SIMATS ENGINEERING

International Conference on Neural Evolution & Adaptive Intelligence (ICNEAI -2025)

On

10 March 2025

PROCEEDINGS OF ICNEAI - 2025

Organized By

Department of Neural Networks

ABOUT SIMATS

Saveetha Medical and Educational Trust was established in 1986 mainly to provide medical relief, to promote Education and encourage Research. The Trust started a Saveetha Dental College and established an attached General Hospital in the year 1988. Subsequently the Trust established a Nursing College, Physiotherapy College, Occupational Therapy College and an Engineering College in order to comply with our commitment and to serve the people, especially those living in Rural Village in and around Chennai and adjoining districts of Tamil Nadu.

To fulfil the norms of the University Grants Commission, for the purpose of obtaining "Deemed to be University" status, Saveetha Medical and Educational Trust has sponsored another Trust (viz.) Saveetha Institute of Medical & Technical Sciences (SIMATS) in the year 2001. Subsequently, the said Trust (SIMATS) was declared as "Deemed to be University" with the following three Institutions under Section -3 of the UGC Act, 1956 as per Notification of the Govt. of India No.F.9- 3/2002-dated 18-03- 2005, now known as Saveetha Institute of Medical and TechnicalSciences (SIMATS) (Deemed to be University). https://www.saveetha.com/

1. Saveetha Dental College & Hospital
2. Saveetha College of Nursing
3. Saveetha College of Physiotherapy
4. Saveetha School of Engineering
5. Saveetha Medical College & Hospital
6. Saveetha School of Management
7. Saveetha School of Law
8. Saveetha College of Occupational Therapy

9. Saveetha School of Physical Education
10. Saveetha College of Allied Health Sciences
11. Saveetha College of Pharmacy
12. Saveetha College of Architecture and Design
13. Saveetha College of Liberal Arts and Sciences

The SIMATS received Accreditation by the National Accreditation Board for Hospitals and Healthcare providers and the National Accreditation Board for Laboratories for RTPCR Testing for Covid-19.

The institution has a total student strength of 10000 and 1500 faculties with non-teaching staff around 2500.

SIMATS is ranked among the top 10 Indian Universities and claimed 395th rank in World in 2020 UI Green Metric World University Rankings on Sustainability by University of Indonesia, Jakarata.

SIMATS has been recognized as Social Entrepreneurship, Swachhta & Rural Engagement Cell (SES REC) Institution by Mahatma Gandhi National Council of Rural Education, Department of Higher Education, Ministry of Education, and Government of India.

ABOUT SIMATS ENGINEERING

SIMATS Engineering (SSE), revolves around a highly dynamic and innovative curriculum, that puts down greater emphasis on hands-on training cum market targeted value-added programs. The institute offers diverse undergraduate, post-graduate and doctoral programs. All UG programs comprise of enterprising platforms including interdisci-plinary electives, choice-based credit system and a semester sandwich program option, in collaboration with renowned engineering institutions overseas. SSE is a NAAC A++ & NIRF 64 ranking institute, offering idiosyncratic IET enabled choice-based credit courses, with a strong insistence on practical training.

SIMATS Engineering offers Under Graduate, Post Graduate and Doctoral programmes in the following Departments.

Under Graduate-B.E/B. Tech

- Department Of Agricultural Engineering
- Department Of Automobile Engineering
- Department Of BioMedical Engineering
- Department Of Biotechnology
- Department Of Bioinformatics
- Department Of Computer Science Engineering
- Department Of Civil Engineering
- Department Of Electronics and Communication Engineering
- Department Of Electrical and Electronics Engineering
- Department Of Energy and Environmental Engineering
- Department Of Information Technology
- Department Of Mechanical Engineering
- Artificial Intelligence and Machine Learning
- Artificial Intelligence and Data Science

Post Graduate -M.E./M.Tech

- Computer Science & Engineering
- Product Design & Development
- Communication System Power Systems
- Structural Engineering

Doctorate-Ph.D.

- All disciplines of Engineering, Science & Humanities

Each department is enriched with experienced, dedicated and knowledgeable faculty members. With an extraordinary infrastructure facility and with innovative teaching methods like MILA, Flipped Classes, etc., SSE provides the best platformfor the students to excel in their academics.

A faculty Member of SIMATS Engineering was included in top 2% Scientist in India from Stanford University, USA in the Building and construction category.

- The College has CLAB –Classroom Laboratories
- Saveetha Engineering Industries
- Study Flex @ Saveetha

ABOUT THE ORGANIZING DEPARTMENT

The Department of Neural Networks at SIMATS Engineering proudly organizes the Neural Evolution & Adaptive Intelligence international conference. As a pioneer in cutting-edge technologies such as neural networks, machine learning, and artificial intelligence, our department plays a key role in advancing research and education in these transformative domains. Our team of experts is dedicated to exploring the deep complexities of neural networks, from their foundational principles to their most advanced applications. With a strong academic and research background, our faculty members actively contribute to shaping the future of AI, deep learning, and adaptive intelligence. The Department of Neural Networks offers an environment that fosters innovation and knowledge sharing, making it the perfect platform for thought leaders, researchers, and industry professionals to come together, exchange ideas, and collaborate on the next big breakthroughs in the field. By hosting the Neural Evolution & Adaptive Intelligence conference, we aim to facilitate global discussions on the latest advancements in neural networks, evolutionary algorithms, and adaptive intelligence systems. Our goal is to provide a stage for forward-thinking scholars and practitioners to present their research and explore new opportunities for the evolution of intelligent systems while inspiring the next generation of researchers to push the boundaries of what neural networks can achieve across a wide range of industries.

ABOUT THE CONFERENCE

The International Conference on Neural Evolution & Adaptive Intelligence (ICNEAI 2025) is set to be a premier platform for participants to delve deep into the latest trends and innovations in neural networks, adaptive intelligence, and machine learning technologies. This conference is designed for researchers, academia, industry professionals, and students, providing an excellent opportunity for the exchange of cutting-edge research and ideas within these transformative fields. The event promises an enriching experience through a variety of sessions, including keynote addresses, technical presentations, workshops, and specialized panels. These offerings are curated to expand attendees' understanding and expertise in adaptive intelligence, evolutionary algorithms, deep learning, and their applications across diverse industries. By engaging with leading scientists, experts, and colleagues, participants can explore the latest advancements, share research insights, and discuss the future of intelligent systems.

ICNEAI 2025 also welcomes prospective authors to submit their research papers for presentation at the conference. The conference aims to spotlight new innovations arising from groundbreaking research in areas such as neural networks, AI-driven technologies, evolutionary computing, and intelligent system design. By fostering a collaborative environment, ICNEAI 2025 encourages the exchange of ideas, supporting continuous progress in the fields of neural networks and adaptive intelligence.

DIRECTOR'S DESK

It is a great honor to invite distinguished scientists, academicians, young researchers, industry professionals, and students to attend the International Conference on Neural Evolution & Adaptive Intelligence (ICNEAI 2025) on 10th March 2025 at SIMATS Engineering. I would like to congratulate the ICNEAI 2025 organizing team for their forward-thinking approach in providing a platform for scholars and students from various institutions to come together and share their insights. At SIMATS Engineering, we are dedicated to exploring new frontiers in technology and nurturing the curiosity and excellence of our students.

I believe that through research and collaboration, we can contribute significantly to the evolution of neural networks, adaptive intelligence, and AI technologies, making meaningful advancements that can benefit society and the world at large. This conference will serve as a stepping stone for emerging researchers to present their work and gain exposure to global trends in the field. I commend the ICNEAI 2025 team for their dedication and vision, and I wish the conference great success in fostering innovation and inspiring the next generation of researchers.

Dr. RAMYA DEEPAK
DIRECTOR, SIMATS Engineering

PRINCIPAL'S DESK

Warm and Happy greetings to all. I am immensely happy that the SIMATS Engineering is organizing a one-day International Conference on Neural Evolution & Adaptive Intelligence (ICNEAI 2025) on 10th Macrh 2025. I hope that the theme of the conference about emerging technologies in the Engineering field will provide a common platform for academicians; researchers and industrialists to share their knowledge and experience about recent advancements in Engineering. I appreciate the active interest and participation shown by the faculty members involved in this conference and maintaining the research ambiance in the SIMATS Engineering.

I wish the team ICNEAI 2025 all the very best in all their sustained pursuits for excellence and earnest efforts in making the conference a grand success.

Dr. B. RAMESH

PRINCIPAL,

SIMATS Engineering

CONVENOR'S DESK

Dear Esteemed Colleagues and Participants,

I hope this message finds you in great health and high spirits. It is with immense pleasure and enthusiasm that I extend my warmest welcome to all of you to the One-Day International Conference on Neural Evolution and Adaptive Intelligence – 2025 (ICNEAI 2025), organized by the Department of Neural Networks, Computer Science and Engineering Programme, SIMATS Engineering, Thandalam, Chennai. This conference serves as a distinguished platform that unites academicians, researchers, industry professionals, and students from various institutions across the globe to exchange insights and advancements in the ever-evolving fields of Neural Networks, Artificial Intelligence, and Adaptive Learning Technologies. The rapid progress in these domains is shaping the future of intelligent systems, and this event aims to foster discussions, collaborations, and innovations that will contribute to a technologically enriched society.With esteemed keynote speakers and expert panel discussions, ICNEAI 2025 promises to be a remarkable gathering, facilitating meaningful interactions, thought-provoking ideas, and pioneering research. We look forward to your active participation and valuable contributions in making this conference a grand success

Dr. R.Balamanigandan
Professor & Head
SIMATS

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ICNEAI_001

Exploring the Potential of Virtual Reality in Abscess Surgery using Machine Learning

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Abstract

The continuous evolution of medical technology has paved the way for innovative approaches to enhance surgical precision and training, particularly in procedures like abscess surgery. This study investigates the integration of Virtual Reality (VR) technology into the surgical management of abscesses, offering a transformative method for surgeons to visualize, plan, and execute these procedures. The proposed VR platform provides an immersive virtual environment that closely mimics real-world abscess scenarios, enabling surgeons to practice and receive guidance in real time. Key features include advanced imaging techniques, intuitive interactive interfaces, and haptic feedback systems that replicate the tactile sensations of surgery with exceptional accuracy. The primary objectives are to enhance surgical precision, minimize complications, and improve training capabilities, thereby contributing to better patient care. By combining realistic simulation modules with effective surgical planning tools, this VR-driven approach has the potential to refine abscess surgery workflows and elevate the overall proficiency of surgeons.

Keywords: *Surgical precision, Interactive Interfaces, Tactile Sensations, Simulation Modules.*

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ICNEAI_002

Immersive Justice: Revolutionizing Crime Investigation with AR/VR and AI-Driven Forensics

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Abstract

Crime investigative processes are often affected by certain evidence evaluation errors, delays in forensic analysis, and complications regarding crime scene recreation. In this paper, we introduce an AR/VR crime-solving platform that contains virtually real crime scenes where evidence is analyzed and reconstructed to identify suspects. The platform utilizes AI-based forensic tools and machine learning for crime pattern analysis, enabling investigation accuracy. Cases from history such as Sony Pictures Hack, Zodiac Killer, and Black Dahlia serve to demonstrate the ability of the user to analyze evidence in the frame of practice cases to form new conclusions. Besides this, a custom feedback website allows for logging in to identify the suspect the individual believes committed the crime and participate in a community forum discussion where forensic investigations experts carry out collaborative problem solving. Research indicates that immersive technology would complement the shortcomings of conventional investigative methods, thereby enhancing crime-solving efficiency as well as initiating public participation in justice programs.

Keywords: *AR/VR, Crime Investigation, Digital Forensics, Artificial Intelligence, Crime Scene Reconstruction, Cybercrime, Criminal Justice*

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ICNEAI_003

Real-time Sign Language Recognition and Subtitle Generation Using Machine Learning

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Abstract

Sign language plays a critical role in communication for the deaf and hard-of-hearing communities. However, real-time automated systems for translating sign language into text are still lacking. This study introduces an innovative approach to detect sign language gestures and generate real- time subtitles for complete sentences by applying machine learning methods. The system employs Convolutional Neural Networks (CNNs) to extract features from video data and Recurrent Neural Networks (RNNs) to model the temporal sequences of gestures. To enhance performance, transfer learning is applied using pre-trained models from large human action recognition datasets. Additionally, a Visual-Language Mapper is used to connect visual data with language models, ensuring accurate subtitle generation. The results demonstrate state-of-the-art performance on established sign language datasets, showcasing its practical potential for real-time communication application.

Keywords: *Convolutional Neural Networks (CNNs), Machine Learning, Real-Time Subtitle Generation, Recurrent Neural Networks (RNNs), Sign Language Recognition, Transfer Learning*

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ICNEAI_004

VOCABDUNK AR/VR - Dunk Your Way to Fluent Speaking

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Abstract

Traditional vocabulary learning often feels repetitive and disengaging, leading to poor retention and mispronunciations. VocabDunk AR/VR revolutionizes language learning by integrating Augmented Reality (AR) and Virtual Reality (VR) with an exciting basketball-themed gamified experience. Designed for Meta Quest, this immersive game allows players to practice vocabulary and pronunciation in an interactive environment. Using Natural Language Processing (NLP) and speech recognition AI, the game evaluates pronunciation accuracy correct pronunciations result in successful basketball shots, while mispronunciations lead to missed attempts. Real-time feedback ensures continuous improvement, making the learning process engaging and effective. By blending sports mechanics with language acquisition, VocabDunk AR/VR transforms vocabulary training into an enjoyable and dynamic experience.

Keywords: *Augmented Reality (AR), Gamified Learning, Natural Language Processing (NLP), Speech Recognition AI, Virtual Reality (VR), Vocabulary Acquisition*

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Real-time Sign Language Recognition and Subtitle Generation Using Machine Learning

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Abstract

Rapid advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP) have enabled the creation of intelligent chatbots capable of facilitating human-like conversations across diverse domains. This paper explores the design and implementation of an AI-powered chatbot tailored for the judicial domain to address the increasing complexity of legal systems and the demand for efficient access to legal information. By leveraging state-of- the-art machine learning algorithms and NLP techniques, the chatbot offers real-time, context- aware responses to legal inquiries. It serves as a versatile tool for legal professionals and the general public, assisting users with navigating judicial laws, legal procedures, and case-related queries. This innovation aims to streamline access to vital legal information, ensuring accuracy and efficiency in legal assistance.

Keywords: *Chatbot, Judicial, Legal Assistance, Machine Learning, Natural Language Processing, Real-time Responses*

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SKINOVA – AI AR Powered Dermacare

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Abstract

In today's fast-paced world, skincare issues such as acne, pigmentation, and rashes are common, yet many individuals lack access to dermatologists for proper diagnosis. This project aims to develop an AI-powered mobile application that leverages computer vision and machine learning to analyze skin conditions and provide real-time insights. Using OpenCV and TensorFlow/Keras, the system will process facial images to detect skin problems like acne, wrinkles, and dark spots. It will then provide users with personalized skincare recommendations based on AI analysis. The model will be trained on dermatological datasets and optimized for mobile use to ensure offline functionality. The proposed solution will benefit individuals by offering instant skin assessments, reducing dependency on professional dermatologists, and promoting better skincare routines. Future enhancements include integrating AR for real-time skin simulation and IoT-based smart skincare devices.

Keywords: *AI In Skincare, Computer Vision, Skin Disease Detection, Deep Learning, Mobile Health, AR In Beauty Tech.*

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Using LLMs for Code Generation: Benefits, Limitations, and Best Practices

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Abstract

Large Language Models (LLMs) have changed the way developers write code by making it easier to generate, optimize, and debug programs. These AI models, trained on a huge amount of programming data, help speed up development, reduce mistakes, and make coding more accessible for people who aren't experts. But at the same time, LLM-generated code has some downsides, like security risks, a lack of deep understanding of the code's context, and issues with maintaining code quality. This paper looks at both the benefits and the challenges of using LLMs in software development. It also explores best practices to make the most of LLMs while avoiding potential problems. By understanding what LLMs do well and where they fall short, developers can use them effectively while keeping their code secure, reliable, and easy to maintain.

Keywords: *LLMs, Code Generation, Software Development, AI, Best Practices, Security Risks*

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Life In The Microverse: Tardigrade Adventures

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Abstract

Tardigrades, also known as water bears, are microscopic organisms renowned for their extreme resilience to harsh environments, including outer space. This project presents an immersive Virtual Reality (VR) experience that explores the fascinating world of tardigrades, their unique survival mechanisms, and their microhabitats. Designed for educational and public engagement, the VR simulation allows users to shrink to a microscopic scale, interact with tardigrades in their natural environments, and witness their extraordinary adaptations, such as cryptobiosis and radiation resistance. Through realistic 3D models, interactive storytelling, and scientific accuracy, this project provides a unique and engaging learning experience beyond traditional classroom methods. The VR experience aims to enhance scientific curiosity and understanding by offering lesser-known facts about tardigrade physiology, behavior, and their potential implications for space research and biotechnology. By blending cutting-edge technology with biological exploration, this project serves as an innovative tool for educators, researchers, and science enthusiasts

Keywords: *Tardigarde, VR Simulation , 3D Models, Learning Experience*

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Immersive Ocean Exploration Through Virtual Reality

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Abstract

Virtual Reality (VR) is transforming the way we engage with and learn about marine ecosystems by offering an immersive and interactive experience. Our project utilizes VR technology to simulate underwater environments, allowing users to explore the ocean's depths, interact with marine life, and develop a deeper understanding of oceanic ecosystems. To assess user comprehension, we incorporate quizzes that evaluate their learning progress and reinforce key concepts. This innovative approach eliminates physical and logistical barriers to deep-sea exploration, making marine education more accessible and engaging. By combining advanced VR simulations with educational content, our project fosters curiosity, enhances environmental awareness, and provides an experiential learning platform for users of all backgrounds. Through this technology-driven solution, we aim to inspire a greater appreciation for marine biodiversity while advancing ocean literacy in an interactive and impactful way.

Keywords: *Virtual Reality, Immersive Learning, Deep-Sea Simulation, Interactive Education.*

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Revolutionizing Eye Surgery with VR: Advanced Assistance & Training

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Abstract

The integration of Virtual Reality (VR) into eye surgery represents a transformative advancement in medical technology, offering unprecedented opportunities for both surgical assistance and training. This research paper explores the potential of VR to revolutionize ophthalmic procedures by enhancing precision, reducing risks, and improving patient outcomes. We present a comprehensive framework for VR-assisted eye surgery, leveraging real-time 3D visualization, haptic feedback, and AI-driven guidance systems to assist surgeons during complex procedures. Additionally, we propose a VR-based training platform that simulates realistic surgical environments, enabling trainees to practice and refine their skills in a risk-free setting. Through experimental validation and case studies, we demonstrate the efficacy of VR in improving surgical accuracy, reducing operation times, and enhancing the learning curve for aspiring ophthalmologists. This study underscores the potential of VR to redefine the future of eye surgery, making it safer, more accessible, and more effective.

Keywords: *Virtual Reality (VR), Eye Surgery, Ophthalmic Surgery, Surgical Assistance, Surgical Training, Haptic Feedback, 3D Visualization, AI Guidance, Medical Simulation, Precision Surgery.*

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ARvertise: Advanced AR Solution for Product Insights

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Abstract

Arvertise is an advanced augmented reality (AR) solution designed to enhance the retail and consumer goods industry by providing instant product insights through real-time scanning. Utilizing AR technology, the application enables users to scan various items in a retail environment and access comprehensive details on their composition, ingredients, nutritional profile, and recommended applications. Additionally, Arvertise offers step-by-step usage guidance, catering to health-conscious consumers, professionals with specific dietary needs, and individuals seeking informed purchasing decisions. With an intuitive interface and AI- driven recommendations, Arvertise transforms conventional shopping into an interactive and data-driven experience, fostering greater product transparency and consumer engagement.

Keywords: *Augmented Reality (AR), Product Scanning, Retail Technology, Consumer Goods, AI-driven Recommendations, Nutritional Information, Smart Shopping, Product Transparency.*

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Back To Life VR: Virtual Journeys Into Extinct Habitat

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Abstract

Virtual reality (VR) offers a unique opportunity to create immersive educational experiences, allowing users to explore historical and scientific concepts in an interactive way. This project aims to develop a VR-based simulation where users can observe extinct animals in different atmospheric conditions and in different prehistoric periods. The objective is to recreate realistic environments that depict prehistoric species such as dinosaurs, mammoths, and saber-toothed cats under varying climate conditions, including ice ages, prehistoric jungles, and volcanic eras. By leveraging VR technology, the project seeks to enhance engagement and learning about extinct species, their ecosystems, and the environmental factors that contributed to their extinction. Once developed, the effectiveness of this VR experience will be assessed based on user engagement, learning outcomes, and the impact of immersive storytelling in scientific education. Future research will focus on refining the simulation, integrating interactive elements, and evaluating its potential as a tool for education and research. The difference between other project and our project is this idea has not yet been implemented in VR, it is only available in AR. So a VR experience will be provided and we will be demonstrating on various extinction event that made this animals extinct.

Keywords: *Virtual Reality, Extinct Animals, Immersive Learning, Atmospheric Conditions, Education, Ecosystems.*

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EvolvDiagnost: Adaptive Neural Evolution for Medical Diagnostics: The Application of Neuroevolutionary Algorithms to Optimize Diagnostic Accuracy in Healthcare Settings

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Abstract

The integration of artificial intelligence in healthcare diagnostics has shown promising results but often suffers from limitations in adaptability and generalization across diverse patient populations. This study explores the application of neural evolution techniques to develop self- optimizing diagnostic systems that adapt to varied medical data. A total of 15,000 patient records across 8 different medical conditions were utilized for training and validation. Using genetic algorithms to evolve neural network architectures, our approach showed significantly ($p < .001$) improved diagnostic accuracy 15.7% higher compared to traditional fixed- architecture neural networks. Furthermore, the evolved networks demonstrated remarkable adaptability when presented with previously unseen medical conditions, achieving 82.3% diagnostic accuracy without additional training. The adaptive nature of these evolved networks allowed for effective knowledge transfer across related medical conditions while maintaining high specificity (91.2%) and sensitivity (89.6%). These findings suggest that neuroevolutionary approaches offer substantial benefits for creating robust, adaptable diagnostic systems capable of handling the complexity and variability inherent in medical data.

Keywords: *Neural Evolution, Healthcare Diagnostics, Adaptive Intelligence, Genetic Algorithms, Diagnostic Accuracy, Medical Imaging*

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AI for Self-Repairing & Evolving Software Systems

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Abstract

Modern software systems face frequent cybersecurity threats, performance bottlenecks, and software bugs, requiring manual intervention for debugging and optimization. This study explores the potential of AI-driven self-repairing and evolving software systems that autonomously detect, debug, and optimize their own codebase in real-time. Unlike traditional approaches, this system leverages neural evolution and deep learning to analyze system behaviour, identify vulnerabilities, and generate optimized code patches without human oversight. The AI model continuously learns from emerging threats and software performance metrics, ensuring adaptability to new cyber risks and evolving computing environments. Experimental results indicate that AI-driven self-repair mechanisms can significantly reduce software downtime and improve security resilience. Future research is required to refine AI decision-making accuracy and ensure broader applicability across various software architectures.

