

Sustainable Computing for a Digital Tomorrow

॥॥ A Proceedings of Symposium:
"Intelligent Horizons: Future of AI/ML across Cloud,
Security, and Beyond"॥॥



॥॥ Organised By ॥॥
Department of Computer Science and Engineering,
JIS University

Book of Abstracts ॥॥ Volume 01 ॥॥

॥॥ Volume Editors ॥॥
Dr. Sandip Roy, Dr. Paramita Sarkar, Dr. Nazma Naskar
& Mr. Suprativ Saha



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ORGANIZED BY

DEPARTMENT OF COMPUTER SCIENCE
AND ENGINEERING

JIS UNIVERSITY

Volume Editors

DR. SANDIP ROY

DR. PARAMITA SARKAR

DR. NAZMA NASKAR

MR. SUPRATIV SAHA

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FROM EDITOR'S DESK

WE ARE PLEASED TO PRESENT THE BOOK OF ABSTRACTS TITLED “SUSTAINABLE COMPUTING FOR A DIGITAL TOMORROW”, PREPARED FOR THE ONE-DAY SYMPOSIUM ON “INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND”, HELD ON 19TH JUNE 2025 AT JIS UNIVERSITY. THIS VOLUME HIGHLIGHTS THE INNOVATIVE IDEAS AND RESEARCH CONTRIBUTIONS OF STUDENTS AND SCHOLARS IN THE FIELDS OF AI, ML, CLOUD COMPUTING, AND CYBERSECURITY. EACH ABSTRACT REFLECTS A COMMITMENT TO RESPONSIBLE INNOVATION AND SUSTAINABLE DIGITAL ADVANCEMENT. WE EXTEND OUR SINCERE THANKS TO ALL CONTRIBUTORS, MENTORS, AND REVIEWERS. WE HOPE THIS BOOK INSPIRES ONGOING EXPLORATION AND COLLABORATION IN THE TECH COMMUNITY.

Sandip Roy-

Prof. Dr. Sandip Roy



Dr. Nazma Naskar

Paramita Sarkar

Dr. Paramita sarkar



Mr. Suprativ Saha



ABOUT THE SYMPOSIUM

THE ONE-DAY SYMPOSIUM ON “INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND” IS ORGANIZED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, JIS UNIVERSITY. IT AIMS TO EXPLORE THE CONVERGENCE OF AI, ML, CLOUD COMPUTING, AND CYBERSECURITY.

BRINGING TOGETHER INDUSTRY LEADERS, ACADEMICIANS, RESEARCHERS, AND STUDENTS, THE EVENT FOSTERS KNOWLEDGE-SHARING AND DISCUSSIONS ON EMERGING TECHNOLOGIES AND THEIR REAL-WORLD IMPACT.

A MAJOR HIGHLIGHT IS THE POSTER PRESENTATION COMPETITION, WHERE CSE STUDENTS SHOWCASE INNOVATIVE, PROJECT-BASED SOLUTIONS, ENCOURAGING HANDS-ON LEARNING AND CREATIVE THINKING.

THIS SYMPOSIUM SERVES AS A PLATFORM TO BRIDGE THEORY WITH PRACTICE, INSPIRING THE NEXT GENERATION OF TECH INNOVATORS.



VICE CHANCELLOR'S MESSAGE



IT IS WITH IMMENSE PLEASURE THAT I WELCOME YOU ALL TO THE ONE-DAY NATIONAL SYMPOSIUM ON “INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND,” ORGANIZED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE), JIS UNIVERSITY ON 19TH JUNE, 2025.

TODAY, WE ARE HONOURED TO HOST TWO DISTINGUISHED PERSONALITIES—MR. BIKRAMJIT DEBNATH, COUNTRY HEAD OF MICROSOFT AZURE, INDIA AND SOUTH ASIA, AND DR. RITUPARNA CHAKI, ESTEEMED PROFESSOR FROM THE UNIVERSITY OF CALCUTTA. THEIR PRESENCE NOT ONLY ELEVATES THIS SYMPOSIUM BUT ALSO INSPIRES OUR STUDENTS AND FACULTY MEMBERS ALIKE. THE RAPID CONVERGENCE OF ARTIFICIAL INTELLIGENCE, MACHINE LEARNING, CLOUD INFRASTRUCTURE, AND CYBERSECURITY IS CHANGING THE TECHNOLOGICAL LANDSCAPE. THIS SYMPOSIUM IS A TIMELY INITIATIVE, CREATING A PLATFORM FOR DIALOGUE AND INNOVATION IN THESE CRITICAL DOMAINS.

I'M ESPECIALLY DELIGHTED THAT THE EVENT WILL CONCLUDE WITH A POSTER PRESENTATION COMPETITION, WHERE OUR CSE STUDENTS WILL SHOWCASE THEIR DEVELOPED PROJECTS. THIS OFFERS A REAL OPPORTUNITY FOR YOUNG MINDS TO DEMONSTRATE CREATIVITY, TECHNICAL SKILL, AND PRACTICAL APPLICATION.

I COMMEND THE DEPARTMENT OF CSE FOR ITS COMMITMENT TO ACADEMIC ENRICHMENT AND EXTEND MY BEST WISHES TO THE PARTICIPANTS, SPEAKERS, ORGANIZERS AND OTHER ASSOCIATED MEMBERS. LET THIS SYMPOSIUM IGNITE CURIOSITY, COLLABORATION, AND FORWARD-THINKING IDEAS.

I WISH ALL THE BEST FOR THE EVENT.

~ Prof. (Dr.) Bhaskar Gupta

Vice Chancellor, JIS University



PRO VICE CHANCELLOR'S MESSAGE

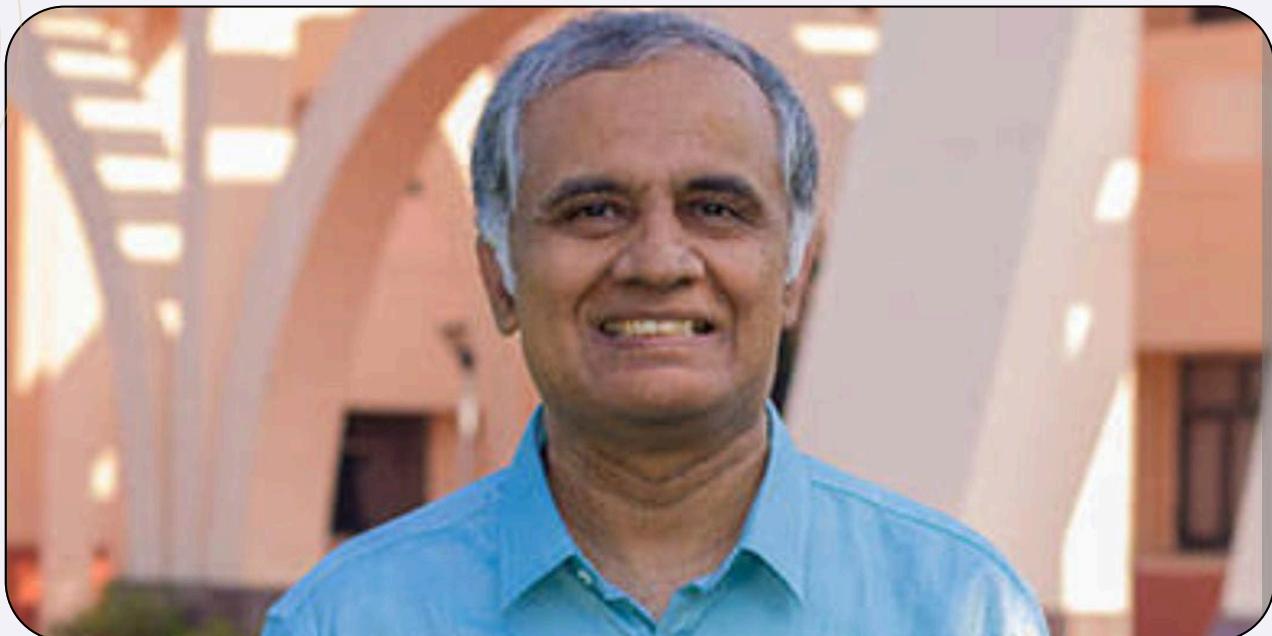


THIS SYMPOSIUM STANDS AS A TESTAMENT TO JIS UNIVERSITY'S COMMITMENT TO CUTTING-EDGE RESEARCH AND ACADEMIC EXCELLENCE. BY ADDRESSING CRITICAL AREAS LIKE ARTIFICIAL INTELLIGENCE, CLOUD TECHNOLOGIES, AND CYBERSECURITY, IT CREATES A VITAL SPACE FOR LEARNING AND COLLABORATION. I ESPECIALLY APPRECIATE THE INITIATIVE TO INCLUDE A STUDENT-LED POSTER PRESENTATION, ENCOURAGING PRACTICAL INNOVATION. MY SINCERE CONGRATULATIONS TO THE ORGANIZING TEAM, AND BEST WISHES FOR A SUCCESSFUL AND ENRICHING SYMPOSIUM.

