learning from historical and real-time data, enabling predictive maintenance and dynamic response to varying environmental conditions. Experimental results demonstrate improved accuracy in gas detection and effective emission reduction, showcasing the potential of AI-driven solutions in promoting sustainable environmental practices.

Keywords: Artificial Intelligence (AI), Multi gas monitoring, Deep Learning, accuracy, Sustainable environmental practices

Train Accident Prevention System

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The Train Accident Prevention System (TAPS) is a safety mechanism designed to enhance the reliability and security of train operations by preventing potential accidents on railway tracks. Utilizing an Arduino microcontroller along with ultrasonic sensors, buzzers, and LEDs, the system provides real-time monitoring of the train's proximity to obstacles or hazards. The main objective of this project is to develop a low-cost, efficient solution for early detection of obstacles, thereby improving the safety of train systems, especially in situations where human intervention may be delayed or ineffective.

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Earl Detection of Lung Diseases using Artificial Intelligence

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The circumstance which influences the regular process of the lungs is categorized as lung syndrome. such as Chronic Obstructive Pulmonary s Pneumonia, Tuberculosis, disease and lung cancer are treated as most critical public health concerns worldwide, and flop to recognize and report these diseases prematurely can possibly cause irreparable outcomes. To address these challenges, the advanced method is recommended for lung infection classification and proving health department experts in the diagnosis and planning protective measures at an initial point. Prematurely recognition and correct classification of these diseases are vital for actual medication and reducing death rates. Conventional diagnostic approaches, like instruction manual analysis of chest X rays and Computerized Tomography scans are sluggish and susceptible to human oversight. With modern advances in artificial intelligence (AI), specifically deep learning, there is strengthening potential to automate and improve diagnostic progression.

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Vitamin Deficiency Prediction and Food Recommendation using Machine Learning

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ABSTRACT

Vitamin deficiency is a major global health issue and if not treated, can cause numerous diseases and disorders. Detection at an early stage is essential so that treatment is not delayed, and possible complications are avoided. In this research, a deep learning method is utilized for computerized detection of vitamin deficiency from medical images and clinical data. The system under proposal utilizes convolutional neural networks (CNNs) to examine medical images, like skin images or other biological indicators, for indications of vitamin deficiency. The model seeks to present a low-cost, non-invasive technology that can be adopted in healthcare environments for enhanced diagnostics.

Keywords: Vitamin deficiency, Deep learning, Convolutional Neural Networks, Medical imaging, Automated detection, Feature extraction.

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EAZY CART: RFID Billing System and Automatic Human Following

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Abstract-The evolution of retail environments has created a demand for smarter, more efficient shopping solutions that reduce manual effort and waiting times. This paper presents the design and implementation of the Eazy Cart system, an intelligent shopping trolley that integrates RFID-based automated billing with an autonomous following mechanism. The system is designed to enhance customer convenience by eliminating the need for traditional checkout counters and minimizing physical strain during shopping. The RFID module ensures real time item detection and billing, while ultrasonic and infrared sensors enable the trolley to follow the user safely and smoothly throughout the shopping space. The Eazy Cart system serves as a step forward toward the realization of fully automated, customer-centric retail experiences aligned with Retail 4.0.

Keywords - Smart Trolley, RFID Billing, Autonomous Navigation, Retail Automation, Embedded Systems, Human Following Robot, Retail 4.0

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Optimal Artificial Intelligence Technique for LVRT Capability Improvement of a Grid-tied Kayathar Wind Energy Conversion System

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Abstract:

This paper proposes an Advanced Artificial Intelligence Protection Technique based on Low Voltage Ride-Through (LVRT) For A Large-Scale Doubly Fed Induction Generator (DFIG) Wind Farm. The proposed protection technique consists of two dependant approaches. The first approach is fault detector algorithm that using adaptive neuro fuzzy inference system as an artificial intelligence technique to detect the fault occurrence and its location. The second approach is implementation of LVRT grid code to discriminate between tripping or not tripping decision for faulted wind turbine generators based on fault conditions such as its duration and voltage level.

Keywords ANFIS networks , DFIG , Egyptian LVRT grid code , Large-scale wind farm , Fault detector.

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Exploring the Efficacy of Reinforcement Learning Techniques in Corporate Bond Credit Rating Models

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Abstract—The topic of this work is the implementation of reinforcement learning (RL) in credit rating models for corporate bonds with the expectation to enhancing the existing credit rating systems. The RL-based model developed here uses historical related financial and macroeconomic data and continues to use the real time environment information for learning. All the evaluated parameters, including accuracy, precision, recall, and F1-score, reveal that the proposed RL model has a better performance relative to other methods. The RL agent has the feature of learning, and by a dynamic learning environment, the agent is able to offer precise bond ratings in consideration of current factors in the market. The simulation of the performance demonstrates an enhanced saving compared to iterations; the agent accumulates more rewards every time it makes a better decision. This paper discusses how RL can be used to improve the predictions of corporate bond ratings to provide better efficient tools to the financial institutions.

Keywords—Reinforcement Learning, Corporate Bond Credit Rating, Predictive Modeling, Financial Markets, Accuracy, Real-Time Learning, Adaptive Systems, Credit Scoring, Machine Learning, Financial Analytics