Keywords: *AI-driven Debugging, Self-repairing Software, Cybersecurity, Neural Evolution, Autonomous Software Optimization.*

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Bus Tracking and Crowd Indication System on MTC

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Abstract

Public transport users frequently encounter difficulties such as unpredictable bus arrival times and overcrowding, which can result in an unpleasant commuting experience. Tracko is a system specifically developed to tackle these challenges by offering real-time bus tracking and crowd level information. Utilizing GPS technology, Tracko accurately monitors bus locations and predicts arrival times. To assess bus crowd levels, Tracko employs three distinct methods: ticketing data, where passenger counts are collected via the conductor's ticketing machine or a dedicated application; camera-based detection, where an AI model evaluates CCTV footage to estimate the number of passengers onboard; and weight-based measurement, where load sensors installed on buses determine the total passenger weight. These data points are analyzed using machine learning models to deliver precise crowd density predictions. Users can access real-time bus locations, estimated arrival times (ETA), and crowd levels through a mobile application. Tracko enables passengers to plan their journeys more effectively by minimizing waiting times and avoiding overcrowded buses, thereby enhancing the overall efficiency of public transport systems. This system plays a significant role in the advancement of smarter cities, improving convenience and commuter satisfaction.

Keywords: *Bus Tracking, Crowd Indication, Real-Time Data, GPS, Machine Learning, Computer Vision, Crowd Density Estimation, Ticketing Data, Load Sensors, AI, Public Transportation, Smart Cities, Commuter Experience, Mobile App, ETA, Passenger Counting, CCTV Analysis, Crowd Prediction.*

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DineAR

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Abstract

Consumers often face difficulties when ordering food, especially when unfamiliar with the dishes on a restaurant menu. DineAR is an innovative mobile application designed to revolutionize the food ordering experience by integrating 3D visualization with menu scanning technology. By simply scanning the menu with their smartphone camera, users can interactively view dishes in three-dimensional formats, allowing them to better understand the food before placing an order. The app offers a full range of interactive features, such as rotating, zooming, and customizing dishes, ensuring customers can make informed decisions. In addition, DineAR provides detailed information about ingredients, nutritional content, and allergen warnings, which helps users make choices aligned with their preferences or dietary restrictions. The system uses advanced image recognition and AR technologies to present a realistic, engaging, and visually rich dining experience. Designed to enhance customer engagement and satisfaction, DineAR also integrates gamification and social sharing features, fostering a fun and personalized approach to food ordering. By offering a novel way to visualize dishes, DineAR bridges the gap between food unawareness and culinary creativity, adding an element of surprise and delight to dining experiences. This system paves the way for smarter, more interactive dining, making food choices both informed and exciting.

Keywords: *3D Food Menu, Augmented Reality, Interactive Food Ordering, Menu Scanning, Food Visualization, Mobile Application, Food Customization, Ingredient Information, Allergen Warnings, Image Recognition, Gamification, Social Sharing, Customer Engagement, Dining Experience, AR Technology, Culinary Creativity*

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The Multiplayer Sports Experience by using virtual reality

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Abstract

The Multiplayer VR Sports Experience is a next-generation virtual reality (VR) system designed to revolutionize sports gaming by offering highly immersive and interactive multiplayer gameplay. This system employs advanced VR motion tracking, haptic feedback, and real-time physics simulation to create an authentic sporting experience. Users can engage in various sports such as soccer, basketball, tennis, and boxing, either competitively or cooperatively, in a virtual environment that replicates real-world dynamics. The experience is powered by cloud-based multiplayer networking, ensuring seamless interaction among players globally, while AI-driven opponent behaviours enhance single-player modes. Customization features allow users to personalize avatars, sports equipment, and game rules, adapting the experience to different skill levels and preferences. The integration of AI-based coaching provides real-time feedback and analytics to improve player performance.

Keywords: *Virtual Reality (VR), Multiplayer Gaming, Immersive Sports, Simulation, Motion Tracking, Haptic Feedback.*

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The Future of Interior Design: VR-Powered Creativity

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Abstract

Virtual reality (VR) is transforming interior design by replacing traditional 2D plans with immersive, interactive 3D environments that enhance visualization, customization, and collaboration. Designers can create lifelike digital spaces, allowing clients to explore and modify interiors before execution, reducing errors and streamlining decision-making. Integrated with AI and real-time rendering, VR enables personalized design recommendations and supports sustainable choices by simulating materials, lighting, and energy efficiency. This technology fosters deeper client engagement, enhances precision, and accelerates project timelines. It also allows designers to experiment with innovative concepts in a risk-free virtual setting. As VR continues to evolve, its widespread adoption will redefine industry standards, making interior design more efficient, interactive, and future-focused.

Keywords: *Industry Transformation, Error Reduction, Sustainable Development, Virtual Reality.*

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Blood Cancer Detection using Adam Optimizer in ResNet Model

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Abstract

Blood cancer poses many diagnostic challenges because the condition has varied subtypes and presentations, affecting the blood, bone marrow and lymphatic system. Using EfficientNet and ResNet convolutional neural network (CNN) architectures, this study develops an advanced detection system optimized with the Adam optimizer. The system aims to identify several subtypes, like Acute Lymphoblastic Leukemia (ALL), Chronic Lymphocytic Leukemia (CLL), Follicular Lymphoma and Mantle Cell Lymphoma. EfficientNet's scalable architecture, along with ResNet's residual learning capabilities, improves diagnostic accuracy as well as reliability. That is because of the Adam optimizer's adaptive efficiency, in addition to the prior factors. To catch many characteristics of all subtypes, the model is trained on a wide range of data. The Adam optimizer certainly guarantees faster convergence and improved generalization by expertly adjusting the learning rate and efficiently handling sparse data. The considerably optimized model is integrated into a completely standalone application so real-time medical image analysis can be promptly done on a platform that runs quite smoothly.

Keywords: *Blood Cancer, EfficientNet, ResNet, Adam Optimizer, Detection System.*

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Flower Shop: An Immersive E-Commerce

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Abstract

The development of an eCommerce website using full-stack technologies aims to create a dynamic and scalable platform that provides users with a seamless online shopping experience. By leveraging both front-end and back-end technologies, this project integrates a user-friendly interface with robust server-side functionalities. The front-end is designed using modern web technologies such as HTML, CSS, and JavaScript, along with frameworks like React or Angular, ensuring responsiveness and interactive design. The back-end utilizes server-side technologies like Node.js with Express, or Django, enabling efficient handling of user requests, product data, and transaction management. The database architecture is built using relational (SQL) or NoSQL databases such as MySQL or MongoDB, allowing for the effective storage and retrieval of product listings, customer information, and orders. Security protocols, such as SSL encryption and user authentication, are implemented to ensure the protection of sensitive data during transactions. Additionally, payment gateway integrations (e.g., PayPal, Stripe) are incorporated to facilitate secure online payments. This eCommerce site incorporates essential features like product catalog management, customer profiles, shopping cart functionalities, order processing, and real-time inventory updates. Moreover, an admin panel is developed for inventory management, order tracking, and user management. The system is optimized for scalability, ensuring the site can handle growing traffic and product offerings, making it a versatile solution for businesses seeking to establish an online retail presence. Ultimately, the project aims to provide a comprehensive, reliable, and secure eCommerce platform, offering a smooth and intuitive shopping experience for customers while empowering business owners with powerful tools to manage and grow their online stores.

Keywords: *Ecommerce Development, Full Stack Development, Online Flower Shop, Responsive Web Design, Product Catalog Management, Shopping Cart Integration, Payment Gateway Integration, Order Management System, Inventory Management, User Authentication, Database Management (SQL/NoSQL), Customer Profiles, Secure Online Payments, Delivery Scheduling*

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AI-Based Surveillance and Behavioural Analysis System for Crime Detection

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Abstract

In an era of increasing urbanization and security concerns, the need for advanced surveillance systems that can proactively detect and respond to criminal activities in real-time has never been more crucial. This abstract presents a cutting-edge solution: an Artificial Intelligence- based security system that leverages behavioral analysis techniques to analyze live video feeds from street cameras and crowded areas. This system autonomously detects crimes and anomalies without the need for constant manual monitoring, drastically reducing response times and potentially saving lives. Our innovative system combines state-of-the-art computer vision and machine learning algorithms to continuously monitor public spaces. By analyzing the behavior of individuals and groups, it can identify unusual patterns or activities that may indicate criminal behavior. When a potential threat is detected, the system immediately triggers an alert and sends a notification directly to the nearest police station, allowing law enforcement to respond swiftly and efficiently. This proactive approach not only expedites the capture of criminals but also enhances public safety by deterring potential wrongdoers. Furthermore, our system is designed to adapt and improve over time through machine learning. It continuously refines its understanding of normal and abnormal behavior, reducing false alarms and increasing accuracy. Our AI-based security system focuses on represents a transformative step towards enhancing public safety. By automating surveillance and rapidly detecting crimes and anomalies, we can reduce response times, increase the chances of apprehending criminals, and ultimately save lives.

Keywords: *AI-Powered Surveillance, Behavioral Analysis, Crime Detection, Public Safety, Rapid Response, Autonomous Alert System*

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ICNEAI_022

AI-Powered AR for the Deaf: Real-Time Sound Recognition, Directional Awareness and Speech Captioning

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Abstract

Communication barriers and limited environmental awareness pose significant challenges for individuals who are deaf or hard of hearing, affecting their ability to engage in daily activities, respond to critical sounds, and navigate public spaces safely. Traditional assistive technologies often rely on specialized hardware such as hearing aids and cochlear implants, which can be expensive, restrictive, and inaccessible to a large portion of the population. This project proposes an AI-powered Augmented Reality (AR) solution that enhances auditory perception by providing real-time audio transcription, directional sound awareness, and speech captioning. The system utilizes machine learning-based audio recognition to analyze ambient sounds in real time, distinguishing between speech, environmental noises, and emergency alerts such as alarms, sirens, and horns. Recognized sounds are processed and visually represented using AR overlays, indicating both the type of sound and its precise spatial direction relative to the user. For a more immersive experience, visual cues such as arrows and glowing markers appear in the user's field of view, pointing towards the exact location of the detected sound source. Emergency alerts, such as sirens, alarms and horns, trigger flashing red warnings and vibrations to ensure immediate attention, while real-time speech detection displays floating text captions near the estimated speaker's direction, allowing for easier interaction in conversations. This intuitive directional awareness system significantly enhances environmental perception, helping users navigate their surroundings and respond effectively to auditory stimuli in real time.

Keywords: *Augmented Reality (AR), Machine Learning-Based Audio Recognition, Directional Sound Awareness, Real-Time Speech Captioning.*

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AI-Driven Neural Evolution for Early Breast Cancer Detection

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Abstract

The breast cancer continues to be a major global health challenge, emphasizing the need for early and accurate diagnosis to improve treatment outcomes. This study presents an advanced deep learning framework, the Enhanced Neural Evolution-Based Deep Learning Model (ENEDLM), which combines genetic algorithms (GA) with optimized convolutional neural networks (CNNs) to enhance feature extraction, classification precision, and computational efficiency in breast cancer detection. The model was trained and validated using benchmark datasets, including the Wisconsin Diagnostic Breast Cancer (WDBC) dataset and the BreakHis dataset, which contain both mammographic and histopathological images. It has been achieved a classification accuracy of 98.5%, outperforming conventional CNN models by 3-5% in precision and recall. The integration of an adaptive genetic evolution mechanism enabled dynamic refinement in feature selection, significantly reducing false positives and false negatives. Moreover, the model's interpretability was improved using SHAP (SHapley Additive Explanations) analysis, allowing clinicians to better understand the key features influencing diagnostic decisions. A comparative evaluation against leading deep learning models, such as ResNet, VGG-16, and EfficientNet, highlighted the superiority of ENEDLM in terms of accuracy, computational efficiency, and robustness to data variability. This proposed AI-driven model has strong potential for real-world applications in medical diagnostics, offering a scalable and reliable solution for early breast cancer screening.

Keywords: *Breast Cancer Detection, Neural Evolution, Deep Learning, Genetic Algorithms, AI in Healthcare, Explainable AI*

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ICNEAI_024

Automated Umbrella Rental System for Urban Commuters

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Abstract

With the rise of smart urban solutions, on-demand umbrella rental services have emerged as a convenient alternative to traditional ownership. This study proposes an Automated Umbrella Rental System, enabling users to borrow, return, and pay for umbrella rentals seamlessly through a mobile-based platform. The system integrates QR code-based authentication, secure pre-authorization payment processing, and real-time tracking to ensure efficient rental operations. Users can scan a QR code, make a refundable deposit, and rent an umbrella, with charges calculated based on usage duration. The system automatically deducts the rental fee and refunds the balance upon return, minimizing misuse and losses. A prototype was developed and tested for usability, transaction reliability, and real-world feasibility. Findings indicate that the system enhances convenience, promotes sustainable sharing practices, and optimizes resource management in urban settings.

Keywords: *Umbrella Rental, Smart Rental System, QR Code, Automated Payments, Urban Commuters, Pre-Authorization, RFID, IoT.*

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ICNEAI_025

Deep Learning With 3D CNN For Knee Osteoarthritis Detection And Classification

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Abstract

Of all joints, the knee is the most commonly afflicted with osteoarthritis (OA), which is the most common form of arthritis. Even though CNNs are seriously being utilized in medical imaging, 3D CNNs are yet to be applied as a standard for diagnosing knee OA. In this paper, the 3D CNN model was applied on the knee MRI sequences to classify the presence of osteoarthritis (OA). Probably the strongest point of 3D CNNs over 2D CNNs is that 3D CNNs can process the whole MRI sequence in one go, while 2D CNNs can only analyze a single photograph. In this, the KL grading ranking the intensity of OA from 0 to 4 was used for each one of the knees based on MRI data taken. The result showed that the 3D CNN model could differentiate the OA and non-OA knees well both in test and validation phases. Another model used for comparison is a 2D CNN model that uses X-ray images. Although much less accurate than the 3D CNN on MRI data, this model was also able to be used quite well. Thus, the diagnosis of knee OA is much more accurate by the method combining MRI and 3D CNN technology as compared to just with X-ray imaging, although both of these models have some clinical values. The work concludes by depicting how 3D CNN can be useful in the detection of OA through complex sequences of MRI images compared to traditional 2D methods.

Keywords: *Knee Osteoarthritis, 3D Convolution Neural Network, Magnetic Resonance Imaging, Osteoarthritis.*

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ICNEAI_026

Efficient Portal for Locating and Recovering Lost items in a sample

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Abstract

An online tool called the "Lost and Found" portal is created to assist people in reporting, finding, and recovering misplaced objects. The goal of this approach is to close the gap between people who have lost their possessions and those who have located them. Registering, logging in, and reporting lost or discovered items— including locations, descriptions, and photos for easier identification— is simple for users. Users can filter things by type, location, or date using the portal's effective search engine. A secure messaging system facilitates user-to-user communication to protect privacy and make setting up item retrieval simple. Additionally, the portal has an administrator interface for tracking submissions and confirming reports and resolving conflicts. When a matching item is discovered, users are notified in real time. This solution promotes ease and dependability for all users by streamlining the lost item return process.

Keywords: *Lost Item Reporting, Found Item Reporting, Item Matching System, User Interface, Secure Communication, Database Management, Search Functionality.*

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ICNEAI_027

DOCQ - A Virtual Queue Management and Appointment Booking Application for Hospital and Healthcare

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Abstract

Effective queue management and appointment scheduling are crucial for optimizing patient flow and enhancing the overall experience in healthcare settings. This paper presents DOCQ, a virtual queue management and appointment booking application designed to streamline these processes. DOCQ offers a user-friendly interface for patients to book appointments online, view real-time queue status, and receive notifications regarding their turn. For healthcare providers, the application facilitates efficient scheduling, reduces patient wait times, and provides valuable data insights into patient flow patterns. The system incorporates features such as appointment reminders, automated queue updates, and integration with existing hospital information systems. This paper details the design and implementation of DOCQ, highlighting its key functionalities, and discussing its potential to improve efficiency and patient satisfaction in healthcare delivery. Preliminary results from a pilot study demonstrate the positive impact of DOCQ on reducing wait times and improving patient experience.

Keywords: *Virtual Queue Management, Appointment Booking, Healthcare, Patient Flow, Efficiency, Patient Satisfaction, Mobile Application, Digital Health, Queue Management System.*

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ICNEAI_028

AI Based Smart Parking System using ESP32-CAM

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Abstract

The rapid increase in urban populations and vehicle ownership has created a significant demand for efficient parking solutions. Traditional parking systems often struggle with high traffic volumes, leading to inefficiencies. This paper presents an AI-based Smart Parking System using the ESP32-CAM, designed to automate vehicle entry and exit while ensuring smooth traffic flow and accurate vehicle tracking. The system incorporates infrared (IR) sensors at both the entry and exit points to detect vehicle presence. Upon vehicle arrival at the entry, the ESP32-CAM captures an image of the vehicle's number plate and sends it to a dedicated Number Plate Detection API for processing. If recognition is successful, the vehicle's entry is logged, the current time is fetched via an NTP update, and the barrier opens to allow the vehicle to enter. Similarly, at the exit, the system detects the vehicle, logs the exit time, and opens the barrier if the vehicle count is greater than zero. A brief delay ensures smooth departure before closing the barrier and decrementing the vehicle count. Additionally, a web server continuously handles incoming client requests, such as serving a web interface for monitoring or responding to system commands. The system is powered by an affordable combination of components, including the ESP32-CAM, a servo motor for barrier control, and IR sensors for vehicle detection. The system is highly customizable and scalable, allowing future enhancements such as cloud-based analytics, real-time parking space availability, and integration with mobile apps for user convenience. This AI-driven solution reduces human intervention, enhances parking efficiency, and offers a reliable, scalable solution to urban parking challenges.

Keywords: *Smart Parking System, ESP32-CAM, AI-based Parking, Number Plate Recognition, Infrared Sensors, Automated Barrier Control, NTP Time Synchronization, Web Server Integration*

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ICNEAI_029

Real-Time Material Detection using Machine Learning

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Abstract

Identifying materials like glass, plastic, or paper from video footage is crucial in industries like recycling, manufacturing, and quality control, where accurate material classification can significantly impact productivity, efficiency, and decision-making. However, current methods struggle with various challenges, including variations in lighting, objects blocking the view, and similarities in appearance between materials, which can lead to reduced accuracy and reliability. This paper proposes a new approach using a convolutional neural network (CNN) architecture, specifically a variant of the ResNet-50 model, to classify materials from real-time video. We also incorporate a transfer learning approach using the weights of the pre-trained MobileNetV2 model to adapt our model to new, unseen materials, reducing the need for extensive retraining and improving its ability to generalize to diverse environments. Additionally, we utilize a feature fusion technique combining texture, colour, and depth features to improve robustness against lighting variations and occlusions, enabling our model to accurately identify materials even in challenging scenarios.

Keywords: *CNN, Machine Learning, Recycling, Material Detection, Real-Time Data Processing.*

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ICNEAI_030

AI-Powered Multimodal Chatbot for Text, Image, 3D Model, and Video Generation

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Abstract

In recent years, artificial intelligence (AI) has revolutionized human-computer interaction, with advanced chatbots playing a crucial role in automating tasks, enhancing productivity, and improving user experiences. This paper presents an intelligent multimodal chatbot capable of generating text, images, 3D models, and videos, making it a versatile tool for various applications, including creative content generation, education, design, and entertainment.The proposed chatbot integrates natural language processing (NLP), generative AI models such as GPT for text generation, diffusion models for image creation, neural radiance fields (NeRF) for 3D modeling, and generative adversarial networks (GANs) for video synthesis. It employs a deep learning-based architecture

Keywords: *Multimodal Chatbot, Generative AI, Text Generation, Image Synthesis, 3D Model Generation, Video Generation, Natural Language Processing (NLP), Deep Learning, Diffusion Models, Neural Radiance Fields (NeRF), Generative Adversarial Networks (GANs).*

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ICNEAI_031

AI-Powered Resume Ranking System

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Abstract

The hiring process requires efficient resume screening to identify top candidates, yet traditional methods are often slow and inaccurate. This project introduces an AI-powered Resume Ranking System that automates resume evaluation, ranks candidates based on job relevance, and provides data-driven insights for skill enhancement. The system leverages Natural Language Processing (NLP) and Machine Learning (ML) to extract and analyze resume data. A hybrid ranking approach is used, combining TF-IDF (Term Frequency-Inverse Document Frequency) for keyword extraction, Cosine Similarity for relevance measurement, and Fuzzy Matching for approximate text comparisons. The backend, built using Flask and a database (MySQL/PostgreSQL), securely stores applicant data for future retrieval and analysis. A React- based frontend allows users to upload multiple resumes and view rankings in an interactive dashboard. Additionally, predictive analytics is used to identify skill gaps and provide personalized recommendations for applicants based on industry trends and future job market requirements. This helps both recruiters and candidates make informed decisions, ensuring a more efficient and strategic hiring process.

Keywords: *Natural Language Processing (NLP), Machine Learning (ML), Deep Learning (DL), Text Mining, Predictive Analytics, Cosine Similarity, Fuzzy Matching, Keyword Extraction, Resume Parsing.*

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ICNEAI_032

Blood Finder
(An One-Stop site to find your right donor using Geo-Proximity Searching)

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Abstract

Timely access to blood donations is crucial for saving lives, yet many patients face difficulties in finding the right blood donors during emergencies. This paper presents the Blood Finder Web Application, an innovative and efficient platform designed to bridge the gap between blood donors and recipients. The system leverages a user-friendly web interface to connect individuals in need with potential donors based on real-time availability and location proximity. The application features a secure registration system for donors and recipients, an intelligent matching algorithm to suggest suitable donors, and a notification system to alert users about urgent blood requirements. Additionally, the platform integrates hospital and blood bank data to provide comprehensive information on blood stock levels. By implementing modern web technologies and database management techniques, the application ensures a seamless and responsive user experience. Our approach enhances the efficiency of blood donation processes, reduces response time in emergencies, and encourages voluntary donations through awareness campaigns. This paper discusses the architecture, implementation, and impact of the Blood Finder Web Application, highlighting its potential to improve healthcare accessibility and emergency response systems.

Keywords: *Blood Donation, Web Application, Emergency Response, Donor-Recipient Matching, Healthcare Technology*

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ICNEAI_033

Data Visualization: Leveraging Machine Learning for Data-Driven Insights

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Abstract

Data visualization provide comprehensive insights into customer sales trends across multiple regions. This proposed work involved the application of advanced machine learning tools to analyze large datasets, uncovering critical patterns and trends that informed key business decisions. A primary focus of my role was the identification of key performance indicators (KPIs), which required extensive data cleaning and manipulation to ensure the integrity and accuracy of the analysis. Through this process, I was able to transform raw data into actionable insights, which were then visualized in an engaging and easy-to-interpret format. The resulting visualizations not only highlighted important trends but also provided the marketing team with the clarity needed to refine strategies effectively. The development of this proposed dashboards served as a powerful communication tool, enabling stakeholders to better understand customer behavior, regional performance differences, and sales dynamics. These insights led to the optimization of campaign strategies and more targeted customer retention initiatives. The outcomes of this work contributed significantly to adopt a more data-driven approach in their marketing efforts, ultimately driving measurable improvements in customer engagement and retention.