~Prof. Gautam Ghosh

Pro Vice Chancellor, JIS University

PRO VICE CHANCELLOR'S MESSAGE



IT IS A MATTER OF PRIDE TO WITNESS JIS UNIVERSITY HOSTING THE ONE-DAY NATIONAL SYMPOSIUM ON “INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND.” THE INTEGRATION OF AI, ML, CLOUD, AND CYBERSECURITY IS SHAPING THE NEXT GENERATION OF INNOVATION, AND IT IS ENCOURAGING TO SEE OUR STUDENTS AND FACULTY ENGAGE WITH SUCH TRANSFORMATIVE TOPICS. I COMMEND THE DEPARTMENT OF CSE FOR ORGANIZING THIS FORWARD-LOOKING EVENT AND EXTEND MY BEST WISHES TO ALL PARTICIPANTS AND GUESTS.

~ Prof. Rajendra V. Nargundkar

Pro Vice Chancellor, JIS University

DEAN OF ACADEMIC'S MESSAGE



IT IS TRULY A PLEASURE TO BE PART OF TODAY'S SYMPOSIUM ON "INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND," ORGANIZED BY OUR DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING.

WE ARE PRIVILEGED TO HAVE TWO EMINENT FIGURES WITH US—MR. BIKRAMJIT DEBNATH, LEADING MICROSOFT'S AZURE OPERATIONS ACROSS INDIA AND SOUTH ASIA, AND DR. RITUPARNA CHAKI, A RENOWNED ACADEMICIAN FROM THE UNIVERSITY OF CALCUTTA. THEIR EXPERIENCE AND INSIGHTS WILL UNDOUBTEDLY ENRICH THIS EVENT. THE SYMPOSIUM'S THEME REFLECTS A CRITICAL AND DYNAMIC INTERSECTION IN MODERN COMPUTING. AI AND ML ARE TRANSFORMING INDUSTRIES, WHILE CLOUD COMPUTING AND CYBERSECURITY ARE BECOMING FOUNDATIONAL IN SUPPORTING INNOVATION SECURELY AND AT SCALE. FOR OUR STUDENTS, THIS IS NOT JUST AN ACADEMIC DISCUSSION—it is a glimpse into the future they are preparing to shape.

I AM Equally EXCITED ABOUT THE POSTER PRESENTATION COMPETITION THAT FOLLOWS. THESE STUDENT-LED PROJECT SHOWCASES ARE PROOF OF THE INNOVATION BREWING WITHIN OUR DEPARTMENT AND A TESTAMENT TO OUR EMPHASIS ON EXPERIENTIAL LEARNING.

LET TODAY BE A DAY OF OPEN LEARNING, INSPIRED THINKING, AND NEW CONNECTIONS. I CONGRATULATE THE CSE DEPARTMENT FOR THIS INITIATIVE AND WISH ALL PARTICIPANTS GREAT SUCCESS.

~ Dr. Himangshu Sekhar Maji

Dean of Academic, JIS University

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REGISTRAR'S MESSAGE



IT IS TRULY A PLEASURE TO BE PART OF TODAY'S SYMPOSIUM ON "INTELLIGENT HORIZONS: FUTURE OF AI/ML ACROSS CLOUD, SECURITY AND BEYOND," ORGANIZED BY OUR DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING.

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LET TODAY BE A DAY OF OPEN LEARNING, INSPIRED THINKING, AND NEW CONNECTIONS. I CONGRATULATE THE CSE DEPARTMENT FOR THIS INITIATIVE AND WISH ALL PARTICIPANTS GREAT SUCCESS.

~ Dr. Atanu Kotal

Deputy Registrar (Academic), JIS University



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FACE RECOGNITION: FUSION OF CNN – VEDIC PRINCIPLES

Avijit Pakhira¹, Debmalya Sanyal², Gourab Saha³, Ishita Mukherjee⁴, Muskan Kumari⁵, Abhrendu Bhattacharya⁶

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Abstract

In Vedic Mathematics, we integrated our Convolutional Neural Network (CNN) with Vedic Mathematics. That gave us not just the Vedic Mathematical Convolutional Neural Network (VMCNN), it also opened up a new phase of face recognition development. In the VMCNN, we use authentic Vedic Mathematics for our calculation, such as Urdhva-Tiryagbhyam - vertical and crosswise multiplication. The VMCNN architecture is based on Anurupyena and other Indian arithmetic sutras, replacing conventional multiplication operations with Vedic-based computations to reduce latency and computational overhead. The purpose of the integrated architecture is to generate a deep, user-customisable intelligent model that is highly efficient and fits low-power, embedded or edge devices- where computational resources are limited-in term of both electricity and memory. After conducting empirical evaluations on large-scale datasets such as ImageNet and CIFAR-10, it can be found that VMCNN has an improvement of 9.0% in accuracy, 8.3% precision, and 8.5% recall compared to traditional CNN models. The study further points to the power-saving quality of the model that can be made use in real-time biometric authentication applications, and it is for this reason that the screen readers are broadcasted at length. In addition, the paper identifies some key gaps in current research. The researchers feel that they were being too conservative when it came to addressing these asymmetrical distributions (and as you'll see shortly, they were right). Second, except for the development of lightweight Vedic-inspired models, there is no consistent attention on these difficult research problems and little success solving the solution. The researchers will therefore set out here precisely what type of methods they have already tested to reduce risk. Taking the interpretability and elegance of ancient logic together with modern artificial intelligence, face recognition performance not only got a major boost, but also proposed a way that is within reach and completely ethical. It also needed few new resources for biometric systems. The discoveries suggest wider experimental validation and interdisciplinary exploration, carving out a fresh area where the wisdom of the traditional knowledge system can be truly useful to next generation AI development."



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IMPACT OF ARTIFICIAL INTELLIGENCE ON SERVICE QUALITY AND CUSTOMER EXPERIENCE: A CASE STUDY OF THE INDIAN BANKING SECTOR

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Abstract

Customer satisfaction is a key performance indicator (KPI) in the banking sector, particularly in rural areas where personalized attention to clients is often lacking. By 2023, the Indian banking industry is expected to invest \$4.11 billion in AI-driven technologies, underscoring the expanding trend of using AI to improve customer satisfaction. Chatbots have emerged as a crucial tool in this regard, offering immediate client support by responding to questions, disclosing account details, and helping with a range of banking duties. A detailed literature review reveals that the use of chat bots in banking is increasingly popular. It is anticipated that the market for chatbots would increase from \$190.8 million in 2016 to \$1.25 billion by 2025, demonstrating the growing need for this type of technology. In order to assess this trend, this study uses a secondary data gathering methodology and both positivism and interpretivism methodologies. Python has been selected to develop a chat bot tailored to the Indian banking sector, with Natural Language Processing (NLP) at its core. NLP enables the bot to analyze user queries and provide automated, contextually relevant responses. The design phase includes the creation of a UML diagram to identify key actors and use cases, while the testing phase focuses on three key metrics: response time, user happiness, and accuracy. These factors are critical in ensuring that chat bots enhance customer experience and provide effective support. To improve AI systems and better satisfy changing customer needs, banks must actively interact with their clients.