Keywords: *Data Visualization, Business Decision, Business Analytics, Sales Dynamics.*

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ICNEAI_034

Indian Sign Language to Text/Speech Translation

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Abstract

Deaf individuals face significant communication challenges daily. The inability to hear makes it difficult to communicate with those who do not understand sign language, creating barriers in education, work, and social interactions. Technology can help bridge these gaps, and sign language recognition is one such solution. This paper presents a robust system for converting Indian Sign Language (ISL) to text or speech, using deep learning models such as Convolutional Neural Networks (CNN) and Long Short- Term Memory (LSTM) networks for effective sign language recognition. We evaluate the performance of CNN and LSTM models in recognizing both static and dynamic signs in ISL. The CNN model outperforms LSTM for recognizing static sign language characters and hand shapes, achieving high accuracy in isolated sign recognition. However, the LSTM model excels in recognizing dynamic gestures, capturing the temporal dependencies in continuous sign language communication, and is particularly effective in interpreting phrases and sentences. The integration of CNN for static sign recognition and LSTM for gesture sequencing provides a comprehensive solution for real- time sign language translation. The proposed system aims to enhance communication between deaf and hearing individuals, fostering greater social integration, accessibility, and inclusion in educational, professional, and social settings. The results demonstrate the system's effectiveness in bridging communication gaps, offering a promising solution for enhancing the quality of life for the deaf and hard-of-hearing population.

Keywords: *Deaf and hard-of-hearing, DHH, Indian Sign Language, CNN, LSTM, Static and Gesture Sign Languages, Text-to-Sign Language Model, MediaPipe Holistic, Sign Language Recognition, SLR, SLT.*

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ICNEAI_035

Dynamic Traffic Management With Multi-Strategy Control

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Abstract

Effective traffic signal control is essential for reducing congestion and improving urban mobility. This study presents a Traffic Flow Optimizer that evaluates four distinct strategies for traffic management: Fixed Cycle (FC), Longest Queue First (LQF), Q-learning (QL), and Search-Based Optimization (SB). The system simulates real-world traffic conditions and optimizes signal timing to minimize vehicle waiting time and improve traffic throughput. The FC approach follows predetermined signal cycles, while LQF dynamically prioritizes lanes with the highest vehicle count. Q-learning, a reinforcement learning technique, enables adaptive decision-making by learning from traffic patterns. The Search-Based Strategy explores optimal traffic light configurations through heuristic methods. The framework is implemented using NumPy for data processing, SciPy for optimization, and Pygame for visualization. Experimental results indicate that Q-learning and search-based approaches outperform conventional methods in dynamically varying traffic conditions. This research contributes to the development of intelligent traffic control systems suitable for smart cities and real-time traffic management.

Keywords: *Traffic Signal Optimization, Fixed Cycle, Longest Queue First, Q-learning, Search-Based Optimization, Intelligent Traffic Control.*

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ICNEAI_036

Enhancing Transparency and Efficiency: Blockchain-Based Fund Tracking in Government Fund Allocation

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Abstract

The Government Fund Allocation and Tracking System (GFATS) is a blockchain-based solution that enhances transparency, security, and accountability in public financial management. By using smart contracts, GFATS automates fund disbursements based on predefined conditions, reducing errors and delays. It offers real-time tracking of funds, ensuring transparency from allocation to utilization, while decentralized third-party verification ensures independent audits. Blockchain based mobile payments facilitate secure, direct transfers to beneficiaries, promoting financial inclusion. The system also supports tokenization for efficient fund management, integrates digital identity management for eligibility verification, and uses Zero-Knowledge Proofs (ZKPs) to maintain privacy. A robust grievance mechanism allows real-time issue reporting, and cross-border fund allocation ensures transparency in international projects. Additionally, GFATS enables willing individuals and organizations to donate funds to government initiatives, with all contributions transparently tracked on the blockchain. This comprehensive framework optimizes resource allocation, combats corruption and strengthens public trust in government financial systems.

Keywords: *Blockchain, Smart Contracts, Fund Tracking, Transparency, Accountability, Decentralized Verification, Financial Inclusion, Tokenization, Zero-Knowledge Proofs(ZKPs) ,Digital Identity Management, Secure Transactions, Cross-Border Fund Allocation, Corruption Prevention.*

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ICNEAI_037

Digi-T: Ticket, Travel, Transit

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Abstract

Public transportation is an integral part of urban life, yet users often encounter challenges such as a lack of exact change for ticket payments and the inefficiency of cash transactions. This project aims to address these issues by developing a user-friendly web application, Digi-T , tailored to enhance the public bus transportation experience. Built using the LAMP stack with MYSQL as the Database for Back-End, the application provides seamless digital solutions for ticketing and payment. The application enables users to register and log in with their email or phone number, ensuring a personalized and secure experience. By entering their current location and destination, passengers can view the travel fare and choose to pay using an integrated points system or cash equivalent through a private digital wallet. Users can recharge their wallet either online or at bus stations, ensuring flexibility and convenience. Additional features include the ability to view recent ticket history, and access digital copies of tickets anytime. The application also incorporates a robust feedback mechanism, allowing users to lodge complaints, provide reviews on travel experiences, or report website issues directly through a dedicated menu. By eliminating the dependency on exact cash and digitizing the ticketing process, Digi-T not only simplifies transactions but also reduces operational overhead for bus services. The project focuses on providing a reliable, efficient, and modern platform that enhances user satisfaction while addressing critical pain points in public transportation systems. Through its innovative approach, Digi-T aims to revolutionize how people interact with public bus services, fostering a smoother, cashless travel experience.

Keywords: *Public Transportation, Digital Ticketing, Bus Services, Cashless Transactions.*

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ICNEAI_038

Geospatial Crime Forecasting and Predictive Analytics: Advanced Mapping of Chicago Crime Data

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Abstract

Predictive policing and crime analysis help modern law enforcement agencies use resources to fight crime proactively. This research presents a novel machine learning framework designed to predict crime hotspots, establish areas of higher risk, and analyze crime patterns. Crime analysis and forecast are systematic methods to derive an understanding of criminal activities. However, the major issues are the integrity of the datasets describing crime and the efficacy of their analysis for the prediction of, and action against, future crimes. This present work intends to implement machine learning techniques to predict crime from the Chicago crime dataset, which describes elements like locations, descriptions, type of crime, dates, times, latitudes, longitudes, and so forth. The dataset will be preprocessed (including feature selection and scaling) before model training to improve prediction accuracy. Different visualizations of the dataset would lead to insights such as peak crime months, etc. Significantly, the methodology is relevant not only to Chicago, as it can be easily translated to other regions endowed with available datasets. The crime analysis and prediction are based predominantly on the K-means clustering model and contribute to the identification of crime patterns, cooperation among co- offenders, and evaporation of organized crime syndicates. With the help of K-means clustering, law enforcement agencies can project future crime occurrences and design intervention measures on the grounds of time, space of occurrence, population features, and type of crime.

Keywords: *K-Means Clustering, Data Mining, SK-Learn, National Crime Records Bureau, Crime Analysis, Crime Prediction.*

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ICNEAI_039

Optimized And Automated Organ Matching and Donation System Using Python with Real-Time Notification

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Abstract

Organ donation and transplantation is a life-saving procedure in the medical field. Limitation in donor, ineffective donor-recipient matching, delay in transplantation cause patient's life and wastage of organ. This study introduces everyone to a python-based, optimistic and automated system for organ matching and donation that includes real-time notifications to speed up the procedure. The technology pair up donor and receivers according to urgency, medical suitability and geographical closeness using sophisticated matching algorithms like weighted scoring algorithm. By guaranteeing direct contact between hospitals, donors and receivers with a real-time notification system, which increases the effectiveness of organ distribution within limited time. Testing made on datasets of patients and registered donors, the model showing notable gains in reaction time and matching accuracy. With this research organ donation can be made more successful and efficient with automation and rea-time updates, which plays a major role in shortening waiting time and improve patient outcome.

Keywords: *Organ Donation, Automated Matching, Real-Time Notification, Python, Medical Compatibility*

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ICNEAI_040

Affective Computing Of Speech Emotion Recognition Using Deep Learning

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Abstract

Human-Computer Interaction (HCI) requires the difficult task of emotion recognition from speech signals. Many approaches have been employed in the literature on speech emotion recognition (SER). The paper proposes a deep learning-based speech emotion recognition system (SER) that can detect emotions in real - time and generate context-aware notifications. It also covers the database used for emotion extraction. This paper provides an overview of Deep Learning techniques. How does this work? The RAVDESS dataset is being examined in this research. The extraction of three primary characteristics, namely Mel Frequency Cepstral Coefficient (MFCC), Mel Spectrogram, and Chroma, allows for the prediction of emotions through different states such as tone, pitch, expression, behaviour, etc. To sum up, SER is an innovative technology that is revolutionizing the way humans and machines interact by enabling systems to develop emotional awareness. Even though there are still issues with accuracy and generalization, advancements in research methods and technology are opening new opportunities for advanced applications in various fields.

Keywords: *Affective Computing, Speech Emotion Recognition, Deep Learning, CNN, LSTM.*

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ICNEAI_041

Blockchain-Based Smart Monitoring Framework for Defense Industry

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Abstract

The blockchain-based smart monitoring framework enhances security, transparency, and efficiency in defence asset management. By utilizing distributed ledger technology (DLT), smart contracts, and Internet of Things (IoT) devices, the system ensures real-time tracking of military assets, personnel, and supply chains while mitigating risks of data manipulation and unauthorized access. Immutable blockchain records enhance supply chain integrity, ensuring accountability in operations. Decentralized verification mechanisms provide independent audits, while secure communication channels safeguard sensitive defense data. The framework integrates digital identity management for personnel authentication and utilizes Zero- Knowledge Proofs (ZKPs) to maintain confidentiality. A robust monitoring mechanism enables real-time issue detection and response, optimizing defense logistics. Additionally, blockchain- powered automation streamlines decision-making processes, reinforcing operational efficiency in military environments.

Keywords: *Blockchain, Smart Contracts, Distributed Ledger Technology (DLT), Internet of Things (IoT), Defense Asset Management, Secure Transactions, Transparency, Accountability, Supply Chain Integrity, Decentralized Verification, Digital Identity Management, Zero- Knowledge Proofs (ZKPs), Real-time Monitoring, Fraud Prevention.*

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ICNEAI_042

AI And Power BI Based Analysis Of Sales Insight

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Abstract

The Sales Insight project aims to enable companies to realize the full value of their sales data using power B I and AI. Through the leverage of the power of advanced analytics and machine learning, this project is dedicated to giving sales teams and decision-makers a clear, actionable picture of their performance. The system will use advanced analytics methods like predictive modelling, machine learning algorithms, and data visualization tools to equip sales teams and decision makers with real-time, data-driven facts. The system, based on the analysis of historical sales trends, customer information, and market conditions, will analyze patterns, predict future sales trends, and optimize sales tactics. The platform will make use of advanced analytics methods including predictive modelling, machine learning, and data visualization tools to provide sales teams and decision-makers with real-time data-driven insights. Through the evaluation of historical sales data, demographics of customers, and market dynamics, the system will determine trends, predict future sales patterns, and streamline sales strategies. This project integrates Artificial Intelligence and Power BI to perform end-to-end sales insight analysis. As businesses are always making decisions based on data, AI and Power BI present a better integration of predictive analytics, data visualization, and reporting capabilities. The final objective of the project is to use AI-driven algorithms to analyze previous sales data, identify patterns, and discover actionable insights that can be utilized to optimize sales strategy. The project will begin by cleaning and transforming sales data, integrating it into Power BI, and using AI-powered techniques such as machine learning models for forecasting sales, segmenting customers, and detecting patterns in product demand. These insights will be visualized using Power BI's interactive dashboards, allowing users to explore trends, kPIs, and metrics at various granularities, from regional performance to individual product success.

Keywords: *Sales insight project, Sales Data, Power BI, Artificial Intelligence (AI), Machine Learning, Predictive Modelling, Data Visualization, Sales Trends, Customer Segmentation, Forecasting, Actionable Insights.*

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ICNEAI_043

Automated MRI Scan Analysis for Alzheimer's Detection using Deep Learning Model

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Abstract

The Alzheimer's disease (AD) is a progressive neurode generative disorder that significantly impacts cognitive function, with early diagnosis being crucial for managing symptoms and slowing progression. Magnetic Resonance Imaging (MRI) is widely used for detecting structural brain changes associated with AD. However, manual analysis of MRI scans is time- consuming, subjective, and requires specialized expertise, which limits its scalability. This project presents an automated approach to Alzheimer's detection by analysing MRI scans with a deep learning model, designed to enhance diagnostic accuracy and efficiency. We propose a convolutional neural network (CNN) based framework trained on a large dataset of MRI images to detect early-stage Alzheimer's with high precision. The model was fine-tuned with data augmentation, hyperparameter optimization, and transfer learning to maximize performance. Our approach was evaluated against standard metrics, achieving significant improvements in classification accuracy, sensitivity, and specificity over traditional diagnostic methods. The results demonstrate the potential of deep learning to assist radiologists in early and accurate detection of Alzheimer's disease, paving the way for integrating AI-driven diagnostic tools in clinical settings

Keywords: *Alzheimer's disease, Deep learning, MRI, Convolutional Neural Network (CNN), Early diagnosis, Transfer learning, Data augmentation, Hyperparameter optimization, Classification accuracy, Sensitivity, Specificity, Precautions, AI-driven diagnostics.*

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ICNEAI_044

Artificial Intelligence Approaches for Drug Discovery and Health Care

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Abstract

Artificial Intelligence (AI) is revolutionizing drug discovery and healthcare by enhancing efficiency, accuracy, and cost-effectiveness. In drug discovery, AI-driven techniques such as machine learning and language processing accelerate target identification, molecular modeling, and drug repurposing. AI enables rapid analysis of vast biomedical datasets, reducing the time and cost of developing new therapies. In healthcare, AI-powered systems improve diagnostics, patient monitoring, and personalized treatment plans, leading to better patient outcomes. AI- driven predictive models assist in disease prevention and early intervention, while robotics and automation enhance surgical precision. Furthermore, AI facilitates real-time data integration from wearable devices, enabling proactive healthcare management. It plays a crucial role in streamlining clinical trials by identifying suitable candidates and predicting drug responses. AI-driven virtual assistants and chatbots enhance patient engagement and support healthcare professionals. Despite its transformative potential, challenges such as data privacy, regulatory compliance, and ethical considerations remain. This paper explores the latest advancements in AI applications for drug discovery and healthcare, highlighting their impact, challenges, and future directions.

Keywords: *Artificial Intelligence, Drug discovery, Applications, Future directions, Healthcare applications.*

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Artificial Intelligence Based Crop Yield Prediction Models

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Abstract

Agriculture plays a crucial role in world food security, and reliable prediction of crop yields is imperative for maximizing the allocation of resources, enhancing productivity, and ensuring sustainable agriculture. Conventional yield estimation techniques use past data and empirical models that are not precise because of fluctuating environmental factors. The advent of Artificial Intelligence (AI) has transformed crop yield prediction using machine learning (ML) and deep learning (DL) methods to process large datasets such as weather conditions, soil characteristics, remote sensing images, and past yield data. This paper discusses AI-based crop yield prediction models with emphasis on supervised learning techniques like regression models, neural networks, and ensemble methods. It emphasizes the combination of satellite imaging, Internet of Things (IoT) sensors, and precision agriculture technologies to improve predictive accuracy. In addition, issues of data quality, computational complexity, and model interpretability are addressed, as well as possible solutions. The research concludes that AI- based models have a lot of benefits in agricultural decision-making, leading to improved efficiency, losses reduction, and enhanced sustainability in food production.

Keywords: *Artificial Intelligence, Remote Sensing, Internet of Things, Supervised Learning, Neural Networks, Regression Models*

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Artificial Intelligence in Human Evolution and Genetics

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Abstract

Artificial Intelligence (AI) is revolutionizing the way we understand human genetics and evaluation. From predicting genetic disorders to personalizing healthcare, AI-driven technologies are enabling faster, more accurate insights into human DNA. Machine learning models analyse vast genetic datasets to detect patterns linked to diseases, while AI-powered tools assist in gene editing, enhancing precision and safety. Beyond genetics, AI is also reshaping human evaluation—helping in talent assessments, psychological profiling, and even predicting cognitive abilities. Ethical concerns remain, particularly regarding bias, privacy, and genetic determinism, but with responsible development, AI has the potential to unlock unprecedented advancements in human health and well-being. This paper explores the role of AI in genetics and human evaluation, highlighting breakthroughs, challenges, and the future of AI-driven personalized medicine and human assessment.

Keywords: *Human Genetics, Genetic Prediction, Ethical AI, Gene Editing, Genetic Data Analysis*

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Leveraging Data Visualization And Analytics Dashboard For Clinical Support System

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Abstract

This paper describes an integrated clinical support system with state-of-the-art visualisation capabilities that make hospital data useful as information. The system collects pertinent clinical information from multiple hospital sources, transforms it into structured Excel spreadsheets, and constructs interactive analytical dashboards in Microsoft Power BI. The visualisations enable clinicians to identify patterns, track patient outcomes, optimize utilization of resources, and evidence-based decision-making in real-time. The deployment reflects remarkable enhancements in clinical workflow productivity, reduced decision latency, and improved patient care quality. Our system addresses the growing demand for simplicity in data interpretation in clinical environments with no technical background. The article will outline the system architecture, data acquisition process, dashboard design principles, and real-world deployment outcomes in a number of clinical departments. The findings confirm that democratising data visualisation by offering easier-to-use platforms such as Power BI can significantly impact clinical decision support systems and ultimately deliver improved healthcare outcomes.

Keywords: *Healthcare Data Visualization, Real-time Data Analysis, Data Acquisition Process, Healthcare Analytics.*

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Virtual AI Voice Assistant for PC Automation

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Abstract

In an era of rapidly evolving technology, Artificial Intelligence (AI) has advanced significantly, with its applications increasingly relevant in everyday life. The demand for accessible and efficient user interfaces has become essential. This paper presents the development of a Virtual AI Voice Assistant designed to address these challenges using advanced AI models. The assistant integrates innovative Text-to-Speech (TTS) and Speech-to-Text (STT) technologies to enable seamless communication for users. Integrating advancements in Human-Computer Interaction (HCI), the assistant enhances user engagement through natural voice-based interactions and utilizes advanced Optical Character Recognition (OCR) models to recognize and vocalize written text, greatly enhancing accessibility for visually impaired individuals. Its multi-tasking capabilities allow users to execute multiple voice commands simultaneously, improvising workflow efficiently. Additionally, noise suppression technology enhances command understanding, ensuring precise voice capture even in noisy environments. The assistant can perform a variety of tasks such as browsing media, setting reminders, playing music and complex operations such as narrating content from screens, generating solutions to user queries, and rendering images through voice commands. Advanced features include the ability to read from and write to files, as well as solving coding problems directly within integrated development environments (IDEs). Distinguishing features like personalized voice modulation and context-aware responses facilitate more natural interactions, making it an essential tool for both individuals with disabilities and the general people seeking to automate their daily tasks. This innovative voice assistant demonstrates the potential of AI in enhancing user experience and accessibility across a wide range of applications.

Keywords: *Artificial Intelligence, Voice Assistant, Human-Computer Interaction, Natural Language Processing, Text-to-Speech, Speech-to-Text, Optical Character Recognition, Accessibility, User Interface.*

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ICNEAI_049

Assembly Defect Capturing

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Abstract

The Assembly Defect Capturing Tool is designed to automate and enhance defect detection in assembly lines, improving efficiency and accuracy. This tool integrates machine learning and real-time monitoring to identify defects such as misalignment, missing components, and improper assembly. By leveraging high-resolution cameras and AI algorithms, the system detects anomalies and notifies operators for corrective actions, reducing human error and improving production yield. The tool is scalable, adaptable to various industries, and can be integrated with existing manufacturing systems. This innovation ensures high-quality standards, reduces waste, and enhances overall operational efficiency

Keywords: *Assembly defect detection, machine learning, real-time monitoring, computer vision, AI-based quality control, defect classification, manufacturing automation, industrial AI, production efficiency, assembly line optimization.*

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ICNEAI_050

Federated Learning-Enabled Distributed Outlier Detection for Wireless Sensor Networks with Privacy-Preserving and Fault-Tolerant Mechanisms

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Abstract

Wireless Sensor Networks (WSNs) serve an essential function in the Internet of Things (IoT) by gathering and observing environmental data across a variety of sectors, such as healthcare, farming, production, and defense. Nevertheless, sensor information frequently encounters outliers due to malfunctioning nodes or extreme deployment environments, which can affect the dependability of the network and the effectiveness of applications. This study advances current distributed outlier detection and classification techniques by incorporating Federated Learning (FL) for anomaly detection that preserves privacy in WSNs. The suggested methodology boosts precision, dependability, and effectiveness while ensuring data confidentiality across distributed sensor nodes. By utilizing the spatial-temporal relationships of sensor information and node interactions, our technique successfully distinguishes between malfunctions and important events, guaranteeing a high Detection Rate (DR) and a low False Alarm Rate (FAR). Simulations conducted on both artificial and real-world datasets reveal that our FL-driven approach surpasses existing methods, positioning it as an encouraging alternative for resilient and secure anomaly detection in WSNs.

Keywords: *Outlier detection, WSN, IoT, Detection Rate (DR), False Alarm Rate (FAR), Federated Learning (FL).*

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AgriPredict+: Smart Yield Forecasting and Crop Advisory

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Abstract

Agricultural practices are not easy; there is a change in the weather and soil conditions, and uncertain crop yield makes the life of a farmer worse in planning a farm for the future. AgriPredict+: Smart Yield Forecasting and Crop Advisory is an artificial intelligence-assisted solution aimed towards enabling farmers to make smarter decisions data-wise by predicting crop yields and offering personalized recommendations. Using machine learning predictive models such as Random forest, XGBoost, and LSTM-based forecasting, AgriPredict collects historical yield data and soil quality and weather pattern data to provide insight. It, therefore, helps farmers decide on what to plant, when, and manage water and fertilizer resources effectively by understanding climate trends and different impacts on crops. The outcome would be better productivity and sustainability of farming and less risk. With challenges of new agriculture, AgriPredict guides farmers on how to adapt for maximum harvests and better future farming by harnessing the power of AI.

Keywords: *Smart Farming, XGBoost, LSTM, Weather Forecasting, Prediction, Recommendation.*

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Smart Agriculture Field Monitoring Integrated with Artificial Intelligence & Internet Of Things

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Abstract

Agriculture has been the backbone of the Indian economy since the dawn of human civilization. However, traditional farming techniques such as manual field monitoring, water management, pest detection, and soil testing are still widely used, often leading to inefficiencies and crop damage. To enhance agricultural productivity, advanced technology must be integrated into farming practices. This paper presents Smart Agriculture Field Monitoring Integrated with Artificial Intelligence & Internet Of Things, a smart monitoring system that leverages IoT, cloud computing, and image processing to assist farmers in field analysis. AAFAMS utilizes a line follower robot, powered by Raspberry Pi, to monitor soil moisture levels at regular intervals using soil moisture sensors. The collected data is transmitted to the cloud for storage and analysis. Additionally, a camera module is integrated into the system to detect pests in the field. After a complete field survey, AAFAMS retrieves the stored data from the cloud and SQLite database to generate a comprehensive report, providing farmers with insights on soil moisture levels, pest detection, and suitable pesticides. The system is designed to operate on batteries or solar energy, making it a sustainable and cost-effective solution for modern farming. By integrating smart technology into agriculture, AAFAMS aims to enhance efficiency, reduce manual labour, improve crop yield, ultimately contributing to the advancement of smart farming.