Artificial Intelligence is changing the way banks in India interact with their customers. With tools like chatbots becoming more common, customers can now get quick and accurate responses to their questions—anytime, anywhere. This is especially helpful in rural areas, where personalized service can sometimes be limited. By using technologies like Natural Language Processing (NLP), banks are able to better understand what customers need and respond in a way that feels more personal and helpful. Our study shows that AI not only makes banking more efficient but also makes the overall customer experience smoother and more satisfying. Moving forward, it's important for banks to keep listening to their customers and updating their AI systems to meet changing expectations. In the end, the goal is simple: to make banking easier, faster, and friendlier for everyone.



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WALLEE: A PERSONAL AI ASSISTANT

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Abstract

This project presents Wallee, a personal AI assistant developed in Python to enhance user productivity through voice-based interactions. The assistant is capable of responding to a variety of commands such as fetching real-time weather updates, current time and date, telling jokes, reading the latest news, opening websites and applications, and playing songs on demand. Core Python libraries like speech recognition, pyttsx3, web browser, requests, and APIs such as OpenWeatherMap and NewsAPI are utilized.

In addition to its productivity features, Wallee includes an educational Q&A module that answers basic science questions in the fields of Physics, Chemistry, and General Science. This module utilizes predefined answers to common queries such as "What is the speed of light?", "What is oxidation?", and "What is DNA?", providing users with useful knowledge on demand.

The assistant uses rule-based response logic and minimal natural language processing to manage queries and automate tasks. This hands-free assistant showcases how Python can be used to integrate speech recognition, educational interaction, and API-based automation into a single, functional AI model tailored for daily tasks.

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INTELLIGENT RESOURCE SCHEDULING IN CLOUD COMPUTING USING EVOLUTIONARY OPTIMIZATION ALGORITHMS

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Abstract

Cloud computing has become a fundamental pillar of the digital era, offering scalable, on-demand access to computing resources over the internet. One of the key challenges in this domain is efficient resource scheduling, which directly impacts system performance, cost-effectiveness, and service quality. As cloud environments grow in complexity and heterogeneity, traditional scheduling methods often fall short, necessitating adaptive and intelligent optimization strategies. This study explores advanced algorithms for optimizing resource allocation in cloud computing, with a focus on Genetic Algorithms (GA) and Whale Optimization Algorithms (WOA). These evolutionary approaches are evaluated for their ability to handle dynamic workloads and meet Quality of Service (QoS) requirements effectively. The paper presents a comprehensive review of literature related to resource management in cloud systems, emphasizing machine learning and evolutionary techniques.

Additionally, it highlights existing gaps in research, particularly from the perspective of managing finite cloud resources in a fair and efficient manner. By addressing these challenges, the study proposes a direction for future exploration aimed at enhancing resource utilization and overall system efficiency in cloud computing environments.



IOT BASED SMART SECURITY AND USER TRACKING CAR

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Abstract

This project presents the design and implementation of an IoT-based Smart Security and User Tracking Car, aimed at enhancing safety, surveillance, and intelligent mobility. The system integrates various advanced sensors and modules—including an ESP32-WROOM-32 microcontroller, ultrasonic sensors, a LiDAR sensor, GPS, and Bluetooth communication—to enable autonomous movement, obstacle avoidance, and real-time user tracking. The car continuously scans its surroundings using ultrasonic and LiDAR sensors to follow the user while avoiding obstacles. It also monitors environmental hazards with an MQ-2 gas sensor and a fire detection sensor. In case of smoke or fire, the system halts movement, activates a buzzer and LED alerts, and sends a warning message via Bluetooth to a connected mobile device. The car's location is determined using GPS and can be tracked remotely. The system supports live data streaming and status feedback via serial communication, making it suitable for smart patrols, personal security, or disaster recovery operations. This compact and intelligent solution combines IoT technology with autonomous navigation and threat detection to offer a reliable and efficient safety mechanism for users in dynamic environments.

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REMOTE MONITORING OF PATIENTS IN IOT HEALTHCARE SYSTEM

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Abstract

This project presents the design and implementation of an IoT-based Smart Security and User Tracking Car, aimed at enhancing safety, surveillance, and intelligent mobility. The system integrates various advanced sensors and modules—including an ESP32-WROOM-32 microcontroller, ultrasonic sensors, a LiDAR sensor, GPS, and Bluetooth communication—to enable autonomous movement, obstacle avoidance, and real-time user tracking. The car continuously scans its surroundings using ultrasonic and LiDAR sensors to follow the user while avoiding obstacles. It also monitors environmental hazards with an MQ-2 gas sensor and a fire detection sensor. In case of smoke or fire, the system halts movement, activates a buzzer and LED alerts, and sends a warning message via Bluetooth to a connected mobile device. The car's location is determined using GPS and can be tracked remotely. The system supports live data streaming and status feedback via serial communication, making it suitable for smart patrols, personal security, or disaster recovery operations. This compact and intelligent solution coexists with the rapid rate of growth of the civilization our lifestyles, habits are also being changed fast. In this twenty-first century, which is known as 'the age of science as well as technology', we require betterment in everything that are basic requirement of us. Healthcare sector is one of the most important such requirements of us and to bring revolution at this field 'Internet of Things', along with Artificial Intelligence(AI) and Machine Learning(ML) come into scenario. Internet of Things or IoT is neither a very brand-new and modern technology nor it is a very age-old mechanism. Since mid-90s[36], it has come into the field of technology, but IoT alone was not sufficient enough to overcome the limitations of the traditional systems so gradually AI and now ML also have combined with it. In this paper we have basically shown the monitoring of patients remotely at their home specifically who are unable to move to the doctors, with the help of IoT as well as AI[15], maintaining Sustainability[12,13]. Many smart models of today viz. smart city, smart village, smart hospital etc. have been created by applying AI, ML and IoT. In our paper we have done the survey of almost 40 papers and after that we have seen the works done on this area since 1995, the origin of IoT. Then we have taken that data of works done on which area the major within this remote patient monitoring from 1995 to 2025. Hence we can get an idea of the area where not much work has been done so far. That will be our area of research interests.



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CHAIN-MEDIX: HEALTHCARE SECURING BLOCKCHAIN TECHNOLOGY

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Abstract

In the present world, Health and medicine play a pivotal role in every individual's life. Medical records, also referred to as Electronic Health Records(EHRs), involve a large amount of personal information. In this age of big and large data, the growth of digital healthcare records is exponentially increasing, and the rising demand for secure, compatible systems has led to the exploration of blockchain applications, also called ledger technology, in the Healthcare system [3]. Blockchain technology provides a vast number of options for managing healthcare data through its various types of applications. It encrypts the patient's data, provides full access to the data to the patient, and secures the private data from the wrong hands [2]. However, the blockchain faced various issues [1][4] like Scalability, High gas fees, data storage limitations, and others while handling the large metadata of a huge number of patients. The goal of the paper is to address the problems of the blockchain and resolve them for efficient data handling and the best service system in Healthcare technology [7]. The proposed blockchain model provides a secure, transparent, decentralized, and privacy-preserving mechanism for sharing and storing the EHRs. Previously, the data was stored in the cache block as their choices (Doctor/Patient/Admin) with a unique cache ID that holds the previous block link. After that, the data is encrypted through Advanced Encryption Standards (AES), also known as a symmetric encryption method, and transferred to the Inter Planetary File System (IPFS). IPFS prevents data storage limitations in the ledger technology. The stored data was secured by the Smart contracts, which will be used as an automated Access control in our system. Which stores implement the rules and permissions set by the patient who can access their EHR records. We also used Zero Knowledge Proof(ZKP) for authentication of doctors without revealing doctors' personal information, and Proxy Re-encryption for third-party users to work on a disease patient between two hospitals without knowing the personal details of the patient. The Decentralized Application (Dapp) acts as the core interface between patients, doctors, and the blockchain system. It plays a critical role in securely managing, viewing, and interacting with encrypted health records (EHRs). The adaptation of all this in advanced Healthcare Technology will introduce a decentralized, secure, and patient-centric EHR management system using blockchain, smart contracts, cryptography, ZKP, and proxy re-encryption. In this decentralized process the patient will able to maintain a full control over their encrypted health data, while authorized doctors can access and update records through a DApp with strict privacy verification via ZKP.