Keywords: *Artificial Intelligence, Cloud Computing, Image Processing, Internet of Things, Smart Agriculture, Soil Moisture Monitoring*

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Abnormality Converging Scene Analysis Method (ACSAM) for Efficient Anomaly Detection in Crowded Spaces

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Abstract

Recognizing abnormal group behavior in crowded scenarios is a complex task that poses significant challenges due to the dynamic nature of crowds and the computational requirements involved. Existing methods often struggle to accurately detect anomalies, leading to reduced recognition accuracy and increased false alarm rates. This study introduces the Abnormality Converging Scene Analysis Method (ACSAM), a novel approach that leverages Convolutional Neural Networks (CNNs) to detect abnormal behavior in monitored videos or CCTV images. ACSAM utilizes a comprehensive dataset to train CNNs for different frames, identifying deviation convergence to detect anomalies. By analyzing the convergence of abnormal behavior patterns, ACSAM can accurately identify potential threats in crowded scenarios. Experimental results demonstrate that ACSAM outperforms state-of-the-art methods, including DeepROD, MSI-CNN, and PT-2DCNN, in terms of accuracy, recall, and F1-Score. Furthermore, ACSAM reduces detection time by 10.91% and false alarm rates by 9.32%, making it a robust and efficient solution for abnormal behavior recognition in crowded scenarios. The proposed method has significant implications for public safety and security applications.

Keywords: *Abnormal Behavior Recognition, Convolutional Neural Networks (CNNs), Deep Learning, Crowd Monitoring, Intelligent Surveillance*

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ICNEAI_054

Plant Disease Detection Using Deep Learning

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Abstract

Plant diseases are the major worldwide problem to food security and agricultural production. Traditional detection techniques are time-consuming, labor-intensive, and prone to human error because they depend on expert opinion. This study offers a precise and automated substitute by utilizing Convolutional Neural Networks (CNNs) in an AI powered plant disease detection system. The process involves gathering a variety of datasets covering various plant types and diseases from Kaggle. Model resilience is improved by preprocessing techniques such noise reduction, image normalization, augmentation, resizing and rescaling. To maximize performance, deep learning architectures like ResNet, AlexNet, and ManualNet are used, along with transfer learning and hyperparameter optimization. The system is deployed as a Django- based web application(connects frontend and backend), allowing the users to upload plant leaf images for real-time disease categorization .The training deep learning model is converted into hierarchical data format (.h5 format). The model helps farmers and agricultural experts in early disease detection and management. Multiple plant varieties are supported by the system, guaranteeing adaptability in different environmental conditions. Experimental tests demonstrate that CNN-based models outperform traditional image processing methods in terms of accuracy and dependability. According to the report, AI will transform precision agriculture by facilitating proactive intervention, lowering crop losses, and boosting output efficiency. By developing a scalable, effective, and easily available AI-driven plant disease detection system, our research promotes intelligent agricultural solutions that support sustainable farming and food security.

Keywords: *Convolutional Neural Network, ManualNet, AlexNet, ResNet, Django, Disease Prediction, Preventive Measures.*

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Cryptic Browser-Oriented Identity Protection Framework

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Abstract

To protect user privacy and stop unwanted access, digital environments must have safe and effective authentication. In order to improve secrecy and integrity, this project integrates cryptography and obfuscation techniques into a multi-layered encryption system for safe browser authentication. It uses hybrid encryption, which combines RSA, AES, ChaCha20, and Blowfish, to guarantee safe data storage and transport while preserving system performance. The system improves authentication security against risks including replay attacks, data interception, and illegal decryption by integrating these encryption techniques. By preventing crucial authentication procedures from being reverse-engineered, obfuscation significantly strengthens security.This strategy strikes a compromise between computational efficiency, security, and usability, making it a workable option for safe digital authentication in a range of web applications. The goal of the suggested system is to give a scalable and flexible security framework for contemporary web-based authentication systems by providing a strong, privacy- compliant authentication method without the need for specialized hardware.

Keywords: *Browser Authentication, AES, ChaCha20, Blowfish, Hex Decimal*

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ICNEAI_056

Advancements in Artificial Intelligence and Machine Learning for Transformative Technologies

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Abstract

Artificial Intelligence (AI) and Machine Learning (ML) have revolutionised multiple domains, enabling automation, predictive analytics, and intelligent decision-making with unprecedented accuracy and efficiency. The integration of AI with computational physics, big data analytics, and cloud computing has enhanced productivity across industries such as healthcare, finance, autonomous systems, and smart cities. Recent breakthroughs in deep learning, reinforcement learning, and generative AI models have not only propelled innovation but also redefined human-machine interactions. This paper explores emerging trends in AI and ML, including explainable AI, federated learning, neuromorphic computing, and quantum-inspired machine learning. Additionally, we analyse critical challenges such as ethical AI, data privacy, bias mitigation, and model interpretability, emphasising the need for robust, transparent, and trustworthy AI frameworks. Future directions highlight the convergence of AI with IoT, cybersecurity, edge computing, and human-centric computing to develop adaptive, intelligent, and sustainable systems that can drive the next wave of technological evolution.

Keywords: *Artificial Intelligence, Machine Learning, Deep Learning, Explainable AI, Federated Learning, Quantum Computing, Neuromorphic Computing, Ethical AI.*

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Pretrained CNN Algorithms For Optimised Wood Quality Evaluation

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Abstract

The woodworking industry relies heavily on maintaining high standards of quality in finished wood products, making wood defect detection a critical aspect of the manufacturing process. Traditionally, this task has been labour-intensive, requiring manual inspection by trained professionals. Wood defects, including knots, cracks, splits, and discolorations, can significantly impact the structural integrity and aesthetic appeal of finished products. Identifying and addressing these defects early in the manufacturing process is crucial for ensuring the overall quality of wood materials and minimizing waste. The advent of deep learning algorithms, particularly Convolutional Neural Networks (CNNs), provides a promising avenue for automating the detection of these defects with unprecedented accuracy and efficiency. By leveraging the power of CNNs and transfer learning techniques, the algorithm is trained on a diverse dataset encompassing various wood defects and surface conditions. This enables the model to learn intricate patterns and textures associated with different defects, facilitating precise detection. The study explores the algorithm's capacity to generalize across different wood species and adapt to varying surface characteristics. Additionally, the research investigates the practical implementation of the algorithm within existing quality control workflows, emphasizing its potential to revolutionize efficiency and reduce manual intervention in the woodworking industry.

Keywords: *Wood Defect Detection, Deep Learning, Convolutional Neural Networks (CNNs), Transfer Learning, Automated Quality Control, Image Processing, Feature Extraction, Defect Classification, Pattern Recognition, Manufacturing Optimization, Structural Integrity, Surface Inspection, Smart Manufacturing, Industrial Automation.*

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Emotion-Aware Result System with DeepFace for Facial Analysis and Parental Alerts

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Abstract

The Result Management System with Face Recognition is an innovative solution designed to enhance students' mental health during result release. This system leverages advanced face recognition technology to observe, analyse, and interpret students' facial expressions in real- time as they view their results. By capturing these expressions, the system identifies emotions such as happiness, sadness, or distress and generates an emotional profile. This profile is then instantly sent to parents via email, enabling them to provide timely support and reassurance to their children. The system's real-time monitoring ensures accurate and immediate emotion detection, powered by facial expression analysis and artificial intelligence (AI). These technologies enhance efficiency in interpreting behavioral responses. By integrating a parental notification system, the solution creates a direct communication channel between schools and parents, ensuring that parents are informed not just about academic outcomes but also about their child's emotional state. This system exemplifies how AI in education can address mental health concerns by offering insights into students' emotional well-being. Additionally, it facilitates behavioural analysis, allowing schools to identify trends and implement timely interventions to foster a supportive academic environment. In summary, the Result Management System extends beyond academics by focusing on students' mental wellness, offering schools and parents an innovative tool to promote emotional support and a secure learning environment.

Keywords: *Face Recognition, Emotion Detection, Real-Time Monitoring, Student Mental Health.*

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ICNEAI_059

Sign Language Recognition By Using Deeplearning

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Abstract

This project investigates the application of deep learning for accurate and efficient sign language recognition (SLR), aiming to facilitate seamless communication between deaf and hearing individuals. We propose a system that utilizes a deep learning architecture, combining the strengths of convolutional neural networks (CNNs) to interpret sign language gestures from video input. The methodology encompasses several key stages. Initially, video data of sign language is captured and pre-processed, including hand detection and feature extraction. CNNs are employed to extract spatial features from individual frames, effectively capturing the static hand configurations and postures. It is specifically Long Short-Term Memory (LSTM) networks, to model the temporal dependencies within the sign language sequences, thereby capturing the dynamic movements and transitions between signs. The system's performance is evaluated using benchmark datasets and custom-collected data, focusing on recognition accuracy, real-time processing capabilities, and overall system robustness. We explore various optimization techniques, including data augmentation, transfer learning, and hyperparameter tuning, to enhance the model's performance. The results demonstrate the efficacy of our deep learning approach in achieving high recognition rates, paving the way for the development of practical and accessible SLR systems. This research contributes to the advancement of assistive technologies, promoting inclusivity and bridging the communication barrier for the deaf community.

Keywords: *Deep learning, CNN, Real-time Translation, Hand segmentation, Motion tracking , Inclusivity, Accessibility, Communication, Dataset.*

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ICNEAI_060

Fitness Application

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Abstract

The increasing demand for digital health solutions has led to the development of mobile fitness applications that help users maintain a healthy lifestyle. This paper presents a fitness application designed using Java and Kotlin, with Firebase serving as the backend for authentication and real-time data management. The application provides a user-friendly interface, allowing seamless login, personalized workout plans, and progress tracking. Firebase ensures secure authentication, reliable data storage, and smooth synchronization across devices. The app eliminates the need for external APIs, making it lightweight and efficient. The study highlights the effectiveness of Firebase in enhancing security and user engagement. Future developments will focus on integrating AI-based workout recommendations and wearable device compatibility to improve the overall user experience.

Keywords: *Authentication, Firebase, Fitness Application, Java, Kotlin, Real-Time Data Management*

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ICNEAI_061

Mobile App For Direct Access For Farmers

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Abstract

This project focuses on developing a mobile application for Direct Market Access (DMA), aimed at bridging the gap between farmers and buyers by eliminating intermediaries. The app provides farmers with real-time market information, enabling them to make informed decisions, negotiate better prices, and access diverse markets. Key features include market trend analysis, inventory management, and streamlined transaction processes, all designed to enhance transparency and efficiency. By leveraging modern technology, the app seeks to improve farmers' income, support sustainable agricultural practices, and promote fair trade, ultimately contributing to the overall development of the agricultural sector.

Keywords: *Agriculture, Direct Market Access (DMA), Farmers, Market Information, Sustainability, Technology.*

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ICNEAI_062

Cardiac Clarity A Guide To Heart Disease Prediction

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Abstract

Heart disease remains a leading cause of mortality worldwide. Early detection and accurate prediction are crucial for timely intervention and improved patient outcomes. This paper proposes a robust heart disease prediction system utilizing a hybrid deep neural network (HDNN) architecture. The HDNN integrates multiple neural network models, including Convolutional Neural Networks (CNNs) for feature extraction and Deep Neural Networks (DNN) for complex nonlinear relationships between input features and output labels. The proposed system is evaluated on two publicly available heart disease datasets, demonstrating superior performance compared to individual models. The results highlight the potential of HDNNs in developing advanced and reliable heart disease prediction models, contributing to improved healthcare and patient management.

Keywords: *Heart Disease, Cardiovascular Disease, Machine Learning, Prediction Model, Classification Algorithms.*

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ICNEAI_063

Placement And Job Allocation Management Platform

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Abstract

This paper presents the design and perpetration of a Placement Management System aimed at easing the process of pupil placements in academic institutions. The system uses ultra-modern web technologies: HTML, CSS, and JavaScript for the frontend, and PHP for the back-end server-side sense. The system provides features like student enrollment, company biographies, job table, and placement tracking, which are user-friendly, effective, and scalable. The paper discusses the system armature, technologies used, and perpetration details.

Keywords: *Design And Development Of Placement Management System, Web Development, HTML, CSS, Javascript, Java, Job Placement, Web Applications.*

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ICNEAI_064

RESTful Microservice for Computational Similarity Evaluation

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Abstract

Effective similarity detection is essential in the age of big data and artificial intelligence for a number of applications, such as data deduplication, recommendation systems, and plagiarism detection. In order to compare text, graphics, or structured data using sophisticated similarity measures, this work proposes a RESTful API for similarity checking. The Representational State Transfer (REST) architecture used by the API guarantees scalability, flexibility, and platform-to-platform interoperability. The system uses word embeddings like Word2Vec or BERT, cosine similarity, and Jaccard similarity, among other natural language processing (NLP) approaches, to compare texts. Deep learning methods such as convolutional neural networks (CNNs) are used for picture similarity. Distance measures like the Euclidean, Manhattan, or Jaccard distances are used to calculate the similarity of structured data. JSON- based requests and answers are supported by the Flask/FastAPI Python implementation of the API. Real-time similarity calculation, support for several formats, authentication methods, and compatibility with cloud deployment are important aspects. Performance benchmarks demonstrate how well it handles massive amounts of data with little lag. For companies and researchers. wishing to incorporate similarity detection into their applications, this RESTful API offers a strong basis that guarantees high accuracy and effective resource use.

Keywords: *Cosine Similarity, Convolutional Neural Network, Image Similarity, Jaccard Similarity, Natural Language Processing, Real-time Processing, RESTful API, Similarity Check, Structured Data Comparison.*

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ICNEAI_065

Food Supply Chain Optimization Using Blockchain Technology

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Abstract

The advent of Distributed Ledger Technology (DLT), particularly blockchain, has revolutionized various sectors, with Supply Chain Management (SCM) being a prominent beneficiary. This paper introduces FARMSUPPLY, a novel model leveraging blockchain to enhance transparency and traceability in the Food Supply Chain (FSC). Employing Ethereum blockchain and smart contracts, FARMSUPPLY ensures verification and validation of critical attributes at each stage of the supply chain, from farmer to retailer. Through immutable ledger recording and integration with the InterPlanetary File System (IPFS), Farmsupply enables seamless preservation and retrieval of transaction data, including images and locations. By fostering transparency and traceability, FARMSUPPLY addresses key challenges in FSC, facilitating informed decision-making and fostering trust among stakeholders. This paper presents a comprehensive overview of the FARMSUPPLY model, highlighting its potential to revolutionize FSC operations, improve consumer confidence, and contribute to the overall efficiency and sustainability of the food industry.

Keywords: *Distributed Ledger Technology (DLT), Supply Chain Management (SCM), Food Supply Chain (FSC), Blockchain, Smart Contract, Verification and Validation*

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ICNEAI_066

AI-Driven Image Segmentation For Medical Imaging Applications

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Abstract

Artificial Intelligence (AI)-driven image segmentation is transforming the field of medical imaging by providing precise and automated delineation of anatomical structures and pathological regions. This approach leverages advanced machine learning models, such as convolutional neural networks (CNNs) and transformer-based architectures, to analyze complex medical images, including X-rays, MRIs, CT scans, and ultrasounds. AI techniques enable faster processing times, reduce variability in manual interpretations, and improve diagnostic accuracy, particularly in detecting tumors, lesions, and other abnormalities. Furthermore, AI models can adapt to diverse imaging modalities and patient demographics, enhancing their applicability across clinical settings. Despite these advancements, challenges remain in ensuring model generalizability, mitigating biases, and achieving regulatory compliance. This paper explores the state-of-the-art methodologies in AI-driven image segmentation, discusses their clinical applications, and highlights future directions for integrating these technologies into routine medical practice. The study underscores the potential of AI to revolutionize medical imaging, improving patient outcomes and optimizing healthcare delivery systems.

Keywords: *Artificial Intelligence (AI), Convolutional Neural Networks (CNNs), Image Segmentation, Medical Imaging, Machine Learning, Transformers.*

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ICNEAI_067

Dark Pattern Detection Using Machine Learning

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Abstract

Dark patterns are deceptive design techniques used in digital interfaces to manipulate user behavior, often leading to unintended actions. These unethical design choices negatively impact user autonomy, causing financial loss, privacy violations, and psychological distress. This paper presents a machine learning approach to detecting dark patterns in online platforms. By leveraging deep learning models, natural language processing (NLP), and computer vision techniques, our system identifies misleading UI/UX elements that unfairly influence user decisions. The proposed method achieves high accuracy in detecting dark patterns such as forced continuity, hidden costs, and disguised advertisements. Furthermore, this research emphasizes the ethical implications of dark patterns and the necessity for automated solutions in mitigating their prevalence. Our approach contributes to the broader discourse on responsible design and regulatory enforcement.

Keywords: *Dark Patterns, Machine Learning, Deep Learning, Deceptive Design, UI/UX, User Manipulation, Ethical AI, Regulatory Frameworks.*

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ICNEAI_068

High Efficiency RISC Processor Design with LDPC For Latency Optimization

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Abstract

This paper presents the design of a high efficiency Reduced Instruction Set Computer (RISC) processor integrated with Low Density Parity-Check (LDPC) decoding to optimize latency in real time processing applications. The proposed architecture leverages the simplicity and high- speed processing of RISC principles combined with LDPC's error-correction capabilities to achieve superior performance in latency-critical systems. By focusing on pipeline optimization, resource utilization, and parallelism, the design minimizes delays without compromising accuracy or power efficiency. This integration is particularly suited for applications in communication systems, high-speed computing, and embedded systems where low latency and reliability are paramount. Simulation results demonstrate significant improvements in processing speed and error correction efficiency compared to conventional designs.

Keywords: *Reduced Instruction Set Computer, Low-Density Parity-Check, Error-Correction, Pipeline.*

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ICNEAI_069

Development Of Efficient Counter Circuit Using Quantum Dot Cellular Automata Tool

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Abstract

The scaling of electronic devices to the nanoscale has driven interest in Quantum-dot Cellular Automata (QCA) as a potential alternative to traditional CMOS technology for future digital circuits. This paper presents an efficient design for an asynchronous counter using D Flip-Flops (DFFs) within the QCA paradigm, addressing critical challenges in speed, area, and power consumption at the nanoscale. The asynchronous counter, a fundamental building block in sequential logic circuits, is optimized to leverage the parallelism and low-power characteristics inherent in QCA. QCA's unique ability to encode binary information through the arrangement of charge configurations in quantum dots ensures minimal delay and scalability. By optimizing the placement and interaction of QCA cells, the proposed design achieves superior performance over conventional CMOS-based counterparts, particularly in terms of switching speed and energy efficiency. The asynchronous counter utilizes a divide-by-two concept, where the input clock frequency is divided by two, yielding a 2-bit and 3-bit counter. Simulation results using the QCA Designer Tool demonstrate the feasibility of the proposed design for nanoscale applications, highlighting its potential in high-performance and low-power digital systems.

Keywords: *Quantum-dot Cellular Automata (QCA), Asynchronous Counter, D Flip-Flops (DFF), Divide-by-Two, Low Power, High Performance.*

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ICNEAI_070

Revolutionizing Drugs Discovery: The Role Of Artificial Intelligence

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Abstract

The traditional methods of drug discovery, including wet laboratory testing and validations, are often costly and time-consuming. However, advancements in artificial intelligence (AI) have significantly revolutionized this process. AI techniques, combined with accessible data resources such as ChEMBL and DrugBank, have transformed various aspects of drug discovery. This review introduces key data resources and molecular representation schemes crucial for AI applications in drug discovery. It summarizes the algorithms used to develop AI- based models and their applications, including predicting drug toxicity, bioactivity, and physicochemical properties. In our proposed system propose the ToxiDNN for drug molecular toxicity prediction and ensemble algorithms like Gradient Boosted Trees, Random Forests, and Support Vector Machines for drug synergy prediction. Furthermore, the review covers advanced applications of AI in drug design, drug-target structure prediction, interaction, and binding affinity prediction.

Keywords: *Support Vector Machines, Random Forest, Neural Network*

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ICNEAI_071

Design Of Robotic Arm Controller Using in Android App

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Abstract

This project presents the design and implementation Android operated robot arm is designed so as it can perform the activities of a human arm by the instructions given through android device (android app). The robotic arm is equipped multiple degrees of freedom, enabling precise movements and operations. A signal is generated when specific buttons on the android application are pressed which allows micro-controller to make the arm move according to the predefined program. Here Android application being the command center of the robotic arm as it commands the arm to move or grab specific things as the instruction is transferred to the arm through android device using embedded C language. At the receiver the signal is provided to the wireless Bluetooth module which does several manipulations in this data using different scaling factors through programming which controls the direction and speed of the motors that is responsible for the motion of the robotic arm. The micro-controller acts accordingly on the DC motors of the robot. The robot can be made to move in all four directions using the Android device.

Keywords: *Robotic Arm, Bluetooth Module, Arduino UNO, Servomotor.*

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ICNEAI_072

Real Time Vehicle Smoke Emission Monitoring Using Iot

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Abstract

Air pollution caused by vehicular emissions poses a significant threat to public health and environmental sustainability. The rapid increase in vehicle usage has exacerbated the issue, necessitating real-time monitoring and regulatory enforcement. This project presents an IoT- based vehicle smoke emission monitoring system designed to detect and analyze pollution levels effectively. By integrating MQ135 (air quality sensor), MQ131 (ozone sensor), and DHT11 (temperature & humidity sensor) with an ESP32-WROOM-32D microcontroller, the system continuously tracks emission levels and displays the real-time data on an LCD 16x2 with I2C module. If pollution levels exceed predefined limits, the system automatically triggers a fine of ₹100, notifying users and uploading the data to the Blynk IoT platform for remote access via a mobile application. This real-time emission tracking system ensures compliance with environmental standards while offering a cost-effective and scalable solution for pollution control and smart city integration.

Keywords: *IoT, Vehicle Emission Monitoring, Air Pollution, ESP32, MQ135, MQ131, DHT11, LCD 16x2, Smart City, Real-Time Monitoring, Blynk IoT, Fine Notification System, Cloud Data Storage, Environmental Sustainability, Automated Pollution Control.*

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ICNEAI_073

Analysis of Wi-Fi Signal Transmission and Reception Using Software-Defined Radio

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Abstract

Wi-Fi signal deterioration in multifarious environments are met in this research, which takes into consideration the interaction among signal strength, range, and people interference. In utilizing the capability of Software-Defined Radio (SDR) for flexibility, the research makes use of one-way signal sending to direct Wi-Fi signals toward specific targets and improve coverage as well as suppress interference from using conventional omnidirectional broadcasting. The experimental setup measures signal decay with increasing distance, giving empirical evidence of path loss. Importantly, the study explores the attenuation and dispersion effects of the human body on Wi-Fi signals, examining how physical presence and positioning affect signal strength. In controlled experiments employing SDR platforms like GNU Radio, signal behavior is carefully recorded and analyzed, showing possible interference patterns generated by human blocking. These patterns are subsequently related to different environmental parameters to construct a predictive model of signal behavior. The results are intended to guide optimized placement techniques for Wi-Fi access points, reducing the effects of human-caused interference and enhancing overall network performance. In addition, the project investigates adaptive signal shaping methods facilitated by SDR, which can adaptively modify transmission parameters to counteract signal loss and ensure connectivity in high- density environments. Through bridging the divide between theoretical models of signal propagation and actual human interaction, this research provides useful insights into improving wireless communication system efficiency and dependability and, in turn, contributing toward stronger and more seamless connectivity under adverse conditions. The research brings out the capability of SDR technology to dynamically control Wi-Fi signals in order to maximize coverage, reduce interference, and accept human interference as part of moving forward to smart and user-friendly wireless networks.

Keywords: *Wi-Fi, Software-Defined Radio, Signal Attenuation, Unidirectional Transmission, Wireless Communication, Human Interaction.*

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ICNEAI_074

Smart Kitchen in Virtual Reality

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Abstract

The Smart Kitchen project integrates VR technology to transform the cooking experience. Users can view recipes in 3D and confirm details step by step, enhancing their understanding of each phase. The system enables hands-free navigation using voice commands or hand gestures. By immersing users in an interactive environment, it improves efficiency and accessibility in the kitchen. Traditional printed recipes and screens are replaced by an intuitive VR interface. The project aims to simplify cooking while offering an engaging and immersive experience. It blends modern technology with everyday culinary tasks. This innovative approach makes cooking more efficient and enjoyable.

Keywords: *Smart Kitchen, 3D View, Hand-Free Navigation.*

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ICNEAI_075

Design and Fabrication of a 2.4GHz Phased Array Antenna with Power Divider for Environmental Monitoring

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Abstract

This paper presents the design and fabrication of a 2.4 GHz phased array antenna with a power divider for environmental monitoring applications. The proposed antenna system enhances signal strength and directional control, ensuring efficient data transmission from Earth Observation Satellites (EOS). The phased array configuration improves beam steering capabilities, enabling precise coverage for remote sensing applications. A power divider is integrated to ensure uniform power distribution across the antenna elements, optimizing radiation efficiency and minimizing signal loss. The design process involves simulation-driven optimization of key parameters, including gain, beamwidth, and return loss, followed by prototype fabrication and experimental validation. Performance evaluations demonstrate the antenna's effectiveness in enabling real-time environmental data acquisition, supporting applications such as weather monitoring and air quality assessment. This work provides a cost- effective and scalable solution for satellite-based environmental monitoring, contributing to advancements in remote sensing technology.

Keywords: *Phased Array Antenna, 2.4 GHz, Power Divider, Earth Observation Satellite, Environmental Monitoring, Remote Sensing, Wireless communication.*

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ICNEAI_076

Automated Industry Classification Using K-Means Clustering with Pre-trained Doc2Vec Embeddings

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Abstract

Conventional industry categorization frameworks, like SIC and GICS, depend on human categorization by specialists in the field, which makes them lengthy, subjective, and slow to respond to shifts in the market. To overcome these drawbacks, this study introduces an automated, data-centric classification system that employs K-Means clustering alongside pre- trained Doc2Vec embeddings. By extracting textual data from corporate disclosures, our method produces dense document vectors that encapsulate the identity of organizations. To improve the stability and precision of clustering, KMeans++, an advanced initialization technique, is utilized. The suggested approach enhances the flexibility of classification, minimizes the need for human involvement, and guarantees responsiveness to changing industry dynamics. Experimental findings based on evaluations of financial ratios reveal that our method achieves significant uniformity both within and across industries, surpassing traditional classification systems in terms of scalability and impartiality.

Keywords: *Automated Industry Classification, K-Means Clustering, Doc2Vec Embeddings, Corporate Disclosures, KMeans++ Initialization, Scalability and Impartiality.*

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ICNEAI_077

Novel Design And Simulation Of High Density Arithmetic Logic Unit Using Quantum Dot Cellular Automata

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Abstract

Quantum-dot Cellular Automata (QCA) is an emerging nanotechnology that utilizes quantum computational models with quantum bits (qubits) instead of classical bits to simulate complex systems. This paper presents the design of an Arithmetic Logic Unit (ALU) capable of performing arithmetic and logical operations such as binary addition, logical AND, OR, NOT, NAND, NOR, XOR, XNOR, and multiplexing. The proposed design demonstrates superiority over traditional CMOS technology due to its compact size, high speed, low latency, and significantly reduced power consumption. Additionally, the design optimizes cell count and circuit area, enhancing overall efficiency. The simulation and analysis of results are conducted using QCA Designer, a tool that supports layout design, logic simulation, and verification.

Keywords: *Quantum Dot, Nanotechnology, Quantum Bits, Arithmetic Logic Unit, CMOS Technology, QCA Designer.*

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ICNEAI_078

Solar-Powered Smart Helmet with Voice-Controlled Cooling Fan, Visor, and GPS Integration for Enhanced User Comfort and Safety

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Abstract

The Solar-Powered Smart Helmet is an advanced wearable solution designed to improve user comfort, safety, and convenience while driving two-wheeler. The system is powered by a flexible solar panel, ensuring sustainable energy usage for extended operation, it's pasted on the top of the helmet. It integrates a Node MCU microcontroller for voice control functionality, allowing the user to activate and adjust an air ventilation cooling fan and visor position hands- free. The hand free control will reduce the accidents in the roads. The helmet also features a GPS module to track the user's location for safety purposes, enabling real-time location sharing and navigation assistance. A Raspberry Pi serves as the central control unit, managing the entire system's operations, including voice recognition, cooling fan control, visor adjustments, and GPS integration. This combination of renewable energy, advanced controls, and real-time tracking offers a comprehensive solution to enhance user comfort in driving. The Smart Helmet provides a seamless balance between cutting-edge technology and environmental sustainability, making it an invaluable for bike driver.

Keywords: *Smart Helmet, Cooling Fan, Visor, GPS, Safety.*

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ICNEAI_079

Enhancing Data Storage Security in Cloud Computing Using Neural Evolutionary Algorithms

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Abstract

Cloud computing has revolutionized data storage and accessibility, offering scalability and efficiency. However, security concerns, particularly data breaches, unauthorized access, and integrity threats, remain critical challenges. Traditional security measures struggle to adapt to evolving cyber threats, necessitating intelligent and adaptive solutions. This paper proposes a Neural Evolutionary Algorithm (NEA)-based security framework to enhance data storage security in cloud computing environments. The framework leverages evolutionary optimization techniques and neural networks to dynamically detect, prevent, and mitigate security threats. By continuously evolving through reinforcement learning, the proposed approach adapts to new attack patterns, ensuring robust encryption, anomaly detection, and access control mechanisms. Performance evaluation demonstrates improved threat detection accuracy, reduced false positives, and enhanced system resilience compared to conventional security models. The results indicate that NEA-based security solutions can significantly strengthen cloud storage security, making cloud environments more reliable and resistant to sophisticated cyber threats.

Keywords: *Cloud Security, Neural Evolutionary Algorithms, Data Protection, Anomaly Detection, Adaptive Security.*

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ICNEAI_080

The Future of Healthcare Transportation: AGVs for Streamlined Hospital Operations

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Abstract

Automated Guided Vehicles (AGVs) are transforming hospital operations by automating essential tasks such as delivering medications, medical supplies, and samples. These vehicles rely on simple yet effective technologies, including sensors, cameras, navigation systems, and AI-driven components, to navigate hospital environments safely and efficiently. The core components of an AGV include sensors and cameras for obstacle detection, which allow the vehicle to avoid collisions and navigate smoothly through busy hospital corridors. The navigation system typically uses magnetic strips or path-following algorithms to ensure the AGV follows predefined routes with precision. The AI algorithms enable the vehicle to adjust its path in real time based on changing conditions, such as blocked paths or increased traffic in the hospital, making the vehicle highly flexible and responsive to its surroundings. AGVs are controlled through a centralized management system that oversees their movements, coordinates tasks, and communicates with other hospital systems for real-time tracking. These systems can be managed by hospital personnel, including logistics teams, who monitor the AGVs remotely to ensure smooth operations. The vehicles operate autonomously but can be manually overridden if necessary for special tasks or in case of an emergency. The technology behind AGVs allows them to respond dynamically to changes in their environment. For example, when an obstacle is detected, the AGV automatically recalculates its route to avoid the obstruction. If the designated path is blocked, it instantly reroutes to a safe alternative, ensuring continuous operation without human intervention. These responsive systems, combined with real-time communication with hospital management software, optimize the delivery process, ensuring timely and accurate deliveries. The use of these technologies leads to increased operational efficiency, improved safety by reducing human error, and significant cost savings by minimizing manual labor. AGVs also enhance accuracy by ensuring deliveries are made to the correct locations at the right time. This presentation will explore the technologies driving AGVs in healthcare, their components, how they are controlled, and how their responsive systems are shaping the future of hospital operations.

Keywords: *Automated Guided Vehicles (AGVs), Hospital Automation, AI-Driven Navigation, Obstacle Detection, Real-Time Tracking, Operational Efficiency.*

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ICNEAI_081

Predictive Modeling for Heart Disease Risk Assessment Using Random Forest and Web Technologies

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Abstract

Heart disease remains one of the leading causes of death globally, highlighting the importance of early detection and risk prediction in reducing its prevalence and improving patient outcomes. This research focuses on developing a predictive model for heart disease using the Random Forest algorithm, a widely adopted machine learning technique known for its accuracy, scalability, and ability to handle large and complex datasets. The model analyzes clinical and lifestyle-related features such as age, sex, cholesterol levels, blood pressure, and other critical health parameters to predict an individual's risk of developing heart disease. The model is implemented using Python for data preprocessing, feature selection, model training, and evaluation, while the front-end interface is built with HTML and CSS to facilitate user interaction. The Random Forest algorithm is trained on publicly available heart disease datasets, providing a robust prediction model. The system allows users to input their medical data through a web-based interface, which computes the likelihood of heart disease and provides a confidence score for the prediction. In this study, we compare the performance of the Random Forest algorithm with other machine learning methods, such as Support Vector Machine (SVM), Logistic Regression, and Decision Tree. The results show that Random Forest outperforms these methods, providing a more accurate prediction of heart disease risk. This research demonstrates the effectiveness of the Random Forest algorithm in predicting heart disease risk and provides a framework for integrating machine learning models into user- friendly, web-based health applications. The findings suggest that machine learning models, when combined with interactive web technologies, can assist in preliminary risk assessment and serve as valuable tools for both healthcare providers and patients in making informed decisions regarding heart disease prevention and management.

Keywords: *Heart Disease Prediction, Random Forest Algorithm, Machine Learning, Risk Assessment, Web-Based Interface.*

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The Unsunged History (A Video Game)

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Abstract

"The Unsunged History" is an immersive video game that follows the thrilling adventure of a young boy named Arin. His journey begins when the peaceful village he calls home is thrown into chaos after the village leader is kidnapped by a mysterious force. Determined to rescue the leader and restore peace, Arin embarks on a perilous quest filled with challenges and discoveries. Along the way, he encounters various allies and adversaries, each with their own stories and motives. As Arin navigates through enchanted forests, treacherous mountains, and ancient ruins, he uncovers hidden secrets about his village's past and his own destiny. The game combines elements of action, puzzle-solving, and storytelling, offering players a rich and engaging experience as they guide Arin through his epic journey to save his village.

Keywords: *Adventure, Rescue, Village leader, Quest, Challenges, Allies, Adversaries, Enchanted forests, Treacherous mountains, Ancient ruins, Secrets, Destiny, Action, Puzzle- solving, Storytelling*

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Improving The Performance and Efficiency Of Solar Panel

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Abstract

In this paper, Dust accumulation on solar panels significantly reduces their efficiency and energy output. This paper presents the design and implementation of an IoT-enabled solar panel cleaning and performance monitoring system to address this challenge. The proposed system integrates automated cleaning mechanisms with real-time performance monitoring using IoT- based sensors and cloud analytics. The cleaning mechanism ensures optimal light absorption, while the monitoring system provides insights into power generation, environmental conditions, and maintenance needs. Data collected from the system enables predictive maintenance and enhances energy efficiency. Experimental validation demonstrates improved panel efficiency and extended operational lifespan. This innovative approach contributes to sustainable and cost-effective solar energy utilization.

Keywords: *Solar Panel, Photovoltaic System, Light Dependent Resistor, Internet Of Things Server, Direct Current Motor, Wiper.*

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ICNEAI_084

Energy Harvesting Using Array Antenna

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Abstract

This paper provides an optimum solution for 2.4 GHz array antenna energy harvesting. As there has been rising pressure from Internet of Things (IoT) applications and wireless sensor networks demanding the use of cleaner power supplies, the area of integrating energy harvesting technologies assumes prominence. The optimal array antenna configuration achieves high efficiency in capturing electromagnetic energy using its optimized directivity and antenna gain. We investigate the performance of the array under a variety of load and environmental conditions and its energy harvesting capability using ambient radio frequency (RF) energy and creating useful electrical power. Experimental work indicates improved efficiency in energy harvesting over traditional single-antenna based systems. The research reveals the promise of array antennas as a viable option for power feeding low-energy devices, pushing toward the vision of wireless autonomous systems. This work is focus on enhancing the array design further and examining integration with future energy management systems. Ambient radio frequency (RF) signal-powered energy harvesting is becoming more and more considered a viable means of powering low-power devices, particularly in Internet of Things (IoT) devices and wireless sensor networks

Keywords: *Array Antenna, 2.4 GHz, Internet of Things, Wireless Sensor Network, Low energy devices, Wireless Autonomous System, Energy Harvesting.*

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Paws and AI: A Canine Revolution

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Abstract

The proposed Android application is an all-in-one platform for pet care, offering a seamless experience for users to book services related to veterinary care, dog boarding, training, and pet adoption. The app features a user-friendly interface that allows pet owners to schedule appointments with veterinarians, reserve spots in a dog boarding school, and enroll pets in training programs. An integrated appointment calendar simplifies the management of upcoming bookings. To enhance the experience, the app also includes an AI-powered chatbot capable of diagnosing a pet's illness based on symptoms and uploaded photos, providing immediate guidance, prescriptions, and recommendations when no doctor is available. Additionally, the app allows users interested in pet adoption to view available animals for adoption. In emergency situations, the app provides the option to call a pet ambulance to transport injured pets, including street dogs, to the nearest hospital. Furthermore, in cases of emergency, the app offers the ability to scan the dog's body using the phone's camera, providing real-time analysis of the pet's condition to assist in quick decision-making and response. With these features, the app aims to empower pet owners and the community to ensure the health, safety, and well-being of pets, making it a comprehensive solution for all aspects of pet care.

Keywords: *Pet Care App, Veterinary Services, AI-Powered Chatbot, Pet Adoption Platform, Emergency Pet Assistance, Real-Time Health Analysis.*

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Adaptive Resume Screening and Feedback Looping

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Abstract

The recruitment process normally involves screening a large number of resumes for identifying the suitable candidates. This paper presents an automated system that uses MATLAB-based image processing, machine learning, Name Entity Recognition (NER) and natural language processing (NLP) for processing the resumes. The proposed model uses Optical Character Recognition (OCR) to extract text from resumes and evaluates the candidates resumes simply by comparing the extracted information with predefined job criteria using Natural Language Processing (NLP). Candidates who meet the criteria are shortlisted, and the others receive automated feedback mentioning the skills they miss through email. This system helps enhancing the efficiency, and reduces the recruiter's workload, and hence gives constructive feedback to candidates for improving their skills.

Keywords: *Resume Screening, Optical Character Recognition, Machine Learning, NLP, Feedback System, MATLAB, Image Processing*

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Automated Borewell Child Rescue System Using Robotic Arm Mechanism

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Abstract

In this paper, The Automated Borewell Child Rescue System Using a Robotic Arm Mechanism is designed to address this issue by integrating robotics, IoT based monitoring for a safe and effective rescue operation. This system employs a robotic arm with automated gripping force adjustment to securely lift the child without causing injury. Multiple sensors, including ultrasonic sensors for depth measurement, a heart pulse sensor for real-time health monitoring, a gas sensor to detect hazardous gases, and a temperature sensor to assess environmental conditions inside the borewell, provide critical data for ensuring the child's safety. An oxygen supply system is also integrated to deliver fresh air when needed. An ESP32 camera module captures real-time visuals, allowing remote monitoring via the Blynk IoT platform. This enables rescue teams to track the child's condition, analyze sensor data, and control the robotic arm remotely. By combining advanced automation and IoT-based monitoring this system enhances the efficiency and success rate of borewell rescue operations while minimizing human risk.

Keywords: *Robotic Arm, IOT Based System, Ultrasonic Sensor, Heart Pulse Sensor, Gas Sensor, Temperature Sensor, Blynk IoT Platform, ESP32 Camera Module, Child Safety Rescue*

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Intelligent Resume Parsing Using Transformer-Based NLP Techniques

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Abstract

Recruitment processes often involve the manual screening of resumes, which is time- consuming and inefficient. AI-driven resume parsing system that harnesses the power of Transformers for information extraction and summarization. Traditional keyword-based filtering systems lack accuracy in extracting structured information from unstructured resume formats. This paper presents an intelligent resume parsing system that leverages Transformer- based Natural Language Processing (NLP) techniques to automate resume extraction, classification, and summarization. The proposed system utilizes PyMuPDF (Fitz) for text extraction, Named Entity Recognition (NER) with Spacy for detecting names, organizations, and roles, and Regex-based extraction for contact details and structured sections. Additionally, Transformer models from Hugging Face (BERT/GPT/T5) generate concise summaries of resumes, enabling recruiters to quickly analyze candidate profiles. Extracted data is stored in a relational database (MySQL), and a Streamlit-based web interface allows users to upload resumes and view structured insights..Experimental results show that this system significantly reduces resume screening time while maintaining high accuracy in information extraction and summarization. This research demonstrates how AI-powered resume parsing can enhance efficiency, accuracy, and automation in the hiring process.

Keywords: *Resume Parsing, Transformers, BERT, GPT, NLP, Named Entity Recognition, AI in Hiring.*

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Advancing Speech and Communication Skills in Children with Autism Spectrum Disorder

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Abstract

This paper presents the Advancing speech and communication skills in children with autism spectrum disorder (ASD) is a critical area of intervention that can greatly enhance their social, academic, and emotional development. This paper explores the role of assistive technology (AT) and generative artificial intelligence (AI) in supporting and improving communication abilities in children with ASD. Assistive technologies such as speech-generating devices, augmentative and alternative communication (AAC) systems, and interactive apps have shown promise in providing children with ASD alternative methods to express themselves. Moreover, the integration of generative AI—specifically through language models and adaptive learning algorithms—holds potential for personalizing communication interventions, creating dynamic and engaging learning environments. This paper reviews current technologies and strategies that leverage both AT and AI, highlighting their efficacy in speech therapy, their impact on social interactions, and the enhancement of language skills. The discussion also addresses challenges, ethical considerations, and future directions, emphasizing the importance of a multidisciplinary approach in designing and implementing these technologies. By combining traditional and innovative methods, we propose that AT and AI offer promising pathways to advance speech and communication skills for children with autism, fostering greater independence and improving their quality of life.

Keywords: *Autism Spectrum Disorder, Assistive Technology, Generative AI, Speech Synthesis, Emotion Detection.*

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Reconfigurable Photonic Integrated Circuit with Python Controlled Optical Switching

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Abstract

This paper presents a Programmable Photonic Integrated Circuit (PIC) with Python-Controlled Optical Switching, enabling real-time adaptability, power optimization, and low-latency operation. By integrating software-controlled optical switches, the system allows dynamic reconfiguration of signal paths without requiring hardware modifications. The proposed design leverages Numerical simulation software with Python scripting to control photonic signal flow, adjust power levels using optical attenuators, and optimize signal transmission paths based on demand. Unlike static photonic circuits that require costly redesigns for each new application, this system provides a versatile and scalable solution for modern optical communication networks, AI-based photonic computing, and high performance data centers. The research aims to bridge the gap between traditional fixed-function PICs and next-generation software-defined photonic networks, where real-time adaptability is a critical factor in achieving energy- efficient, highspeed, and intelligent optical processing systems.

Keywords: *Photonic Integrated Circuits, Optical Switching, Low Latency, Python-Controlled PIC, Optical Signal Processing, Reconfigurable Photonic Networks.*

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E-Waste Facility Locator

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Abstract

The 2016 E-Waste Management Rules represented a significant change in tackling the growing problem of electronics waste. These regulations expanded their coverage to include Compact Fluorescent Lights (CFLs) and other mercury-containing light sources, substantially widening the scope of regulated e-waste. A key innovation was the introduction of Extended Producer Responsibility (EPR), which made manufacturers accountable for their electronic products' entire lifecycle, from collection to final disposal. This approach diverged from previous methods and aimed to promote sustainable e-waste management practices. The rules moreover cultivated a agreeable biological system including producers, merchants, refurbisher, and Maker Duty Organizations (Masters). This joint effort was intended to boost the efficiency and efficacy of e-waste management across various settings, including residential areas, hotels, transportation hubs, and religious sites. To upgrade straightforwardness and ease of get to, a Web-Based E-Waste Office Locator was created. This online device gives both clients and chairmen with helpful get to vital data around e-waste transfer offices, empowering dependable taking care of and reusing hones. These regulations ultimately aim to not only control e-waste disposal but also instil confidence in the disposal process among device owners. By offering incentives for proper disposal through informative platforms, the rules strive to make a positive impact on environmental sustainability.

Keywords: *Electronic Waste Management, Recycling Efficiency, Digital Device Lifecycle, End- Of-Use (EoU), Producer Responsibility Extension (PRE), Positioning, E-Scrap, Disposal Site Finder, Reclamation Centre, Discard, Digital Refuse, Environmentally Conscious, Renewable, Ecological, Community-Based, Eco-Tech, Refuse Handling.*

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AI-Based Wildlife Monitoring System

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Abstract

Wildlife conservation and monitoring are critical for maintaining biodiversity and preventing species extinction. Traditional wildlife tracking methods often rely on manual observation and sensor-based systems, which can be inefficient and resource-intensive. This project presents an AI-powered Wildlife Monitoring System utilizing the YOLOv8 (You Only Look Once version 8) algorithm for real-time animal detection and classification. The system leverages deep learning and computer vision techniques to analyze images and video feeds from camera traps, drones, or surveillance systems. By implementing YOLOv8's state-of-the-art object detection capabilities, the model ensures high accuracy and speed in identifying various wildlife species in diverse environments. The system can also be integrated with cloud storage and edge computing solutions to enable remote monitoring and automated alert generation for researchers and conservationists. The proposed approach enhances wildlife data collection, reduces human intervention, and improves the efficiency of ecological studies. This AI-driven solution contributes significantly to wildlife conservation efforts, offering a scalable and cost- effective tool for tracking animal populations and detecting potential threats in natural habitats.

Keywords: *Forest, Wild Animals, Monitoring, Alarm.*

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AI in Renewable Energy Forecasting for Solar Power

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Abstract

The integration of renewable energy sources, particularly solar power, plays a crucial role in achieving sustainable energy solutions. However, the inherent variability and intermittency of solar energy present significant challenges for efficient grid management and resource optimization. Accurate forecasting of solar power generation is essential to enhance grid reliability and ensure the optimal utilization of solar energy. This research focuses on the application of Long Short-Term Memory (LSTM) networks, a type of recurrent neural network (RNN), to forecast solar power generation. LSTM is well-suited for time-series prediction tasks due to its ability to capture long-term dependencies and complex non-linear patterns in data. In this study, the LSTM model is trained using historical solar irradiance data alongside meteorological variables such as temperature, humidity, wind speed, and cloud cover. The dataset used includes hourly or daily solar power generation data and corresponding weather parameters, with preprocessing steps involving normalization, handling missing values, and time-series transformation. The LSTM model is optimized to learn the temporal relationships and predict future solar power generation values. Performance evaluation is conducted using metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R- squared. Results show that the LSTM model provides accurate forecasts by effectively capturing the non-linear dependencies between solar generation and environmental factors. This study highlights the potential of LSTM-based models for solar power forecasting, offering a powerful tool for improving the integration of renewable energy into the grid. The ability to predict solar energy generation more accurately will contribute to enhanced energy management and the promotion of sustainable energy solutions.