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BREAST CANCER PREDICTION USING MACHINE LEARNING

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Abstract

In women Breast cancer has now became a common and fatal disease which is increasing because of various probable factors. Early detection is of utmost importance as it significantly enhances survival rates and enables prompt medical intervention. In this study we proposed a predictive model incorporating three commonly employed Supervised learning classification and regression algorithms .The main objective is to correctly categorize tumors as benign or malignant by studying clinical and diagnostic. The project makes use of the Breast cancer dataset form kaggle which consists of 569 samples with 30 numerical features extracted from digitized images of fine needle aspirate (fna) of breast masses. The dataset underwent pre-processing to address missing values, standardize feature scales, and guarantee data quality, thereby enhancing the model's performance. A train-test split was used to assess model performance . For each algorithm , the analysis process involved measuring key model evaluation . Logistic regression achieved an accuracy of 96.5%, knn 94.7%, and svm 97.2%, suggesting that svm performed the best in classifying the data. The knn model was valued for its simplicity, while logistic regression offered interpretable outcomes and excellent generalization. The svm model excelled over other models because it could effectively handle large amounts of data and had strong decision boundaries based on margins. The study involves a comprehensive evaluation of the three models, considering their performance, computational efficiency, and applicability in the medical field. To gain a deeper understanding of feature importance and model behaviour, visualization tools like correlation heat maps, pair plots, and roc curves were utilized. The findings indicate that the predictive model can efficiently aid in the prediction of breast cancer, providing valuable support to healthcare professionals in the diagnosis and decision-making process. By automating the classification of medical conditions with high accuracy and minimal errors, these models have the potential to decrease the workload of doctors, eliminate personal biases, and enhance patient outcomes. This project concludes that svm is the most reliable model among the three for this dataset, but all three algorithms show promising results and could be integrated into a larger clinical decision support system. The methodology can be further enhanced by integrating deep learning models, employing feature selection techniques, or incorporating additional data sources to enhance prediction performance in practical scenarios.



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PLANT DISEASE DETECTION

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Abstract

Plant diseases are among the most difficult problems that the global agricultural community has to deal with as they result in food security issues, economic instability, and negative ecological consequences. The continuous search for cost- and time-effective methods to screen plant infections at the very beginning or in the case of their asymptomatic state has been complicated by the fact that the majority of diseases go unnoticed and become a problem only when visible symptoms are present, and in particular in the case of some areas. This study is directed at the establishment of a complete, multi-disciplinary model for the detection of plant diseases; this model should, thus, include the most relevant and up-to-date set of lab diagnostics, biosensor technologies, remote sensing, and AI—each mainly deep learning—to be the talking points of their respective descriptors (wordiness). Other than that, there are many different plant species that can be identified early, whether they are common or strange, and are treated correctly and in an appropriate manner.

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E.S.H.A - ENHANCED SYSTEM HANDLING ASSISTANT

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Abstract

In today's fast changing digital world, users frequently face several repetitive tasks, and unorganized workflows. To connect the gap between human intention and machine execution, the project Enhanced System Handling Assistant (E.S.H.A) has been developed. This project is an advanced AI-driven personal assistant. This project is developed by the Team EclipsEchos. The aim of E.S.H.A is to redefine the human and computer interactions by self-healing and a real time intelligent system. The assistant gets human commands and responds through a streamlined architecture which consists of a React.js based frontend, Python as a backend and Gemini Flash2 language model for intent recognition. The tasks submitted to the assistant are routed to modules which can handle project topics, reminders, and email compositions. E.S.H.A has obtained 90% accuracy in prompt interpretation and an average response time in 2 seconds. The backend handles addition of new feature, laying the groundwork for E.S.H.A O.S. The future work of the OS will include voice interface, real time IOT control, biometric based security, on-device learning and contextual awareness. This project will provide a leap in AI systems which will not merely execute tasks but will also support and enhance every digital experience.

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IOT-BASED TEMPERATURE AND HUMIDITY MONITORING AND ALERT SYSTEM

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Abstract

In modern industrial and research settings, precise control of temperature and humidity is essential to ensure the quality, safety, and reliability of sensitive processes and products. Industries such as pharmaceuticals, electronics manufacturing, biotechnology, and data centres require continuous environmental monitoring and regulation. Existing systems for maintaining these parameters are often manual—prone to human error—or rely on expensive commercial solutions that lack flexibility and scalability. This project presents a cost-effective IoT-based system for temperature and humidity monitoring and control tailored for such environments. The system integrates an ESP32 microcontroller, an Adafruit SHT4x sensor, and an e-Paper display to accurately collect and display environmental data. Data is transmitted in real time to a cloud server, where threshold-based alerts are generated and email notifications sent automatically. A mobile app enables users to register, monitor live data, configure thresholds, and manage alerts remotely. To demonstrate automation, the system controls devices such as air conditioners and heaters (simulated by a fan and LED), activating them based on environmental conditions. Our technique demonstrates that the system maintains parameters with over 98% accuracy, confirming its reliability.



AI CHATBOT : BRIDGING CONVERSATIONS

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Abstract

The AI Chatbot Project has been developed as a smart, interactive solution to replicate human oriented conversations using artificial intelligence. It is designed to smooth the conversation and support. This chatbot implements the power of Natural Language Processing (NLP) and Machine Learning (ML) to understand user input, recognize intent, and generate relevant, context-aware responses. It has been developed using Python. This system features a simple, light-weight interface which allows users to interact with it easily across various platforms. It is capable of handling frequently asked questions, offering quick information and assisting users with basic tasks. The chatbot also provides more practical based solutions to the customers. It provides all time availability as an alternative to traditional customer service or support systems. The most striking feature of this system is that it is capable of learning and continuously evolving. It learns through the past interactions to improve accuracy and personalization over time. This continuous learning process makes the chatbot smarter and more effective with usage. Running 24/7, it is ideal for business or organizations that need consistent, reliable support without human interventions. It is developed to serve various sectors like education, health care and customer service making it a versatile tool for enhancing human interactions.

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BASIC TEXT-BASED CHATBOT

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Abstract

Text-based chatbots have become integral to modern communication, with applications spanning customer service, healthcare, education, and entertainment. These conversational agents leverage advancements in artificial intelligence (AI) and natural language processing (NLP) to interact with users in increasingly sophisticated ways. This paper explores the evolution of text-based chatbots, from early rule-based systems to the current generation of AI-driven conversational models, highlighting their capabilities and limitations. It examines how chatbots operate, including the role of machine learning and NLP algorithms in enabling more human-like interactions. Additionally, the paper addresses the diverse applications of chatbots across various industries, their advantages in improving efficiency and accessibility, and the ethical and technical challenges that arise, such as privacy concerns and context understanding. Finally, the paper discusses the future of text-based chatbots, considering emerging technologies and the potential for more personalized, emotionally intelligent interactions. By examining the trajectory of chatbot development and its impact on society, this paper offers insights into the ongoing role of AI in shaping digital communication.