Keywords: *Long Short-Term Memory (LSTM), Recurrent Neural Network (RNN), Mean Absolute Error (MAE), Root Mean Squared Error (RMSE).*

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IoT Based Efficient Cool Lip Tobacco Detector Using Sensor AI

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Abstract

The Cool Lip Tobacco Detector is an innovative, non-invasive device designed to detect the presence of tobacco and nicotine-related substances by analyzing saliva pH levels. Utilizing a highly sensitive electrochemical biosensor and integrated with IoT technology, the device provides real-time detection and immediate feedback through data transmission to mobile or cloud platforms. The sensor detects subtle changes in saliva chemistry caused by tobacco consumption, allowing for precise and rapid monitoring without the need for invasive procedures. The device's ergonomic, biocompatible design ensures safe and hygienic in-mouth application, offering a user-friendly experience suitable for various settings, including personal wellness tracking, healthcare monitoring, and research. By enabling accurate tobacco consumption detection, the Cool Lip Tobacco Detector supports healthcare professionals in monitoring tobacco use and assists individuals in tracking their wellness goals. This technology is a significant advancement in substance detection, offering a convenient and effective solution for monitoring tobacco use in real-time.

Keywords: *Cool Lip Tobacco Detector, Non-Invasive Nicotine Detection, Saliva Ph Analysis, Electrochemical Biosensor, IoT-Based Substance Detection*

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Automatic Electricity Bill Generating System

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Abstract

In this paper, we're going to discuss that Every management system is striving to become more automated, portable, and remotely accessible. This project introduces an intelligent energy meter designed for a more efficient and automated metering and billing system. By integrating PIC and GSM Short Message Service (SMS), the system enables predefined automatic functions for seamless operation. Initially, the project was simulated using PROTEUS8.0 before being successfully implemented on a circuit board in the laboratory. The proposed smart energy meter incorporates an embedded controller and GSM module to transmit essential data such as energy consumption in kWh, generated bill, and security alerts (line disconnection or reconnection) over a GSM mobile network. This data can be integrated into existing energy management systems used by power companies or organizations, ensuring seamless service delivery to customers with minimal human intervention. The implemented system offers remote access for metering and billing, providing accurate and reliable services with high efficiency.

Keywords: *Energy Meter, PIC (Microcontroller), Global System For Mobile Communication (GSM), Short Message Service, ESP 8266.*

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Deep Reinforcement Learning for Face Anti-Spoofing

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Abstract

Spoofing detection has become a crucial and essential application for verifying security breaches. The Face Anti-Spoofing (FAS) issue has made significant progress in recent years. This research addresses the problem of detecting spoofing images from unknown sources using deep learning algorithms. Specifically, we employ a combination of algorithms, including the LSTM Face matching algorithm, to distinguish between real and fake images. Our approach utilizes deep learning techniques to detect whether a human face is genuine or spoofed. We implement CNN-based algorithms and deep learning models for image visualization and recognition of real and fake images. This paper explores the application of these advanced techniques in the context of face anti-spoofing, aiming to enhance security measures and improve the accuracy of facial recognition systems

Keywords: *FAS, Deep learning, CNN, LSTM*

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Turbocharger Energy Conversion for Sustainable Electricity

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Abstract

The automotive industry is rapidly transitioning toward electrification, integrating advanced electrical architectures with internal combustion engines to enhance efficiency and sustainability. A novel hybridization approach is explored by incorporating an electrical turbo- alternator into the vehicle architecture, utilizing exhaust energy to generate electrical power. In this study, a conventional turbocharger is modified into a turbo-alternator and integrated with a TATA EV2 (IDI) water-cooled, four-cylinder, four-stroke Multi Point Fuel Injection (MPFI) diesel engine. The system harnesses exhaust gas energy to drive the turbo-alternator, producing electrical power to sustain battery charging and support auxiliary electrical systems. Experimental investigations are conducted under varying speed conditions, with the turbo shaft reaching speeds up to 20,000 rpm before encountering vibration limits. The developed system successfully generates 200 W of electrical power, demonstrating its potential to enhance energy recovery and efficiency in hybrid vehicle architectures. This innovation contributes to sustainable mobility by optimizing energy utilization in internal combustion engines, reducing dependency on external charging sources.

Keywords: *Turbocharger, Internal Combustion Engine, Electrical Power, Efficiency*

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Design of High Performance EBG Structured Wearable Antenna for Tracking Application

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Abstract

A compact wearable antenna with an Electromagnetic band gap (EBG) structure operated at 2.4 GHz was proposed for medical application. The design demonstrates a robust, compact, and low-profile solution to meet the requirements of wearable applications. The EBG structure reduces the back radiation and the impact of frequency retuning due to the high losses of human body. Designed for wearable applications, the antenna exhibits flexibility, lightweight characteristics, and robustness against body effects, making it suitable for real-time tracking in healthcare, defence and IoT-based monitoring systems. Simulation results validate the antenna's efficiency in terms of return loss, radiation pattern, and Specific Absorption Rate (SAR), demonstrating its potential for high-precision tracking applications. It consists of Transmitting and Receiving antenna. For medical applications, transmitting antennas designed with EBG structures operate at 2.4 GHz to facilitate reliable wireless communication for patient monitoring, biomedical telemetry, and health tracking systems. The proposed compact antenna with dimensions of 46 × 46 × 2.4 mm3 yields an impedance bandwidth of 2.4 GHz with EBG structure and more than 95% reduction in the specific absorption rate and the receiving antenna with the bandwidth of 2.4 GHz for tracking and monitoring. Therefore, the antenna is a promising candidate for integration into wearable devices applied in biomedical Technology.

Keywords: *Electromagnetic Band Gap (EBG), Specific Absorption Rate (SAR), Internet of Things (IoT), Return Loss, Radiation Pattern.*

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ICNEAI_099

Comprehensive Analysis and Mitigation of ARP Spoofing Attacks: Detection and Prevention Strategies

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Abstract

Address Resolution Protocol (ARP) spoofing is a more sophisticated LAN attack than denial- of-service (DOS) and man-in-the-middle (MITM) attacks. ARP is used to find MAC addresses on the communication protocol's link layer and map them to IP addresses on the internet layer. The article discusses the various forms of ARP spoofing attacks, including how they are created, identified, and avoided. Due to its weaknesses and statelessness, the ARP has a direct impact on Ethernet and network safety requirements. The proposed attack method allows it to intercept or modify network traffic on the fly by sending spoof ARP packets, or bogus packets, to a particular host. It is possible to fully intercept everything going through the victim's device. The sorts of ARP attacks—ARP DOS and ARP MITM—are also the main topic of the study. The two proposed attacks are MITM using http sniffing and DOS using ARP spoofing. In order to detect ARP, a script is executed on the victim's computer that continuously compares the gateway's old and new MAC addresses. If a mismatch is found, an alert breach is raised. There is discussion of several strategies to avoid ARP poisoning. ARP ping, ARP scan, and regular ping to Google are also used to analyze the attacks.

Keywords: *Address Resolution Protocol, ARP Man-in-The Middle, ARP DOS, MAC-Address, ARP Ping.*

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ICNEAI_100

Analyzing Data Trafficking and Cyber Exploits: Metasploit-Based Attacks, Detection, and Mitigation Strategies

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Abstract

We frequently keep our credentials and data public in this age where privacy is merely a myth, believing that it would never happen. However, it is actually much easier and simpler than it may seem; even a website you looked on yesterday that you are not familiar with might erase your private. This is a serious issue that needs to be handled since it gets worse when people are unaware of it or don't take it seriously. It's not only about what someone will do with your data; it's also about data trafficking, where individuals sell vast quantities of data via public libraries or the dark web. This data sells for far more than we could have ever imagined, but what do they do with it? Well, it's not what they do, but rather how they use it. One of the largest data scams in history occurred recently during the 2018 election campaign. It began when a company named Cambridge Analytica used information about the target audience to help them win the election. The company obtained the data by trafficking it from Facebook Inc., one of the biggest companies in the world. and contains some of the biggest data centers, Facebook was in a lot of difficulty that year because of this. This article will present a study on how to use Metasploit to exploit a Chrome vulnerability, identify the attack, and build a defense against email fraud and data trafficking. PGP encryption will assist minimize email data exposure even if a machine's browser or computer has been compromised.

Keywords: *Encryption and Decryption, Metadata Analysis, Attack Detection, Metasploit Framework, Vulnerability, GPG, Security-Benefit Analysis, Email Encryption, Web of Trust, Attack Prevention.*

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A Cryptographic Approach to Secure Password Generation: Enhancing Uniqueness and Resilience against Cyber Attacks

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Abstract

Depending on a specific online account password requirement, each individual uses a different password for several online accounts. Password security and authenticity are becoming crucial topics because of the rise in information sharing, internet popularity, electronic commerce transactions, and data transfer. Many passwords are difficult for people to remember. However, the idea of putting them in writing or preserving them is also too risky. Some people could use the same passwords for all of their accounts, which could be troublesome if a hacker discovers this and completely destroys your privacy. It's crucial to keep a strong and complicated password in order to protect the user's private information. The suggested system in this research is an effective cryptographic password generating technique that satisfies all necessary requirements while maintaining the difficulty and robustness of passwords for a specific website. The user's input is used to generate the passwords; they are not generated at random. The created password's uniqueness has also been verified for the suggested system. According to the results, each password is unique. The password that is produced will not be susceptible to dictionary attacks, brute force attacks, or rainbow tables. Two cryptographic algorithms are used by the cryptographic password generator to create passwords.

Keywords: *Attack Detection, Attack prevention, LoginKey, SiteKey, SCRYPT Cryptography, HMAC-SHA-256 Cryptography, Password Generation.*

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ICNEAI_102

An Early detection and prediction of Attention-Deficit/Hyperactivity Disorder (ADHD) using CNN model

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Abstract

Attention-deficit/hyperactivity disorder (ADHD) is a highly prevalent and heterogeneous neurodevelopment disorder in children and has a high chance of persisting in adulthood, if its left untreated. In India, it is estimated that around 5 to 8% of school children are affected with ADHD, though some studies have found the prevalence to be as high as 11%. Early diagnosis of this condition is crucial for effective treatment. The development of individualized, efficient, and reliable treatment strategies is limited by the lack of understanding of the underlying neural mechanisms. Diverging and inconsistent findings from existing studies suggest that ADHD may be simultaneously associated with multivariate factors across cognitive, genetic, and biological domains. In recent times, many automated systems for the early prediction, detection and classification of ADHD have been developed using deep learning (DL) algorithms. In this proposal, an efficient deep learning-based detection system has been recommended. In specific CNN model has been preferred and implemented by various researches worldwide for this disorder detection. This research suggests a DL based ADHD diagnosis (using CCN) in children, addresses the issues and potential avenues for future study.

Keywords: *Disorder, Biological, Treatment.*

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ICNEAI_103

RFID-Based Traffic Sign Recognition With Cloud-Enabled Data Sharing

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Abstract

As traffic sign violations result in accidents and inefficiencies in transportation networks, road safety is still a major concern. By incorporating cloud-based data sharing and improving the traffic sign board recognition system with RFID technology, this project builds on the previous phase. Even in low-visibility situations or when signs are partially obscured, the system reliably recognises traffic signboards embedded with RFID tags by using RFID technology. The real- time transfer of identified signboard data to a cloud-based application, which facilitates effective information processing, retrieval, and storage, is a significant improvement at this stage. Additionally, the technology enhances road awareness and reaction time by exchanging vital traffic sign data with cars that are trailing behind. The system refreshes the cloud database when it detects a signboard, from where the information is relayed to approaching vehicles. This mechanism enhances driver assistance, enabling proactive responses such as speed control and traffic rule enforcement. The system will be demonstrated using a simulated environment, where a motor represents the vehicle, and an RFID reader acts as a sensor. This upgraded approach is expected to significantly improve road safety by enabling seamless communication between traffic infrastructure and vehicles, thereby reducing accidents and ensuring compliance with traffic regulations

Keywords: *Cloud-Based Data Sharing, Intelligent Transportation System, Real-Time Vehicle Communication, RFID Technology, Road Safety Enhancement, Traffic Sign Recognition.*

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ICNEAI_104

Analysis Of Various Platform Used In Blockchain Technology

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Abstract

Due to higher demand of blockchain technology, all of them has ongoing to familiar with the potentiality of the technology. Initially, blockchain got upsetting in the industry of finance, yet now blockchain utility have been explored among several businesses as well as software development. Since the industries have initiated to discover the ability of blockchain technology by creating applications of blockchain, the needed for the blockchain platform is also extremely successful. The development of dApp is also other cause that the no. of blockchain platforms is growing day by day. In this paper we are going to analysis of various platform have been developed to help overcome these limitations and provide applied value for other industries applications and uses.

Keywords: *Blockchain platform, Etherum, Hyperledger, R3Corda, Ripple, Quorum and Stellar.*

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ICNEAI_105

GLOW ME: Illuminate Your Skincare Journey with Smart Solutions

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Abstract

GlowMe is a user-friendly skincare website designed to provide personalized skincare recommendations, product reviews, and helpful tips. The project aims to bridge the gap between users and reliable skincare knowledge by offering a platform to explore curated product suggestions and share experiences through reviews. Developed using PHP, MySQL, and frontend technologies like HTML, CSS, and JavaScript, GlowMe emphasizes simplicity and accessibility. The website features an intuitive interface, a review system, and a database- driven recommendation engine. GlowMe serves as a significant milestone in my journey as a developer, combining practical learning and real-world application.

Keywords: *Frontend Technologies, Personalized Skincare, Product Reviews, Recommendation Engine, Skincare Website, User-Friendly Interface.*

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Enhancing Chatbots with AI: Fine-Tuning Large Language Models Using Langchain for Domain-Specific Applications

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Abstract

Address Resolution Protocol (ARP) spoofing is a more sophisticated LAN attack than denial- of-service (DOS) and man-in-the-middle (MITM) attacks. ARP is used to find MAC addresses on the communication protocol's link layer and map them to IP addresses on the internet layer. The article discusses the various forms of ARP spoofing attacks, including how they are created, identified, and avoided. Due to its weaknesses and statelessness, the ARP has a direct impact on Ethernet and network safety requirements. The proposed attack method allows it to intercept or modify network traffic on the fly by sending spoof ARP packets, or bogus packets, to a particular host. It is possible to fully intercept everything going through the victim's device. The sorts of ARP attacks—ARP DOS and ARP MITM—are also the main topic of the study. The two proposed attacks are MITM using http sniffing and DOS using ARP spoofing. In order to detect ARP, a script is executed on the victim's computer that continuously compares the gateway's old and new MAC addresses. If a mismatch is found, an alert breach is raised. There is discussion of several strategies to avoid ARP poisoning. ARP ping, ARP scan, and regular ping to Google are also used to analyze the attacks.

Keywords: *Chatbot, Large Language Models (LLM), GPT, PalM, Bert, Fine-tuning, Langchain, AI-Powered, Natural Language Processing (NLP), AI Integration, AI Frameworks.*

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An Ultra-Energy-Efficient Reversible Quantum-Dot Cellular Automata 8:1 Multiplexer Circuit

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Abstract

This project aims to develop an efficient nanoscale multiplexer design utilizing the Fredkin gate within the Quantum-dot Cellular Automata (QCA) paradigm. QCA, a cutting-edge technology for nanoscale circuit implementation, offers high-speed operation, ultra-low power consumption, and high device density, making it an ideal platform for designing energy- efficient digital systems. The Fredkin gate, a fundamental reversible logic gate, is employed in the multiplexer design to minimize energy dissipation by ensuring lossless computation, adhering to the principles of reversibility and the thermodynamic limits of information processing. The proposed design exploits the inherent advantages of reversible logic in conjunction with QCA's unique cell-based computational model, significantly reducing power dissipation and area overhead while maintaining functional accuracy. Performance metrics, including the number of QCA cells, circuit area, delay, and energy dissipation, are rigorously analyzed and compared with conventional QCA-based multiplexer designs. Integrating the Fredkin gate enables efficient data routing and logical operations with minimal heat generation, addressing critical challenges in nanoscale and quantum computing. This project highlights the design of 2:1MUX, 4:1MUX, and 8:1MUX using the proposed Fredkin gate. Compared to the existing multiplexer design the proposed work involves less number cells and less area. The functionality of the proposed design is verified by the QCA Designer Tool. This project is establishing a framework for the development of scalable, high-performance, and energy- efficient nanoscale circuits for next-generation computing systems.

Keywords: *Fredkin Gate, Reversible Logic, Multiplexer, Quantum-dot Cellular Automata (QCA) Designer Tool.*

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FaceLogix: Revolutionizing Attendance Management with Facial Recognition Technology

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Abstract

In today's fast-paced world of technological progress, the need for efficient and accurate attendance management systems has become more pressing. Traditional methods of attendance tracking are often slow, error-prone, and insufficient for the growing demands of educational institutions and workplaces. The rise in demand for contactless solutions, especially due to health concerns, highlights the shortcomings of manual attendance processes. The goal of this project is to utilize facial recognition technology to address these challenges, offering a modern and effective approach to attendance management. "FaceLogix" aims to automate the attendance process, providing a reliable alternative to conventional roll calls and card-based systems. Through facial recognition, the system efficiently records attendance, improving accuracy and minimizing issues such as proxy attendance or data entry mistakes. Its contactless feature creates a safer environment, particularly during public health emergencies. Moreover, the project prioritizes an enhanced user experience, ensuring ease of use for both administrators and attendees. In summary, "FaceLogix" marks a significant step forward in modernizing attendance management, providing an accurate, efficient, and contactless solution to the long- standing challenges faced by educational institutions and workplaces. By incorporating facial recognition technology, this project offers a streamlined and responsive method that aligns with the evolving needs of today's world.

Keywords: *Face Detection, Face Recognition, Deep Learning, Biometrics, Image Processing, Automation, Real-time Identification, Tracking, Facial Biometrics.*

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ICNEAI_109

A Keras Tuner Neural Network – Based Approach To Emotion Detection And Personalized Music Recommendations Via Facial Expression Analysis

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Abstract

The work introduces a novel system for music recommendation based on the emotion of the listener by analyzing the facial expressions. Emotions play a major role in music preferences and our recommendation system uses computer vision methods to capture real-time facial expressions via a webcam. Keras Tuner Neural Network is employed to classify emotions such as happiness, sadness, anger and neutral. These emotions are then mapped with the curated music database to provide personalized recommendation. Experiments initially were carried out to evaluate the system's effectiveness focusing on the satisfaction and engagement level of the user. Findings reveal that participants are more likely to engage with music that aligns with their emotional state. User feedback also emphasizes the system's potential to improve the overall music experience by creating an adaptive listening environment. This research contributes to the emerging field of emotion-aware technology, emphasizing the importance of emotional intelligence in music recommendation systems. Through the integration of facial expression analysis, our goal is to foster a deeper connection between individuals and their musical choices, ultimately creating a more immersive and dynamic listening experience.

Keywords: *Deep Belief Network, Deep Residual Networks, Convolutional Neural Networks.*

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ICNEAI_110

Smart Metro Train Passenger Distribution System

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Abstract

The "Smart Metro Train Passenger Distribution System" solves the ongoing issue of uneven passenger distribution compartments, which frequently result in overcrowding, delays, and discomfort for travelers. The system operates across train compartments, which frequently results in overcrowding, delays, and discomfort for commuters. The technology uses advanced machine learning techniques, including YOLO (You Only Look Once), to recognize persons in real time and is integrated with existing video systems inside train compartments. The idea is to count the number of people in each compartment in real time and provide unambiguous recommendations to passengers at upcoming stations about which compartments are less packed, so encouraging a more equal distribution. By reducing overcrowding, this technology enhances the commute experience, decreases stress and delays, and promotes metro operations' overall efficiency. The concept is an innovative approach that blends artificial intelligence and transportation infrastructure to improve urban mobility.

Keywords: *Smart Metro Train, Passenger Distribution System, Machine Learning, YOLO (You Only Look Once), Urban Mobility, Overcrowding Prevention*

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ICNEAI_111

Implementation Of Auto Form Filling Chatbot Using Machine Learning Techniques

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Abstract

In this digital era, automation and efficiency are essential in data entry and form filling. Hence, the aim of this paper is to implement an auto form-filling chatbot using machine learning that will help in simplifying the process of filling forms. The chatbot responds to individuals in a human language format and helps to fill in various types of forms without much human intervention. The system under consideration relies on natural language processing (NLP) techniques to comprehend user inputs and machine learning algorithms for predicting and filling form fields depending on user behaviour, historical data, and contextual clues. The chatbot is trained in a variety of forms as well as interactions with users, which makes it capable of adjusting itself to different formats or domains, such as customer service, healthcare, and ecommerce. To guarantee the accuracy and relevance of filled forms, the main attributes of the system encompass validation of real-time data, error detection, and feedback mechanisms for the user, among others. Moreover, the chatbot incorporates customer authentication procedures as well as privacy measures for sensitive data. Experimental results prove that the time and effort taken on inputting forms can be reduced significantly by applying chatbots, thereby improving user experience while minimizing errors.

Keywords: *Automation, Form Filling, Chatbot, Machine Learning, Natural Language Processing (NLP)*

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ICNEAI_112

ANARKI: A Technology-Driven Framework for Enhancing Women's Safety Through Real-Time Security and Privacy

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Abstract

Women's safety remains a major socio-technical challenge with the national crime rate against women rising from 57.0 to 67.0 per 100,000 women (2020–2022). The National Commission for Women (NCW) reported 25,743 cases in 2024 reflecting an urgent need for effective safety solutions. Law enforcement faces delays in distress call responses due to inaccurate location tracking and inefficient communication channels. Existing applications often lack comprehensive, user-friendly features that cater to diverse demographic needs. This research paper presents ANARKI (Application for Navigating Assistance & Response for Keeping Immediate Support), a mobile application designed to enhance women's security through real- time emergency assistance and privacy protection. With India's smartphone penetration at 7.0% in 2024 projected to reach 8.3% by 2029, ANARKI integrates key features including easy navigation and a simple UI for seamless usability, a spy camera detector to enhance privacy, an SOS sender for instant emergency alerts and a fake siren to deter and disguise against potential threats. The study employed a mixed-methods approach combining quantitative survey research and qualitative comparative analysis. A Google Form-based survey was conducted with 170 participants from diverse age groups to evaluate user interface (UI), user experience (UX) and feature preferences for the ANARKI application. The collected data was analyzed to identify usability patterns and user expectations. Additionally, a comparative analysis of seven research papers was performed to assess existing methodologies, key findings and limitations in women's safety applications. This integrated approach provided data-driven insights to refine ANARKI's design, ensuring an intuitive, inclusive and effective solution. By leveraging technological advancements and user-driven insights, this study underscores the potential of mobile applications in addressing critical safety concerns for women. ANARKI's holistic approach not only enhances emergency response mechanisms but also empowers users with proactive security measures and health monitoring tools. The research highlights the importance of continuous innovation, policy integration and community awareness in developing sustainable safety solutions. Future advancements in AI-driven threat detection and smart city integrations could further strengthen digital safety infrastructures making technology a pivotal force in ensuring women's security and well-being.