Keywords - Chatbot, Natural Language Processing (NLP), Artificial Intelligence (AI), Machine Learning, Human-Computer Interaction, Conversational AI, Automation, Scalability, Sentiment Analysis, Multilingual Support

In the modern digital landscape, chatbots have emerged as a revolutionary technology, reshaping how people interact with systems and access information. From customer support and e-commerce to healthcare and education, chatbots play an instrumental role in streamlining processes, providing real-time assistance, and improving user experience. Their ability to simulate human-like conversations and automate repetitive tasks has made them an indispensable tool across industries, especially as businesses and individuals seek faster, more efficient solutions to their communication needs. A chatbot, at its core, is a program designed to engage in conversations with users through text or voice. By interpreting and responding to user inputs, chatbots mimic human interaction, making it easier for users to navigate systems, retrieve information, or complete tasks. They range from simple rule-based bots with predefined responses to sophisticated AI-driven systems capable of understanding natural language and learning from interactions. The versatility and scalability of chatbots make them an essential component of modern technology.



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HAND GESTURE MOUSE CONTROL USING MEDIAPIPE, OPENCV AND PYAUDIO

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Abstract

In the realm of modern Human-Computer Interaction (HCI), the need for intuitive, contactless control systems is increasing rapidly—especially in accessibility-constrained and hygiene-sensitive environments. This project proposes a real-time gesture- and voice-enabled mouse control system, leveraging computer vision and natural language technologies to deliver a touch less interface for desktop environments. Employing MediaPipe for hand landmark detection and OpenCV for video stream handling, the system interprets hand gestures such as pointer movement, clicks, and scrolls with high precision. The integration of voice commands via the SpeechRecognition library and offline audio feedback using pyttsx3 enhances user interaction and accessibility.

A standard webcam and microphone serve as the only hardware requirements, enabling low-cost implementation. Real-time responsiveness is achieved using multithreaded execution, ensuring that voice commands and gesture detection run concurrently without performance degradation. Mouse actions such as cursor movement and click detection are facilitated by PyAutoGUI, while NumPy is used for geometric calculations on hand landmarks. The system provides a seamless user experience through visual (OpenCV overlays) and auditory (TTS feedback) confirmations.

This report outlines the complete architecture, methodology, and implementation of the system, which demonstrates efficient, cost-effective, and scalable hands-free interaction for everyday computer use. The modularity and extensibility of the system make it suitable for further development into multi-hand input, mobile applications, and smart home control systems.

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LIX RFID – AUTONOMOUS ATTENDANCE LOGS

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Abstract

Addressing the persistent challenges inherent in traditional attendance methods [1] within educational and organizational settings – namely, manual errors, time inefficiencies, and vulnerability to proxy attendance – this project introduces LIX RFID, a comprehensive and secure attendance management system. LIX RFID pioneers a hybrid approach, seamlessly integrating two powerful identification technologies: Radio Frequency Identification (RFID) for rapid, contactless scanning and biometric fingerprint authentication for secure, irrefutable identity verification [2], [3]. Utilizing cost-effective and widely available microcontrollers such as the ESP32 [3] [4] and Arduino, coupled [5] [6] with an MFRC522 RFID reader and a GT521F52 fingerprint sensor [7], [8], the system ensures fast, accurate, and reliable user identification. Attendance events captured and processed in real-time, transmitted wirelessly (via Wi-Fi), and securely stored within a robust backend database management system like MySQL or MongoDB, facilitating seamless data aggregation, ensuring data integrity, and enabling advanced analytics. Developed with a multi-layered architecture involving firmware (C++), backend logic (Python & Node.js), and an intuitive frontend interface (react-frontend) for administration and monitoring, LIX RFID significantly enhances security through its dual-authentication mechanism [6], [8].

This effectively mitigates common issues such as fraudulent entries and manual recording errors. The system is designed to streamline the attendance process, drastically reducing administrative overhead [7] for institutions managing large volumes of individuals. This report details the system's architecture, the implementation strategy employing modular components and established technologies, and an analysis of its practical benefits and feasibility. By leveraging the strengths of both RFID and biometric technologies within a scalable framework, the LIX RFID project lays a solid foundation for building reliable, efficient, and tamper-proof attendance solutions adaptable to various institutional requirements under the capital of just 4000 INR incl.



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“QRARY” – REDEFINING LIBRARY ACCESS

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Abstract

In today's digital age, the need for intelligent, accessible, and cost-efficient management solutions is paramount. QRARY addresses these needs through a sophisticated, fully web-based library management platform, engineered with HTML, CSS, and JavaScript, which functions entirely client-side by harnessing the browser's Local Storage. This architecture eliminates the need for server infrastructure, drastically reducing deployment costs and enabling offline functionality, making QRARY ideal for educational institutions with limited resources or connectivity challenges.

A core innovation of QRARY is its dynamic QR code generation based on users' roll numbers, facilitating secure, personalized, and contactless authentication for both students and administrators. The system features dedicated user and admin interfaces to streamline key functions such as book borrowing, due-date tracking, inventory management, and user monitoring. To enhance engagement, QRARY integrates a JavaScript-powered chatbot, providing real-time book recommendations and answering user queries, reflecting an intelligent and user-friendly design ethos. Security and privacy are prioritized by storing all data locally, reducing exposure to centralized data breaches. Additionally, QRARY boasts rapid QR code generation and authentication processes, ensuring a smooth and efficient user experience.

While optimized for small to medium-scale deployments, QRARY's modular design supports future enhancements including cloud integration, AI-driven personalized recommendations, and predictive analytics—making it well-aligned with the symposium's vision of AI/ML-powered intelligent systems. With an estimated minimal deployment cost, QRARY offers an accessible path toward modernizing library management and advancing digital transformation in education.

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DEV WORKIFY: A REVOLUTIONIZING USER-FRIENDLY PRODUCTIVITY HUB

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Abstract

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TRAILBUZZ – A HUMAN FOLLOWING ROBOT

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Abstract

This project presents a human following robot designed using Arduino UNO, servo motor, infrared (IR) sensors, DC motors, motor driver, jump wires, and a lithium battery. The robot is equipped with IR sensors that detect and track the human target, allowing it to follow the person autonomously. The Arduino UNO serves as the brain of the robot, processing sensor data and controlling the DC motors through the motor driver. The servo motor enables precise movement and direction control. The robot's power source is a lithium battery, providing sufficient energy for extended operation.

The human following robot has potential applications in various fields, including healthcare, retail, and security. In healthcare, it can assist patients or elderly individuals. In retail, it can follow customers to provide information or assistance. In security, it can track and monitor individuals in specific areas. The robot's design and implementation demonstrate the integration of sensors, actuators, and microcontrollers to achieve autonomous human following capability. This project showcases the potential of robotics and automation in enhancing human life and improving efficiency in various industries.

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DECOR HOME – TO DECORE HOUSE AND MORE STABLE

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Abstract

DecorHome is a web-based platform designed to assist users in planning, designing, and furnishing residential and commercial spaces. The project addresses the challenges faced by individuals—especially those with limited construction experience—by offering personalized, budget-conscious design suggestions based on user preferences and space specifications. By integrating architecture and interior design tools within an intuitive interface, DecorHome functions as a comprehensive digital assistant for construction and home styling projects.

The platform facilitates interactive exploration of decor ideas, access to professional service providers, and storage of personalized project data. Its features include dynamic design recommendations, expert consultation options, and intelligent filtering based on affordability and style. Unlike existing platforms that often lack cohesion between inspiration and execution, DecorHome focuses on bridging the gap through real-time customization and user-friendly tools. Developed using modern web technologies including HTML, CSS, JavaScript, PHP, and MySQL, the platform emphasizes responsiveness, scalability, and cross-device usability. The development process followed a modular and user-centered methodology, beginning with requirement analysis and progressing through interface design, backend integration, and usability testing. Extensive feedback from early users informed iterative improvements.