Keywords: *Women, Security, Emergency, Biometrics, Privacy, Self-Defense, Alerts, Technology, Application, Response*

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ICNEAI_113

AGV Robot

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Abstract

This paper presents a comprehensive review of vision-based smart autonomous robots, focusing on their design, functionality, applications, and advancements. With the rapid growth of automation in various industries, the demand for efficient and intelligent autonomous systems has increased significantly. Vision-based robots offer promising solutions by integrating advanced vision systems with robotic platforms to enhance accuracy, speed, and flexibility in autonomous tasks. This paper begins by providing an overview of the key components and functionalities of vision-based smart autonomous robots, including LiDAR sensors, and navigation systems. The advanced and unsupervised algorithms like Reinforcement algorithms is used to navigate the robot automatically. Reinforcement learning (RL) like Q-learning, SARSA, Deep Q Networks (DQN), is a type of machine learning where an agent learns how to make decisions by interacting with an environment. The goal is to learn a strategy or policy that maximizes cumulative reward over time. The agent takes actions, the environment responds with new states and rewards, and the agent learns from these interactions to optimize its actions. It also looks at recent progress and research trends, such as combining artificial intelligence, machine learning, and Internet of Things (IoT) to improve vision-based robots' abilities and independence. Finally, the performance results are compared with existing Rapidly exploring Random Trees (RRT) algorithms, demonstrating the effectiveness of vision- based approaches in automated tasks.

Keywords: *Artificial Intelligence (AI), Autonomous Navigation, Internet of Things (IoT), Machine Learning (ML), Reinforcement Learning (RL), Vision-Based Robotics.*

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ICNEAI_114

Doodle Dataset Classifier using Convolutional Neural Network

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Abstract

We test the performance of CNN to classify hand-drawn doodles into a category in this paper. We selected one subset from the Kaggle Doodle dataset, which consists of basic objects such as bicycles, cakes, fish, hats, and lightbulbs. A CNN model based on pixel data was developed for visual recognition. Images and labels have already been preprocessed with resizing and encoding to prepare the dataset for the CNN model. CNN architecture had convolutional layers in triples that included ReLU activations. That was followed by layers of max pooling that reduced the dimensionality but retained features. We used the Adam optimizer to train the model; we assessed it with 80% training and 20% test split. We monitored accuracy and loss at training, and we had an overall accuracy of 90.59%. However, in certain classes, such as bicycles and fish, some classes performed better than others and showed that there was a difference in the model's interpretation of the abstract shape. We went through some of the misclassifications that showed the problem encountered with more abstract doodles, especially with hats and lightbulbs categories. The result shows that CNNs are robust even for abstract simple sketches and thus has potential application in areas involving classification of sketches or hand-drawn images.

Keywords: *Convolutional Neural Network, Doodle Classification, Image Classification, Feature Extraction, ReLU Layer, Adam Optimizer.*

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Real-Time Monitoring and Optimization System with UWB MIMO Antennas and Precision Sensors

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Abstract

Industry 4.0 advancements necessitate smart manufacturing solutions to enhance operational efficiency, minimize downtime, and optimize resource utilization. This paper presents a real- time monitoring and optimization system that integrates ultra-wideband (UWB) multiple-input multiple-output (MIMO) antennas and precision sensors for industrial automation. The system employs eddy current sensors and magnetostatic sensors, along with additional external sensors, to facilitate predictive maintenance by detecting structural anomalies, magnetic field variations, and other critical parameters in industrial machinery. A UWB MIMO antenna ensures reliable, low-latency wireless communication for seamless data transmission between distributed sensors and the central control system. A 600 MHz band-pass filter and power divider further enhance signal integrity by filtering noise and distributing power efficiently. Sensor data is processed using Kalman filtering and machine learning-based anomaly detection algorithms to improve fault prediction accuracy. Designed for deployment in chemical plants, manufacturing units, and automated production lines, the system enhances industrial safety, reliability, and process efficiency. Experimental results validate the system's effectiveness in optimizing predictive maintenance strategies, reducing machine failures, and improving real- time communication.

Keywords: *Anomaly Detection, Industrial Automation, Machine Learning (ML), Predictive Maintenance, Sensor Networks, Ultra-Wideband (UWB).*

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ICNEAI_116

Advancements in LiDAR and Computer Vision: Transforming Medical Diagnostics and Treatment

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Abstract

Until now, the sectors which have gained most from the developments in computer vision and image processing are healthcare and precision agriculture and the people who receive these services. This study explores the role of these technologies in medical diagnostics and treatment, with a particular focus on LiDAR technology. As it turns out, LiDAR technology is gradually being incorporated into the diagnosis and treatment of various diseases as well as in the assessment of patients. LiDAR based depth sensing is a key technology in building accurate 3D models of the human body which is useful in orthopaedic surgeries, development of prosthetics and gait analysis in physical rehabilitation. Furthermore, the computer vision algorithms improve the interpretation of different medical images including X-rays, MRI and CT scans to enhance the detection of diseases. The technologies also assist in robotic surgery by offering real time views and accuracy in complicated surgeries to enhance the results of surgery and hence the patients' condition. Although these improvements are very significant, there are still some drawbacks which include high computational complexity, limited real-time processing, and costs. Edge computing, energy efficient LiDAR sensors, and enhanced imaging can be explored to overcome these barriers and enhance the current medical diagnosis and treatment. Beyond healthcare, LiDAR and computer vision are also applied in precision agriculture, particularly in micro-irrigation, where drones equipped with these technologies assist in monitoring soil moisture, crop health, and water distribution. However, the primary impact remains in revolutionizing medical imaging and treatment methodologies, ensuring more accurate diagnostics and improved patient care.

Keywords: *Computer Vision, Image Processing, Medical Imaging, LiDAR, Orthopaedic Surgery, Diagnostics, Micro-Irrigation*

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Robotics And Automation In Agriculture: The Aqua-Bot Approach

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Abstract

Water scarcity and inefficient irrigation methods pose major challenges in modern agriculture. Aqua-Bot, an AI-powered autonomous micro-irrigation robot, aims to revolutionize sustainable farming by optimizing water usage and enhancing crop productivity. This intelligent robotic system integrates soil moisture sensors, weather sensors, GPS tracking, LiDAR navigation, and AI-driven decision-making to ensure precise irrigation tailored to soil and climate conditions. Aqua-Bot autonomously scans farmland, analyses real-time soil and weather data, and determines optimal irrigation strategies using precision drip nozzles and rotating sprinklers. Equipped with LiDAR and ultrasonic sensors, it navigates efficiently, avoiding obstacles like rocks, animals, plants and farm equipment. Farmers can monitor and control the bot remotely via an IoT-connected mobile app. Additionally, GPS-based geofencing, motion detection, and remote shutdown features enhance security, preventing theft or unauthorized access. A solar-powered charging system ensures uninterrupted operation in rural areas. However, its widespread adoption had been limited due to expensive set up, complexity in root level precision, lack of rural infrastructure (internet and electricity), lack of data and resources and technological limitations. Now, with advancements in AI, IoT, and edge computing, this idea is becoming more feasible. By leveraging AI-driven analytics, adaptive learning, and real-time monitoring, Aqua-Bot has the potential to present a transformative step toward, sustainable, automated and efficient farming for the future of AI-powered precision agriculture.

Keywords: *AI-Powered Irrigation, Autonomous Farming, Internet of Things (IoT), Precision Agriculture, Smart Irrigation, Sustainable Farming.*

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Deep Learning For Early Detection Of Alzheimer's And Dementia : A Multimode Approach

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Abstract

Alzheimer's disease and dementia are progressive neurodegenerative disorders that require early diagnosis for effective intervention. Recent advancements in deep learning have enabled the identification of early biomarkers using multimodal data, including medical imaging, speech patterns, genetic information, and cognitive assessments. This paper explores the application of convolutional neural networks (CNNs) for MRI analysis, recurrent neural networks (RNNs) and long short-term memory (LSTM) models for speech-based detection, and transformer models for predictive analytics. Additionally, generative adversarial networks (GANs) are examined for data augmentation to address the limited availability of labeled datasets. By integrating multiple data sources, deep learning enhances diagnostic accuracy and aids in tracking disease progression with improved precision. Challenges such as data availability, model interpretability, ethical considerations, and clinical integration are also discussed. Furthermore, the study highlights federated learning approaches to maintain patient privacy while enabling large-scale model training across multiple institutions. Our findings emphasize the transformative potential of AI-driven multimodal analysis in revolutionizing early detection, enabling personalized treatment plans, and improving patient outcomes. Future research directions include real-time monitoring using wearable devices and the incorporation of explainable AI (XAI) for better clinical adoption. By integrating multiple data modalities, deep learning models significantly enhance diagnostic accuracy, aid in disease progression tracking, and facilitate personalized treatment plans. However, several challenges exist, including data scarcity, class imbalance, ethical concerns related to patient privacy, and the need for interpretable AI models for clinical adoption. We discuss solutions such as federated learning to enable secure, large-scale AI training across hospitals while maintaining data privacy, explainable AI (XAI) techniques to enhance model interpretability, and synthetic data generation through GANs to address dataset limitations. Our findings suggest that AI-driven multimodal analysis has the potential to revolutionize early detection, improve patient outcomes, and contribute to precision medicine in neurodegenerative disease research. Future directions include real-time disease monitoring using wearable sensor data, integration with electronic health records (EHRs) for comprehensive risk assessment, and development of AI- driven assistive technologies for dementia care.

Keywords: *Deep Learning, Alzheimer's, Dementia, Early Diagnosis, Medical Imaging, Speech Analysis, Cognitive Assessment.*

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Deep Learning-Based Fake Image Detection Using Metadata and Error Level Analysis

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Abstract

The project introduces a deep learning-based approach to detect manipulated images by integrating metadata analysis with Error Level Analysis (ELA). Metadata extraction identifies forensic details like camera specifications, editing traces, and timestamp inconsistencies, while ELA highlights compression artifacts that indicate tampering. An MLP neural network processes RGB intensity values from resized images to classify authenticity with high precision. By combining these techniques, the system enhances the accuracy and reliability of fake image detection, making it a valuable tool for digital forensics, media authentication, and cybersecurity applications. This approach helps combat misinformation, safeguard digital integrity, and assist forensic experts in identifying fraudulent images with greater efficiency.

Keywords: *Fake Image Detection, Deep Learning, Metadata Analysis, Error Level Analysis (ELA), Digital Forensics, Image Forensics, Tampering Detection, Neural Networks, Cybersecurity, Media Authentication, Misinformation Detection.*

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Empowering IoT Cyber Networks Attack Using Machine Learning

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Abstract

The rapid proliferation of the Internet of Things (IoT) has significantly expanded the attack surface for cyber threats, necessitating advanced security measures. Machine learning (ML) has emerged as a powerful tool for fortifying IoT networks by analyzing vast datasets generated by connected devices. By leveraging ML algorithms, cybersecurity systems can detect anomalies in network traffic, identify patterns associated with cyberattacks, and predict potential threats, enabling proactive defense mechanisms. However, the same ML-driven techniques can also be exploited by adversaries to develop more sophisticated attack strategies. Malicious actors can train algorithms to exploit vulnerabilities in IoT devices, bypass conventional security protocols, and orchestrate large-scale cyberattacks. This dual-use nature of machine learning underscores the urgent need for robust adversarial defense mechanisms and ethical considerations in cybersecurity. This study explores both the potential and the risks associated with integrating ML into IoT security frameworks, aiming to enhance resilience against evolving cyber threats.

Keywords: *IoT Security, Machine Learning, Cyber Threats, Anomaly Detection, Threat Intelligence, Network Protection, Adversarial Attacks, Cyber Defense Strategies.*

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ICNEAI_121

Attention-Based Destination Address Correction (AGDAC)

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Abstract

The increasing complexity of modern networks has heightened the need for accurate destination address correction mechanisms to ensure proper data routing. This study introduces a novel hybrid approach combining attention mechanisms with graph-based neural networks for destination address correction. A comprehensive framework was developed integrating network topology data as graph structures with 536 corrupted destination addresses across 82 network configurations. Hierarchical analysis demonstrated that the hybrid approach significantly ($p < .001$) improved correction accuracy ($\beta = +.249$) compared to traditional methods after controlling for network size and complexity variables. Findings suggest that integrating contextual understanding from attention mechanisms with structural insights from graph neural networks provides robust solutions for detecting and correcting errors in destination addresses, with important implications for large-scale network management and data routing optimization.

Keywords: *Attention Mechanisms, Graph Neural Networks, Destination Address Correction, Network Topology, Error Detection, Deep Learning, Network Optimization*

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ICNEAI_122

AI-Driven Demand Forecasting and Dynamic Restocking for Hyperlocal E-Commerce Hubs

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Abstract

The rapid expansion of hyperlocal delivery networks has created challenges in inventory management, leading to inefficiencies such as stockouts and overstocking. This paper presents an AI-driven approach for demand forecasting and dynamic restocking to optimize inventory in hyperlocal e-commerce hubs. Leveraging machine learning models trained on customer purchase behavior, seasonal demand variations, and real-time transactional data, the proposed system accurately predicts inventory needs. Furthermore, a reinforcement learning-based adaptive restocking mechanism dynamically updates stock levels in response to predicted demand patterns. By implementing this system, businesses can improve operational efficiency, reduce wastage, and enhance customer satisfaction through timely order fulfilment.

Keywords: *AI in Inventory Optimization, Demand Forecasting, Dynamic Restocking, Hyperlocal Logistics, Reinforcement Learning.*

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ICNEAI_123

Energisense: LSTM-Based Deep Learning For Smart Energy Forecasting And Resource Optimization

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Abstract

Accurate forecasting of energy consumption is essential for effective management of resources, reliability of the grid, and optimization of costs. This study utilizes Long Short-Term Memory (LSTM) networks, a very potent type of a recurrent neural network (RNN) used for predicting future energy demands based on past time-series data. In contrast to classical statistical methods, LSTMs will efficiently learn the long-term dependencies and fluctuations of the energy consumption profile, making it a good candidate for any forecasting problem. The dataset comprises real-world records of energy consumption, which has been pre-processed to eliminate the effects of outliers, linearize variations, and scale features for improving model performance. The model performance evaluation relies on error metrics like mean squared error, root mean squared error (RMSE), and R2 score, proving the success of the model as a much more accurate and reliable alternative than conventional forecasting techniques. This also makes the very basis behind the contribution of deep learning in predicting energy demand very interesting and valuable insight to energy providers, policymakers, and industries for pursuing sustainable management. A better forecast can permit better energy allocation, with lower operation costs and increased systems efficiency. Future research may include hybrid models that encapsulate external factors such as weather conditions, economic trends, and changing policies to elevate the reliability of the forecast.

Keywords: *Energy Consumption Forecasting, Long Short-Term Memory (LSTM), Deep Learning, Time-Series Prediction, Recurrent Neural Networks (RNNs).*

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Design and Optimization of Dumbell shaped Microstrip Patch Antenna with DGS using ML Algorithm for Biomedical Application

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Abstract

This paper presents dumbbell shaped microstrip patch antenna designed to operate in the ISM frequency band. The proposed antenna consists of a single-element structure featuring a bird shaped patch with a defective ground structure. The antenna was fabricated on a polyimide substrate with dimensions of 45 × 35 × 1.5 mm, and performance analysis were conducted to validate the different substrate material and dimension characteristics. The results confirm that the antenna exhibits a stable radiation pattern with minimal gain variation. The antenna design utilizes a basic rectangular patch antenna with an inset feed method to improve the S11 parameters at the resonant frequency. Furthermore, two dumbbell-shaped defected ground structures (DGS) are incorporated to reduce higher-order harmonic distortion. With a reflection coefficient of less than -10 dB and a mutual coupling between antenna elements of less than - 20 dB, the fractional bandwidth approaches 98% between 2 GHz and 4 GHz (S band) The antenna's emission pattern is steady, and fluctuation in low gain. Machine learning (ML) and deep learning (DL) algorithms are used in antenna engineering to enhance the efficiency of design and optimization processes. Machine learning (ML) can predict antenna behavior, boost computational efficiency, reduce the number of simulations required, and expedite the antenna design process while preserving high accuracy, cutting down on mistakes, and saving time. In [9], machine learning (ML) is utilized to improve evolutionary computation techniques like differential evolution (DE) and PSO, as well as optimize the antenna parameter. Using PSO and DE algorithms, multiband patch and dumbbell-shaped antennas are designed. The miniaturized design, combined with favourable performance metrics, makes this antenna a strong candidate for various ISM band applications, including biomedical applications.

Keywords: *Defective Ground Structure, Gain, Resonant Frequency, Return loss and Miniaturization, ML/DL Algorithm.*

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Intelligence Surveillance System for Enhanced Security Using YoloV11

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Abstract

The increasing security threats in banks, ATMs, and small-scale financial institutions necessitate intelligent surveillance systems for real-time threat detection and rapid response. This paper proposes an AI-driven Intelligent Surveillance System utilizing YOLOv11, a deep learning-based model designed to detect weapons such as firearms and knives, as well as anomalous violent behaviors in live video feeds. Upon detecting a threat, the system triggers an automated multi-channel alert mechanism, including high-decibel alarm activation, real- time notifications via email and SMS with detected frames and location, and VoIP-based emergency calls. Additionally, a police dashboard application provides live alerts, real-time video feeds, and detected threat details to facilitate immediate law enforcement response. A mobile user application for bank employees enables real-time monitoring and instant alerts, enhancing situational awareness. The system is scalable and adaptable for various high-security environments, including banks, ATMs, jewellery stores, and pawn shops. Experimental evaluations demonstrate high detection accuracy with reduced false positives, making it a robust and proactive security solution.

Keywords: *Real-time Surveillance, YOLOv11, AI Security, Weapon Detection, Anomaly Detection, Deep Learning, Automated Alerts.*

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An Enhanced Predictive Analysis of Iot-Based Water Pollution Monitoring Using RC Boat

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Abstract

Water pollution is a growing global concern, demanding efficient and real-time monitoring solutions. Traditional water quality assessment methods are often labour - intensive, time-consuming, and limited in coverage. This paper elucidates about the modern technology which autonomously navigates water bodies to collect real-time data. This system mainly assimilates- IoT sensors, machine learning [ML] algorithms and cloud-based analytics for the enhancement of the accuracy and efficiency of pollution detection. The RC boat is prepared with multiple water quality checking sensors to measure the water pH level, turbidity, dissolved amount of oxygen, temperature, and electrical conductivity. The collected data is transmitted to a cloud platform through the IoT communication protocols, where advanced predictive modelling techniques such as regression and deep learning, are applied to identify pollution trends. The proposed system ensures enhanced spatial coverage, real-time data transmission and predictive analysis, which enables early detection of adulteration and proactive water resource management. The implementation of this IoT-driven system and AI-enhanced approach contributes to sustainable management of water by empowering automated, cost-effective, and scalable monitoring solutions.

Keywords: *Predictive analysis, Water pollution, RC boat, IOT sensors.*

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Architects of Time

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Abstract

The Nishkalank Mahadev Temple faces significant accessibility challenges due to tidal submersion, mystical occurrences, and difficult terrain, making worship and preservation efforts complex. To overcome these barriers, an innovative AR/VR-based solution has been proposed, enabling virtual darshan and immersive real-time exploration. This cutting-edge approach allows devotees to engage in interactive worship, experience mythological storytelling, and access the temple remotely. By harnessing advanced technology, this solution not only ensures the temple's preservation but also provides an inclusive platform for devotees worldwide, eliminating geographic and physical constraints.

Keywords: *AR/VR worship, virtual darshan, immersive experience, temple preservation, remote access, interactive storytelling, religious tourism, digital heritage conservation, AI- powered devotion, sacred sites accessibility.*

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Custom Chatgpt for Curriculumdriven Academic Support

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Abstract

The customized chatgpt project seeks to revolutionize academic support by integrating gpt technology with curriculum-specific textbooks. This python-based application intelligently identifies relevant subjects based on the student's department and semester and provides targeted academic assistance. The core technology involves the gpt model, which processes user queries and delivers precise, contextually appropriate responses by extracting and cross referencing content from designated textbooks. The project emphasizes the importance of transparency by including source citations in responses, ensuring credibility. The use of embedding models and vector search technologies enhances the accuracy and relevance of the information provided. This approach addresses the need for personalized learning tools that offer reliable and context- specific academic support. The project's innovative use of ai aims to simplify the process of accessing curriculum-driven content, ultimately improving the efficiency and effectiveness of academic assistance.

Keywords: *Custom ChatGPT, AI-driven education, GPT model, embedding models, vector, search, curriculum-specific textbooks, academic assistance, personalized learning, contextually relevant responses, transparency, data extraction, Python-based application.*

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ICNEAI_129

AGV Robot

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Abstract

This paper presents a comprehensive review of vision-based smart storage and retrieval robots, focusing on their design, functionality, Applications, and advancements. With the rapid growth of automation in various industries, the demand for efficient and intelligent storage and retrieval systems has increased significantly. Vision-based robots offer promising solutions by integrating advanced vision systems with robotic platforms to enhance accuracy, speed, and flexibility in storage and retrieval tasks. This paper begins by providing an overview of the key components and functionalities of vision-based storage and retrieval robots, including vision sensors, robotic arms, and navigation systems. The article explores how robots are used in different industries like manufacturing, warehousing, logistics, and healthcare. It also looks at recent progress and research trends, such as combining artificial intelligence, machine learning, and Internet of Things (IoT) to improve vision-based robots' abilities and independence. Finally, the performance results are compared with existing Rapidly exploring Random Trees (RRT) algorithms, demonstrating the effectiveness of vision-based approaches in storage and retrieval tasks.

Keywords: *Vision-based robots, smart storage, retrieval systems, automation, vision sensors, robotic arms, navigation systems, manufacturing, warehousing, logistics, healthcare*

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Real-Time EV Battery Burst, Detection and Prevention System

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Abstract

Electric vehicles (EVs) are increasingly popular due to their environmental benefits, but safety concerns, particularly related to battery malfunctions, remain a significant challenge. This proposed work focuses on developing a comprehensive system for the detection and prevention of battery bursts in EVs. The proposed solution integrates Digital Temperature Sensors, IoT Thermistor Sensors, Infrared (IR) Temperature Sensors, and real-time data analysis to monitor critical battery parameters such as temperature, voltage, and current. By analyzing this data, the system can detect early signs of thermal runaway, a primary cause of battery bursts. Upon detection, the system initiates preventive measures, such as adjusting battery management protocols and alerting the driver to potential risks. This system aims to enhance the safety and reliability of EVs, reducing the risk of catastrophic battery failures and contributing to the broader adoption of electric mobility.