User testing confirmed that the system successfully provides tailored design ideas, budget estimates, and connections to local providers. The website's visual appeal and intuitive navigation were highlighted as strengths, while the backend effectively managed product data and user interactions. The project also outlined recommendations for future enhancements, such as AI-driven 3D visualization, mobile application support, and real-time consultations with professionals. In conclusion, DecorHome demonstrates how digital platforms can simplify complex construction and furnishing workflows. By offering a blend of intelligent automation and user empowerment, the project sets a foundation for accessible, aesthetically pleasing, and efficient interior design experiences.



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PERSONAL EXPENSES TRACKER

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Abstract

This project introduces a Personal Expenses Tracker-a user-friendly digital application designed to help individuals monitor, categorize, and manage their daily spending. In today's fast-paced financial environment, people often find it challenging to maintain control over their expenses, which can lead to overspending, lack of savings, and poor financial planning [1]. The Personal Expenses Tracker addresses these issues by providing an accessible platform for recording transactions, analysing spending patterns, and setting budget goals. Developed using a structured software development process, the application includes features such as income and expense entry, category-based tracking, monthly budget setting, and visual representations of financial data through charts and summaries. Its design focuses on simplicity, usability, and accessibility, making it suitable for students, professionals, and everyday users seeking better financial discipline [2, 3]. To evaluate the applications impact, a pilot study was conducted with a group of university students. Participants used the tracker for a month and reported improved awareness of their financial habits, increased savings, and more thoughtful spending behaviour. These results suggest that consistent use of digital budgeting tools can promote positive financial outcomes [4]. The project demonstrates how technology can support personal financial management and improve everyday decision-making. It also highlights future possibilities such as integrating bank accounts, adding AI-based recommendations, and offering multi-platform synchronization [5]. Overall, the Personal Expenses Tracker serves as both a practical financial tool and a case study in using technology to enhance financial literacy and responsibility in an increasingly digital society.

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VERBOVISION - WORDS MEET VISION

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Abstract

This project presents VERBOVISION, an AI-powered real-time multimodal [1] assistant that reimagines digital interaction [2] by seamlessly combining inputs from voice, screen content, and camera visuals into one intelligent system. Built using the Google Gemini 2.5 Flash API and a PyQt5-based graphical interface, VERBOVISION differs from conventional assistants [2][3] by understanding what the user says, sees, and shows—enabling highly contextual and natural interactions. The assistant operates in three modes: Audio Mode for speech-to-text conversion, Screen Mode for extracting on-screen information, and Camera Mode [1][4] for interpreting visual surroundings. All these inputs are processed via Gemini's multimodal [1] capabilities, which handle speech recognition, OCR, and visual analysis internally. [5][6] This makes VERBOVISION especially useful in accessibility support, education, and productivity tools. Future enhancements include multilingual support, smarter voice command flows, and deeper system integration. The project stands as a significant leap toward real-time, adaptive, and hands-free digital assistance.

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AI-DRIVEN SENTIMENT ANALYSIS FOR PRODUCT REVIEWS

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Abstract

In today's digital economy, customer reviews significantly influence product perception and decision-making. This project focuses on sentiment classification using Amazon product reviews by applying both classical machine learning techniques and advanced deep learning models. We utilized five Amazon review datasets covering diverse product categories such as electronics, books, and food. The reviews were pre-processed using standard NLP techniques including tokenization, stop word removal, and lemmatization. Feature extraction methods such as TF-IDF, n-grams, and contextual embedding from transformer models like BERT were used to generate numerical representations. We trained various models including Naïve Bayes, SVM, CNN, LSTM, and fine-tuned BERT and RoBERTa. Among these, BERT achieved the highest accuracy (~93.5%) due to its strong contextual understanding. Traditional models like SVM and CNN offered faster execution and lower resource usage, while deep models provided higher precision and adaptability. Evaluation metrics like accuracy, F1-score, and inference time were used to assess performance. This study shows how AI-driven sentiment analysis can automate review evaluation and enhance customer insight for e-commerce platforms. Future enhancements include real-time sentiment tracking, multilingual support, and explainable AI for better interpretability.

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AI SONGWRITER AND MELODY GENERATOR

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Abstract

To overcome the creative and technical hurdles inherent in conventional music composition, including time constraints, limited musical proficiency, and writer's block, this project presents the AI Songwriter and Melody Generator- a comprehensive system that empowers individuals to generate original lyrics and melodies through the use of generative artificial intelligence. Building upon advancements in system that enables people to produce original lyrics and melodies based on generative artificial intelligence [1]. Building on developments in natural language processing (NLP) and symbolic music generation, the system relies on large-scale Transformer models which have been trained on wide-ranging lyric and music datasets to generate emotionally engaging results. AI Song Generator is dedicated to simplifying the music creation process and making it easy for everyone to become a musician. Anyone who wishes to begin writing songs There is no more efficient method for aspiring songwriters to commence their creative journey than by utilizing an AI melody generator. For those songwriters seeking to explore novel artistic possibilities or expedite their compositional process, the harmonious synergy between the capabilities of Artificial Intelligence and the creativity of music producers allows the emergence of a new genre of AI-empowered musicians [2]. This endeavour aims to establish an accessible gateway for musical expression, thereby cultivating a broader interest in the music industry as it continues to evolve. The AI Song Generator is dedicated to simplifying the music creation process and democratizing the path to musical artistry [3, 4]. Users merely need to provide a concise song description or customize the lyrics, title, and style, and the system will immediately generate a complete, novel musical work. These tools do not aim to supplant musicians; instead, they democratize the creative process by providing more individuals with a foundational starting point for their musical endeavours. The architecture combines pre-trained language generators (e.g., GPT-based lyric generation) for producing meaningful and rhyming lyrics, and melody generators based on deep learning (e.g., LSTM-based or Transformers) to generate musically coherent melodic lines that follow the lyrical structure. The system features real-time inference capabilities and a user interface that facilitates interaction, customization, and editing. The system leverages MIDI synthesis and VST integration to enable playback and export capabilities, empowering users with the means to actualize their audio projects. Rather than supplanting musicians or composers, these tools aim to democratize the creative process by furnishing users with a foundation from which to embark on their artistic endeavours. Assessment using user testing and comparative analysis against human-written songs suggests that the tool enhances productivity, promotes ideation, and reduces entry barriers for potential composers and creators of content. This paper outlines the system architecture, training set, generation mechanism, and real-world applications, noting the expanding capabilities of AI to democratize the process of music composition and create creativity at all levels [5]. Using AI to generate entire songs for you instead of putting in the creative work is embarrassing, but there's still merit to it as a production tool, whether that as a way to find inspiration or generating sounds that humans can't



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FACE RECOGNITION BASED ATTENDANCE SYSTEM

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Abstract

The Face Recognition Based Attendance System[1] is an advanced solution designed to automate and streamline traditional attendance marking processes in educational institutions and organizations. Manual attendance systems are often time-consuming, error-prone, and susceptible to proxy attendance. To overcome these limitations, this project implements a system utilizing computer vision and facial recognition technology[2] to accurately identify individuals and record their attendance in real time. Developed using Python and OpenCV[3], the system employs either Haar Cascade Classifier or advanced deep learning models[4], such as CNN-based face detectors[5], for efficient and precise face detection. For the recognition process, it leverages algorithms like LBPH (Local Binary Pattern Histogram)[7] or powerful pretrained deep learning models like FaceNet[8], which transform facial images into numerical embeddings to match with pre-stored images in the database. Once a match is found, the system updates attendance records in a structured format using CSV files or MySQL databases[9]. To enhance user experience, the system incorporates a GUI interface[10] that allows administrators to monitor attendance, generate date-wise reports, and receive real-time alerts[11] for immediate verification or follow-up. These features help ensure that the attendance process is not only accurate but also manageable for institutions. The system has been tested in controlled environments, achieving high accuracy in face recognition even under variable lighting conditions, different facial angles, and minor facial expression variations. Its automated approach eliminates manual efforts, reduces human errors, and addresses security concerns by significantly minimizing the chances of fraudulent attendance. This robust integration of facial recognition with real-time data storage makes the solution not only practical but also scalable for wider adoption in schools, colleges, corporate offices, and other secured spaces. By leveraging advanced algorithms and efficient database integration, the system ensures smooth and effective attendance management suitable for modern organizational needs. In conclusion, the Face Recognition Based Attendance System provides a reliable, efficient, and secure alternative to conventional attendance methods, combining advanced computer vision algorithms with real-time database systems for seamless, automated attendance tracking.

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EARLY PARKINSON'S DISEASE DETECTION

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Abstract

Parkinson's disease (PD) is the second most common neurodegenerative disorder, predominantly affecting older adults, with no established cure. Early diagnosis is critical for effective disease management, yet current diagnostic approaches struggle with subtle symptom onset, data privacy concerns, and a lack of transparency in AI-based decision-making.

This study aims to develop and validate advanced AI-driven frameworks for early PD detection using multi-modal data while ensuring clinical interpretability and reliability. The key objectives include: (1) improving diagnostic accuracy through hybrid deep learning models, (2) mitigating data privacy risks using federated learning techniques, (3) incorporating explainable AI (XAI) methods to enhance transparency, and (4) evaluating multi-modal diagnostic efficacy across speech, imaging, and clinical datasets.

A multi-layered approach was employed, integrating deep transfer learning models (VGG19-GoogleNet) for spiral and wave drawing analysis, speech-based classification via an Interpretable Feature Ranking XGBoost (IFRX) model with feature selection and class balancing, and federated learning strategies utilizing fuzzy rule-based systems and neural networks to ensure data privacy across distributed medical institutions. MRI-based diagnostics leveraged T2-weighted 3D imaging, radiomics feature extraction, and Gradient Boosting classifiers optimized using SMOTE for data imbalance correction. Explainability was ensured through LIME, SHAP, and feature importance analysis to provide clinicians with transparent, interpretable decision-making insights.

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CANCER PREDICTION USING MACHINE LEARNING

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Abstract

Cancer Prediction Using Machine Learning (ML) Cancer remains one of the most gruelling conditions encyclopaedically, with lung cancer and breast cancer being among the most current and life-changing types. Lung cancer generally develops in the lungs, frequently due to smoking or exposure to dangerous substances, while breast cancer originates in the breast, generally affecting women. Beforehand discovery is pivotal for both, as it significantly improves the chances of successful treatment and survival. Traditional individual styles similar as necropsies, mammograms, and imaging ways, while effective, can be time-consuming and dependent on mortal interpretation. Recent advancements in Artificial Intelligence (AI) and Machine literacy (ML) have opened new possibilities in the early discovery and accurate opinion of cancer. Algorithms similar as Random Forest (Accuracy in this project by the dataset (Lung)- 96.77%, (Breast)-92.19%), Logistic Regression (Accuracy (Lung)-88.71%, (Breast)- 82.81%), and Naive Bayes (Accuracy (Lung)-95.16%, (Breast)-85.94%) can dissect large datasets, including medical records, imaging data, and patient history, to prognosticate the presence of cancer with high delicacy. These AI-grounded models offer briskly, cost-effective, and more harmonious results compared to conventional styles. The integration of ML in healthcare systems not only supports croak in making informed opinions but also enhances patient care by enabling early intervention. This paper explores the use of ML algorithms for prognosticating lung and breast cancer and their impact on ultramodern medical diagnostics.

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THE AI REVOLUTION IN LEGAL TEXT: DECODING WITH LLMS

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Abstract

With the rapid expansion of digital legal records and rising caseloads, legal practitioners face mounting pressure from the manual and time-intensive nature of case review processes[1]. This paper delivers a structured examination of existing research on the use of Artificial Intelligence (AI) and Large Language Models (LLMs) within legal technology, with special attention to systems designed to extract key legal insights—particularly from domestic violence judgments [2]. The objective is to assess how AI can significantly cut down review time—by more than 60%—shifting away from traditional reading methods toward AI-powered, query-driven analysis. The paper first outlines earlier NLP techniques such as rule-based methods and keyword extraction, before exploring how transformer-based architectures like LegalBERT, CaseLawBERT, and Mistral offer improved relevance and accuracy (up to 85%). It further investigates how Retrieval-Augmented Generation (RAG) systems reduce hallucination rates by over 30% and enhance factual alignment in lengthy case texts [3]. Research also suggests a drastic drop-in analysis time—from 5–6 hours to under 45 minutes per case—when AI tools are integrated into legal workflows [4]. A side-by-side review of free and open-source tools (e.g., FAISS, Haystack, Tesseract OCR, Hugging Face) evaluates them based on technical efficiency, licensing, and deployment feasibility. In addition, the paper discusses limitations including algorithmic bias, explainability gaps, and ethical accountability in AI-generated legal content [5]. A use case on violence against women litigation is examined through a mined case corpus, revealing thematic patterns and useful metadata insights [6]. The study also emphasizes the role of data in enhancing research clarity and interpretability. This review ultimately supports the development of responsible, accessible, and open GenAI tools for the legal domain.

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INDIAN SIGN LANGUAGE TO TEXT CONVERTER IN REAL TIME

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Abstract

Communication among hearing disabled persons and public community frequently faces because of absence of awareness of Indian Sign language (ISL) . To resolve this discrepancy , we present a real time ISL to text conversion system by utilising an integrated method that combines hardware based detection with vision based recognition methods. The hardware framework using Arduino Uno , Flex sensors and GSM module identify preconfigured static gestures and forward it to a smartphone or portable digital interface for text to speech conversion , as influenced by techniques in [8] and [4] . The vision based module uses CNN (Convolutional Neural Networks) to acknowledge all the static ISL alphabets in real time from live visual inputs. The image pipeline contains preprocessing , segmentation , feature extracting and data mining , similar to methods utilised by [3] and [5]. The CNN model improves categorization reliability and accuracy as well as real time productivity compared to classical or traditional models like LDA and SVM [2][6][7] . Furthermore , sign-gesture data is transferred via the GSM module to a cloud server for model training and adaptive learning following the architecture suggested by [9]. The system's durability across bright environments and surroundings , is verified by evaluating in different conditions , supported by findings in [1] . Additionally , real-time hand-sign recognition , as illustrated in [10] , confirms high accessibility and adaptability. Overall the system encourages inclusive communication by facilitating efficient , real-time translation of ISL into text and speech, thereby strengthening the deaf and mute community in our daily routine.

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SEASONAL CROP PREDICTION BASED ON SOIL TEXTURE

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Abstract

Accurate quantification of soil attributes and crop yield prediction is critical to improve precision agriculture and secure food. National-scale mapping of soil properties, although not heavily exploited previously, has benefited greatly from rigour in the validation and optimization procedures, establishing methods to understand soil attributes over a land mass and the spatial characteristics of soils [1]. These methodologies, augmented by remote-sensing imagery, provide feasible and ecological alternatives to standard soil testing [9]. Crop yield forecasting has developed progressively from a field observational basis to statistical model building using agro-meteorological observation and accumulated data over time (climate-data) [2][3]. Seasonal forecasts, that included UAV imagery and weather-soil interactive characteristics, resulted in timely and more accurate forecast measurements with a lower margin of error for field extrapolation [4]. Climate-based monitoring of soil moisture with systems such as AWRA-L, AMBAV and POAMA-2 assists in monitoring the dry season and formulating water resilient agricultural plans [5][6]. Forecasting systems based on patterns within the soil moisture memory have effectively enabled agricultural practitioners to forecast dry years selected weeks in advance [7]. Indices based on rainfall to make forecasting, customized according to appropriately defined geographical regions, facilitate more timely decision making in vulnerable regions such as the Sahel [8]. Furthermore, combining optical sensors and soil moisture monitoring helps improve in-season and post-season yield forecasting for crops such as winter wheat [10]. Taken together, these integrated approaches emphasize the importance of data-driven, soil-informed forecasting systems in contributing to sustainable agriculture in the face of emerging climate trends.

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EDUARCHIVE: YOUR ULTIMATE ARCHIVE FOR PYQS

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Abstract

Preparation for competitive exams is usually a taxing endeavor, but with the right tool at no charge, it can make an appreciable impact. EduArchive is a free academic web portal aimed to assist aspirants for preparation of various national competitive examinations like GATE, CAT, IITJAM, GRE, and others. It offers its users instant access to a carefully curated set of more than 100 past-year question papers of several disciplines. The core objective is to enable engineering and management students—along with aspiring students from other disciplines—by providing them with dependable, systematic material for self-study.

Students preparing for multiple competitive exams no longer need to visit multiple websites to gather multiple exams' previous-year question papers. With EduArchive, students will get all their required materials in a more organized way in one single platform, saving their valuable preparation time.

The site features a modern, responsive web user interface built with HTML, CSS, and JavaScript [1][2][3]. Its backend has been created with Python and the Django framework, which supports smooth data management, robust performance, and secure access, by the users [3]. EduArchive is designed for quick content retrieval and easy browsing and navigation. This allows users to spend less time on websites and more time solving problems. The website follows usability and accessibility guidelines, which allows it to work well on various devices and screen sizes [4].

Through its open-access question database, EduArchive ensures cheap exam preparation and is aligned with the growing application of open educational resources (OERs) in higher education [5]. The new question papers get updated periodically, and hence EduArchive is a dynamic and original guide towards the direction of exam preparation.

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NEURALINK AND THE NEXT FRONTIER OF HUMAN-COMPUTER INTEGRATION

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Abstract

Neuralink Corporation, founded by Elon Musk in 2016, is pioneering the development of high-bandwidth brain-computer interface (BCI) technologies aimed at facilitating seamless communication between the human brain and external devices [13]. Neuralink's implant, the N1 chip, comprises 1,024 electrodes across ultra-thin threads capable of recording neural signals with sub-millisecond precision [11]. These signals are decoded using AI-driven algorithms, enabling thought-based control over digital interfaces and laying the foundation for brain-to-brain (B2B) communication [14].

Recent milestones include successful human trials, such as the case of Noland Arbaugh—a quadriplegic who regained digital autonomy through thought-controlled cursor navigation [1][2]. Subsequent trials demonstrated expanded capabilities like controlling 3D design tools and synthesizing speech for ALS patients [6][8]. Neuralink's vision extends toward enabling consensual telepathy, where thoughts and emotions could be exchanged directly between individuals [9][15].

This paper explores the technical components of the Neuralink system, including its biocompatible materials, wireless power supply, surgical implantation via robotic precision, and the software ecosystem that supports real-time neural decoding [11][13]. It further analyzes B2B communication in the context of early EEG-based studies, invasive signal acquisition, and real-life applications in mobility restoration, communication, and neurological disorder treatment [14].

Despite its potential, the technology raises ethical concerns regarding cognitive privacy, neurosecurity, and societal inequality [12][10]. As Neuralink progresses, it confronts challenges involving long-term implant safety, neural signal interpretation, and identity preservation [4][5]. Nevertheless, its fusion of neuroscience, robotics, and AI offers transformative possibilities—from collaborative neural networks to augmented learning and emotional synchronization [7].

This abstract presents Neuralink not just as a medical breakthrough, but as a step toward redefining human interaction, with implications spanning healthcare, education, defense, and human cognition [3].

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ARTIFICIAL INTELLIGENCE IN FASHION DESIGN AND METHODS

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Abstract

The world of fashion is witnessing a revolutionary change and one of the key forces behind this change is Artificial Intelligence (AI) that brings the novelty to the design and manufacturing methods. In this abstract, I will examine the multidimensionality of AI incorporated at different phases of the fashion lifecycle, including the conceptualization of an idea, consumer involvement, etc. AI-based algorithms are changing the way trends are predicted, as trends are being forecasted more accurately than ever before, extracting invaluable information about social media, sales and cultural trends, and patterns, removing the need to do market research. Moreover, generative AI systems are enabling new design generation, helping in generating patterns, as well as fabric selection and even assist in prototyping virtually, which will signify massive reduction in time-to-market and significant wastage of materials. Artistic aesthetics can be combined with such techniques as neural style transfer, and machine learning algorithms can optimize supply chain management and inventory control. Intelligent AI is also seen in the area of individual suggestions that can only please the customer and lead to sustainable behavior by eliminating excessive production. This abstract reflects that AI is not a supplemental device but a co-worker, giving a contemporary designer power, simplification, and a more inclusive, efficient, and creatively limit-free tomorrow to the world of fashion.

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SOS BAND: WEARABLE EMERGENCY ALERT FOR WOMEN & ELDERS

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Abstract

In an era when personal security has become an issue of rising concern, especially for women and elderly people, it becomes pertinent to create an accessible emergency system that can detect emergencies and intervene in real time. The SOS Band is the proposed emergency device that is designed for personal protection and is a wearable IoT-based system with real-time location tracking, biochemical monitoring, and wireless alert transmission functionalities. The different key modules used in the system include the ESP32 microcontroller, NEO-6M GPS, SIM800L GSM, and MAX30100 heart rate sensor, which make the system very cheap as well as functionally very rich. The devices provide two modes of activation: one is by pressing the manual panic button, and the other is automatically triggered by an abnormality in the heart rate of the wearer, considering that emergencies might be unconscious. Once it activates, an SMS with real-time GPS coordinates is sent to the predefined emergency contacts, and data are simultaneously updated to cloud databases through Firebase for live monitoring. Such a multilayered system architecture minimizes delays in emergency response times and strengthens the framework of digital health and safety for both urban and rural settings. Under ₹3000, SOS Band supports the vision of India as a smart city and is scalable for possible future incorporation into a national health and surveillance infrastructure. The design and implementation draw largely from the first RFID- biometric integration [1][2] and embedded health systems [3][4], exhibiting both research feasibility and social pertinence.

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SIMPLEXIFY: AN AI-POWERED PERSONALIZED LEARNING PLATFORM WITH INTELLIGENT COMMUNITY BUILDING

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Abstract

Online learning environments face significant challenges including limited social interaction, time management difficulties, and technical barriers that hinder student engagement and success. Simplexify addresses these critical issues through an innovative AI-powered educational platform that transforms digital skill acquisition across technology, business, and design disciplines. The platform implements comprehensive solutions including dynamic user personalization through adaptive profiles and skill assessments, interactive learning materials with modular content delivery, and robust progress tracking with detailed analytics. Key technological features encompass an AI-powered recommendation engine, real-time chat assistance, gamification elements, and cross-platform compatibility with offline access capabilities. Simplexify's most distinctive feature is its intelligent community building system that connects learners based on shared course interests, completion history, and skill levels determined through post-course assessments. This creates targeted peer networks where users with similar learning goals and competency levels can collaborate, share insights, and provide mutual support, effectively addressing the social isolation inherent in traditional online learning. The platform's architecture integrates modern web technologies including HTML5, CSS3, JavaScript, and Firebase authentication to deliver personalized learning experiences. Time management challenges are mitigated through flexible, self-paced learning paths and milestone notifications, while the community matching algorithm ensures meaningful peer connections that enhance learning outcomes. The platform's intelligent course recommendation system analyzes user behavior, performance metrics, and learning preferences to suggest optimal educational pathways. Interactive multimedia content including videos, simulations, and real-world case studies enhances engagement, while certification programs provide professional recognition and skill validation. Technical implementation demonstrates responsive design principles ensuring accessibility across devices, with dark/light mode interfaces optimizing user experience. The AI-powered chat assistant provides instant learning support, while comprehensive analytics offer insights into learning patterns and areas requiring improvement. This research demonstrates the successful integration of artificial intelligence in educational technology, showcasing how personalized, adaptive learning platforms can overcome traditional online learning barriers while providing engaging, effective, and accessible educational experiences for diverse learner populations.

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