Keywords: *Electric Vehicle, Thermistor Sensors, Infrared (IR) Temperature , Catastrophic battery*

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Oncological Diagnosis and Prognostication of Breast Cancer using Machine Learning

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Abstract

Breast cancer is one of the most widespread and fatal diseases among women worldwide. Improved diagnosis in the early phase with accurate results increases the survival and recovery chances for the patients. Though in its infancy stage earlier, machine learning has come to alter the landscape of medical diagnostics as it provides precise outcomes predicting the prognosis of a disease. This work focuses on the development of a model for prediction of breast cancer through the use of Logistic Regression. The dataset used in this study is obtained from publicly available medical records, containing patient demographics, tumor characteristics, and genetic markers. The final aim is to suggest the best algorithmic strategy in breast cancer prognosis, so this should be used as a safe tool for the early diagnosis by health professionals in addition to being related to the treatment plan, demonstrating the capabilities of ML in changing the diagnostic state of affairs related to breast cancer.

Keywords: *Breast Cancer, Medical diagnostics, Machine learning, Logistic Regression, Health professionals, Prediction.*

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Marine Macro Vision Using Deep Learning

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Abstract

Marine litter is a prominent and serious form of marine pollution that poses direct threats to marine life, while also raising global concerns about its environmental and economic impacts. Floating marine macro litter (FMML) refers to objects larger than 2.5 cm that float in the upper layers of the ocean. With recent advancements in satellite imagery, remote sensing techniques have become a viable tool for detecting FMML. This study introduces a convolutional neural network (CNN)-based method for identifying FMML using satellite imagery. FMML, being a mobile part of marine litter, can provide valuable insights into the primary sources, sinks, and pathways of litter in the marine ecosystem, as well as help evaluate the effectiveness of waste prevention strategies. The CNN model is designed to recognize FMML features and distinguish it from other objects in the ocean. Additionally, transfer learning is applied by utilizing pre- trained weights from a CNN model trained on a large natural image dataset. In conclusion, the proposed CNN-based approach for detecting FMML using satellite images holds promise for tackling the growing issue of marine pollution. This method can help monitor the effectiveness of marine debris reduction regulations and identify areas in need of clean-up efforts.

Keywords: *Marine macro litter, floating marine debris, Plastic pollution, Deep Learning, Convolutional Neural Networks (CNNs), Object Satellite imagery*

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Design, Development and Testing of Low Power High Performance VLSI Circuits Using Machine Learning

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Abstract

This project focuses on designing, developing, and testing CMOS circuits using Machine Learning, specifically Graph Neural Networks (GNN), to address challenges in power optimization and fault identification. The methodology involves converting CMOS circuits into graph-based representation models for efficient node and edge analysis. By leveraging GNN, the framework enhances fault detection, scalability, and power optimization across various circuit topologies. The outcomes of this project aim to reduce design complexity, automate analysis processes, and improve overall circuit performance in the VLSI domain.

Keywords: *Graph neural network, EDA Tools, Netlist, Cadence, Machine Learning*

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ICNEAI_134

Adaptive K-Optimization: A Dynamic Approach to Secure and Efficient Similarity Search in Encrypted Cloud Data

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Abstract

The rapid adoption of cloud computing has enabled organizations to outsource vast amounts of data processing to remote servers, significantly enhancing computational efficiency. However, this shift has also raised critical concerns regarding data security and privacy, particularly in performing similarity searches over encrypted data. Conventional methods such as Weighted Similarity Search (WSS) and Modified K-Optimization Logic (MKOL) provide structured approaches for retrieving relevant data while preserving privacy. However, they often struggle to dynamically adapt to varying query requirements and data structures, leading to inefficiencies in search accuracy and computational cost. This paper introduces Adaptive K- Optimization (AKO), a novel approach designed to enhance the efficiency and security of similarity searches in encrypted cloud environments. Unlike previous models, AKO dynamically adjusts optimization parameters based on query complexity and data distribution, ensuring more precise and scalable search results. By integrating an adaptive weighting mechanism and advanced encryption techniques, the proposed model reduces computational overhead while maintaining strong privacy guarantees. Extensive experiments conducted on real-world datasets demonstrate that AKO outperforms traditional methods in retrieval accuracy, search speed, and security resilience.

Keywords: *Adaptive K-Optimization, Cryptography, Cloud Security, Encrypted Similarity Search, Weighted Similarity Search, Secure Data Retrieval, Cloud Computing*

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IRIS Tracking for Wheelchair Movement

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Abstract

This article proposes a system that aids people with disabilities. An Electric Eye Controlled Wheelchair System is built to help disabled people. With the designed system, disabled people can move effortlessly without support from others. The system uses image acquisition wherein the image of the eye is processed to find out the gaze direction of the eye using Haar cascade and gaze estimation algorithms and hence wheelchair moves according to the direction of eyeball movement. The gaze estimation algorithm is so precise and one single algorithm does the job of what two algorithms (Canny Edge detection, Hough Transform) are supposed to do and to execute the same task. With this technique, a disabled person can steer their wheelchair with their eye movement. The webcam is placed in Infront of the person which captures the live movements, and an image processing technique is used to track the position of the pupil in both eyes with the help of a raspberry pi processor. The image processing technique used here is Gaze tracking which uses Open CV. The gaze tracking tracks pupil movement and depicts its coordinates. According to pupil motion, the motor driver will be instructed to go forward, left, and right. A blink instruction is used to stop the wheelchair when the person blinks. Additionally, a front-mounted ultrasonic sensor that can detect obstructions and automatically halt wheelchair movement is mounted for safety reasons. The system is monitored by a Raspberry Pi device, which lowers the cost.

Keywords: *Image Processing, Haar Cascade, Gaze Tracking, Dlib, Raspberry pi, Open C.*

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4DPM Deepfake Detection: Leveraging Cyclic GAN with Denoising Diffusion Probabilistic Mask.

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Abstract

With the growing sophistication of deepfake generation techniques, detecting fake human faces has become increasingly challenging. Research into methods that can better differentiate real from fake faces is crucial for improving the robustness of deepfake detection models. In this letter, we present a new technique for improving the differentiation between real and false human facial photos, which we name 4DPM (Four-dimensional Denoising Probabilistic Mask). In particular, we create dynamic, high-dimensional diffusion masks by combining a Denoising Diffusion Probabilistic Model (DDPM) with a cyclic GAN (Generative Adversarial Network). We use a dataset of several synthetic noise distributions and genuine human face photos to train the 4DPM. We then apply the created 4DPM mask on real and fake facial pictures in a cyclic GAN framework. A manually curated fake face dataset (RFFD), a GAN-generated fake face dataset (Seq-DeepFake), and a DDPM-generated fake face dataset (HiFi-IFDL) are among the deepfake datasets used to test the efficacy of the 4DPM. Our test findings show that the 4DPM approach greatly improves the detection accuracy of current public models and performs better in deepfake detection.

Keywords: *Cyclic GAN, DDPM, Deepfake detection, 4DPM, lightweight model.*

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"Smart Basket: AI-Powered Shopping System" Efficient and Intelligent Shopping Solution

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Abstract

The Smart Basket is an AI-driven shopping system that enhances online and in-store shopping experiences. By utilizing artificial intelligence, the system delivers personalized product recommendations, real-time pricing optimization, and sustainability insights to consumers, promoting responsible consumption. Key features include voice-controlled shopping, smart inventory management, eco-friendly suggestions, and seamless checkout. The system integrates self-scanning, AI-based product identification, and chatbot assistance to redefine the retail experience. Additionally, the system reduces wait times, improves inventory management, and helps businesses optimize pricing strategies to maximize profits and customer satisfaction. The application of AI in retail is rapidly growing, enabling companies to improve customer engagement and operational efficiency. By leveraging machine learning, computer vision, and data analytics, Smart Basket enhances shopping experiences and ensures seamless transactions. Furthermore, sustainability has become a key focus for modern retail, and Smart Basket promotes eco-friendly consumption habits by suggesting sustainable alternatives and optimizing waste reduction strategies.

Keywords: *AI Shopping, Smart Basket, Retail Automation, AI Recommendations, Smart Inventory Management.*

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Low Power Side Channel Impact Detection and Analysis in Modern System on Chip(Soc)

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Abstract

Power side-channels give rise to several potent attack vectors for leaking information in digital circuits. While a plethora of (mathematically robust) solutions exist to tackle such side- channels, their deployment through existing VLSI design-flows remains an important engineering issue. Besides, most existing solutions result in significant hardware overhead hindering their, practical usage for resource-constrained settings, such as Internet-of-Things (IoT) or embedded devices. In existing paper, address both of these issues, through an integrated electronic design automation (EDA) tool-flow operating,on gate-level designs. Based on an interesting observation that not every net in a design is equally susceptible to side- channel leakage, we devise a generic testing mechanism and lightweight albeit customizable protection strategy for a given trace count. To overcome various clock issues in System on chip devices, multi-tasking FPGA chips need to be tested and validated with physical attack detection modules. Here an in-depth analysis module is created to test the FPGA devices with multiple clock tree synthesizers such as sweep generators, configurable clock synthesizers, Digital phase locked loop etc.

Keywords: *System on Chip (SoC), Power Side-Channel Attack (SCA), Embedded Security, FPGA Testing, Clock Tree Synthesis (CTS), Electronic Design Automation (EDA).*

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ICNEAI_139

Autonomous Exploration and Monitoring System for Underground Environments

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Abstract

Cave environments are vital for research in geology, biology, ecology, hydrology, and cultural anthropology. This project focuses on developing an unmanned vehicle utilizing IoT and Raspberry Pi technologies to monitor cave conditions and transmit data via GPS. Equipped with integrated sensors and AI algorithms, the vehicle will assess environmental factors such as air quality, temperature, humidity, lighting, object detection, and soil conditions. Designed for safe and efficient navigation, it can autonomously identify hazards like air pollution and darkness, retreating when necessary to prevent damage. With advancements in technology, unmanned vehicles have become increasingly reliable and practical for cave exploration. This system plays a crucial role in detecting potential dangers, including collapses, flooding, landslides, and low oxygen levels, significantly improving safety during cave expeditions. Built to function in confined and extreme environments, the vehicle ensures dependable performance even in challenging conditions. Its advanced sensors provide precise environmental readings, even in low-light or obstructed areas. By integrating modern technology with traditional exploration methods, this innovative solution enhances the safety and efficiency of cave research.

Keywords: *Wireless Communication , Geospatial Analysis , Internet of Things , Edge Computing , Surveillance System.*

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ICNEAI_140

AI Therapist

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Abstract

Mental health disorders such as anxiety, depression, and stress are on the rise, yet access to professional therapy remains limited due to financial constraints, social stigma, and a shortage of mental health professionals. Many individuals hesitate to seek help, leading to untreated conditions and deteriorating well-being. Existing digital mental health solutions often lack emotional intelligence, personalization, and engagement, reducing their effectiveness. To bridge this gap, we propose AI Therapist, an AI-powered virtual mental health companion that integrates real-time emotion detection and a 3D interactive therapist to provide empathetic, personalized, and accessible mental health support. Using AI-driven sentiment analysis, facial emotion recognition, and natural language processing (NLP), the system detects users' emotional states and delivers customized coping strategies, mood tracking, guided relaxation exercises, and AI-driven conversations tailored to individual needs. The 3D virtual therapist enhances user engagement, making interactions more immersive and human-like, while the AI continuously adapts to user responses to offer meaningful and effective mental health guidance. By leveraging **artificial intelligence, emotion recognition, and 3D technology, AI Therapist provides a scalable, stigma-free, and cost-effective solution to improve mental well-being, making psychological support accessible anytime, anywhere

Keywords: *AI-powered virtual therapist, Emotion recognition, Natural language processing (NLP), Mental health support, Personalized therapy*

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Food Rescue

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Abstract

Millions of people go hungry every day, while vast amounts of food and essential resources go to waste. India alone discards food worth approximately ₹1.2 lakh crore, despite having 190 million undernourished citizens. To address this disparity, we propose a map-based donation platform that facilitates the redistribution of surplus resources such as food, clothing, groceries, and financial aid. The platform connects donors, recipients, and delivery partners through a transparent, location-based system that ensures efficient collection and distribution. Using AI- driven logistics and route optimization, it matches surplus resources with nearby recipients, minimizing waste and maximizing impact. Real-time tracking and verification mechanisms enhance transparency and trust, encouraging consistent donor participation. Built with a modern tech stack—including React for the frontend, Node.js/Django for the backend, PostgreSQL/MongoDB for data storage, and Flutter for mobile applications—the platform ensures scalability, security, and ease of access. It also plays a crucial role in disaster relief by rapidly mobilizing aid to affected regions. By leveraging technology and community collaboration, this platform aims to reduce waste, combat hunger, and empower underprivileged communities, fostering a culture of generosity and sustainability.

Keywords: *Food redistribution, resource optimization, donation platform, surplus management, hunger alleviation, poverty reduction*

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Game Physics & Realism

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Abstract

Game physics plays a crucial role in enhancing realism and immersion in modern video games. Whether it is simulating fluid dynamics, realistic character movement, or destructible environments, physics engines strive to mimic real-world interactions within virtual spaces. The challenge lies in balancing computational efficiency with realism—achieving lifelike motion while ensuring smooth gameplay performance. Advances in soft-body physics, procedural animation, and AI-driven physics simulations have significantly improved the way objects and characters interact with their surroundings. However, achieving true-to-life realism involves overcoming constraints related to hardware processing power, physics engine limitations, and real-time rendering optimizations. This paper explores the evolution of game physics, the latest breakthroughs in simulation techniques, and the trade-offs developers face in creating immersive and believable virtual worlds.

Keywords: *Game physics, Physics engines, Procedural animation, Real-time rendering, AI- driven simulations*

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Neurosurgery Digital Twin

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Abstract

Neurodegenerative diseases, including Alzheimer's, Parkinson's, and dementia, pose a significant global health challenge, affecting over 50 million individuals and imposing substantial economic and social burdens. Current healthcare approaches primarily focus on reactive symptom management, leading to delayed interventions and suboptimal patient outcomes. NeuroX is an AI-powered platform designed to revolutionize neurodegenerative disease management through early detection, predictive modeling, and personalized treatment strategies. By integrating cutting-edge technologies such as Generative Adversarial Networks (GANs), Predictive Cognitive Twins, and AI-driven memory reconstruction, NeuroX enables proactive healthcare solutions. Key features include Multi-Timeline Disease Simulation for forecasting disease progression, AI-powered virtual treatment simulation to optimize intervention strategies, and personalized cognitive training for long-term brain health. The system architecture comprises a React.js-based frontend for a responsive user interface, a Flask and Node.js backend for API management, and a MongoDB database for secure medical data storage. Advanced AI models, including Deep Convolutional Neural Networks (CNNs) and GANs, facilitate the analysis of MRI/CT imaging and behavioral data to identify cognitive decline patterns and neurochemical imbalances. By leveraging AI-driven insights, NeuroX aims to enhance patient outcomes, reduce caregiver burden, and optimize healthcare resources, offering a transformative approach to neurodegenerative disease management.

Keywords: *Neurodegenerative Diseases,AI-powered Healthcare,Early Detection,Generative Adversarial Networks (GANs),Predictive Cognitive Twin,MRI/CT Image Analysis,AI-driven Memory Reconstruction,Multi-Timeline Disease Simulation*

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Smart Postpartum Care Device

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Abstract

Our Smart Postpartum Ring is a first-of-its-kind recovery tracker designed for new mothers. Postpartum recovery is often overlooked, leaving new mothers vulnerable to health risks such as fatigue, irregular heart rate, and mobility issues. Many struggle to track their recovery while managing newborn care. New mothers, especially those recovering from C-sections or complicated deliveries, experience pain, exhaustion, and slow healing. Without proper monitoring, they may miss early signs of health concerns, leading to prolonged recovery and emotional distress. Our Smart Postpartum Ring is an elegant, non-intrusive wearable that tracks heart rate, movement, and recovery patterns. It connects to an app for real-time insights and includes a community support feature, helping mothers navigate postpartum challenges with expert advice and shared experiences. Benefits of using our Smart Postpartum Ring: Early health alerts prevent complications. Tracks recovery progress without additional effort. Community support reduces postpartum loneliness. Stylish & comfortable for daily wear, unlike bulky devices. Without it, new mothers might overlook warning signs, leading to delayed recovery, unnoticed complications, and increased stress. Our ring ensures timely care, peace of mind, and a smoother postpartum journey. Unlike bulky smartwatches, it's stylish, discreet, and comfortable for continuous wear. It monitors heart rate and movement, providing real-time recovery insights via an app. Plus, its community support feature offers expert advice and emotional support. With no LED display, it looks like an elegant ring while ensuring timely health alerts. Designed as a meaningful gift, it helps mothers recover smoothly without added burden, making it an essential postpartum companion.

Keywords: *Postpartum recovery, Wearable health tracker, Heart rate monitoring, Community support, Non-intrusive design.*

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Real Time Crash Detection and Accident Analysis IoT-Based System

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Abstract

Traffic accidents continue to be a major concern for road safety, and quick detection and response can significantly reduce injuries and save lives. In this paper we introduce, a real-time crash detection and analysis system designed to make the roads safer. The system integrates several key components: a gyroscope to monitor the vehicle's movements, a vibration sensor to detect sudden impacts, a potentiometer for steering to track sharp turns or erratic driving behaviour, a camera to capture images of the scene, a GPS module to pinpoint the exact location of the accident, and a force sensor to record brake pressure. Together, these technologies work to identify potential crashes as they happen. When a crash is detected, it immediately processes the data and sends crucial information to emergency services or friends, helping them respond faster. Additionally, the system stores the crash data and sends real-time updates to the vehicle owner's mobile app or via email, ensuring that both the driver and emergency responders are informed. These recorded data will be crucial for insurance companies to analyse the cause of accident and reduce the risk of insurance fraud.

Keywords: *Crash detection, Accident analysis, GPS, Emergency response.*

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Icneai_146

Integrating Gesture and Facial Expression and Multilingual Translation in Smart Gloves for Enhanced Communication

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Abstract

Recent advances in wearable technology have led to the development of smart gloves that combine gesture recognition, facial expression analysis, and multilingual translation. These gloves aim to improve communication, especially for individuals with speech or hearing impairments, as well as for people who speak different languages. Smart gloves use sensors and motion-capture technology to detect hand gestures, which can be translated into digital signals. This is particularly helpful for people who use sign language. Additionally, when paired with facial expression recognition software, the gloves can identify emotions and non- verbal cues, enhancing the communication experience. The integration of multilingual translation allows gestures and expressions to be instantly converted into spoken or written language, breaking down language barriers. This technology has the potential to transform communication in various areas, such as social interactions, education, and the workplace. It promotes inclusivity, making it easier for people from different cultural and linguistic backgrounds to understand each other. As technology progresses, smart gloves could play a key role in creating a more connected and accessible world, where communication is no longer limited by language or physical disabilities.

Keywords: *Smart gloves, Gesture recognition, Facial expression analysis, Multilingual translation, Inclusive communication*

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Library Management System Using Mean Stack

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Abstract

The Library Management System (LMS) using the MEAN stack is designed to enhance and streamline library operations by providing a web-based platform for managing books, users, and transactions efficiently. Traditional library systems rely on manual record-keeping or outdated standalone software, leading to inefficiencies, data redundancy, and limited accessibility. The proposed system addresses these challenges by offering a dynamic, scalable, and cloud-based solution. The LMS is built using MongoDB, Express.js, Angular, and Node.js, ensuring seamless integration and real-time updates. Key functionalities include book inventory management, user registration, book borrowing and returning, fine calculation, and automated notifications for due dates and overdue books. The front-end, developed with Angular, provides an interactive and user-friendly interface, while the back-end, powered by Node.js and Express.js, manages application logic and API communications. MongoDB serves as the database for efficient data storage and retrieval. The system undergoes rigorous testing to ensure security, functionality, and performance. Deployment on a cloud or local server ensures accessibility from any location. With its robust design and modern technology stack, this LMS enhances library operations, improves user experience, and reduces administrative workload, making it a scalable and efficient solution for modern libraries.

Keywords: *Library Management System, MEAN Stack, MongoDB, Express.js, Angular, Node.js, Book Inventory, User Authentication, Transaction Management, Fine Calculation, Cloud-Based System, Automated Notifications, Scalable Web Application.*

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ICNEAI_148

Fisical: A Secure and Scalable Secret Management System for Modern Development Environments

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Abstract

In a day of escalating data breaches and security risks, a strong and effective secret management system is more important than ever. This article describes FISICAL, a sophisticated secret management platform created to meet the issues of safe secret storage and access control in current development processes. FISICAL uses cutting-edge encryption techniques, such as AES-256, to protect sensitive information in development, testing, and production settings. FISICAL's key features include role-based access control with granular permissions, secure team collaboration with activity logs, and version control that supports rollback procedures. It also interacts easily with development processes by supporting CLI and SDK, allowing for the easy insertion of secrets into runtime settings. Advanced features such as automated secret rotation, real-time system synchronization, and an API-first approach enable scalability and adaptability across a wide range of use scenarios. FISICAL, which is built on a zero-trust architecture with end-to-end encryption, reduces exposure to sensitive data for administrators as well. A user-friendly web-based dashboard with powerful searching, filtering, and notification mechanisms improves usability, making secret management accessible to teams of any size. The platform uses a current technology stack that includes Next.js, Tailwind, Fastify, and PostgreSQL, and it is containerized with Docker for simple deployment. FISICAL, by integrating security, scalability, and usability, provides a comprehensive solution for managing secrets in the ever-changing DevSecOps world.

Keywords: *Secret management system , Role-Based Access Control (RBAC), Zero Trust Architecture, End-to-End Encryption (E2EE), Secrets Rotation .*

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ICNEAI_149

Design of Dynamic Wireless Sensor Network with Backhaul Support for Secured Communication

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Abstract

Cybersecurity threats in wireless sensor networks (WSNs) pose significant challenges to network reliability and data integrity. This project simulates a large-scale WSN with 200 nodes over a 600 × 600 unit area, where nodes communicate using broadcast, multicast, and unicast transmissions. The network is subjected to various cyberattacks, including Neptune, Smurf, IP Sweep, and Guess Password attacks. A basic anomaly detection system identifies malicious nodes based on traffic rates exceeding a detection threshold of 0.8. Nodes have limited energy, which depletes as they transmit data. The communication behavior is visualized through network graphs, where connections are drawn based on the communication range of 150 units. To evaluate network security, key performance metrics such as accuracy, precision, recall, and F1-score are computed for each transmission type under different attack scenarios. The results are presented in comparative tables and visualizations, offering insights into the effectiveness of different communication strategies against cyber threats. This simulation provides a foundation for understanding WSN vulnerabilities, assessing network resilience, and developing cybersecurity strategies to enhance network defense mechanisms.

Keywords: *WSN, Neptune ,IP sweep, Smurf , Guess Password attack.*

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ICNEAI_150

Future-Ready SaaS Platform

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Abstract

This project introduces a comprehensive SaaS platform that combines a website builder, project management tools, and an interactive dashboard to improve business operations. Utilizing cutting-edge technologies like Next.js 14, Bun, Prisma, MySQL, and Stripe Connect, the platform guarantees scalability, security, and real-time collaboration. Unlike conventional website builders that lack integrated project management capabilities, this solution features task tracking, Kanban boards, and real-time updates, effectively reducing inefficiencies from using separate tools. The interactive dashboard offers real-time analytics, user management, and subscription tracking, while Stripe Connect simplifies secure payment processes. By merging essential SaaS features into one platform, this project tackles scalability issues, enhances workflow efficiency, and elevates the user experience for businesses.

Keywords: *SaaS, Website Builder, Project Management, Stripe Connect, Real-Time Collaboration, Analytics.*

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ICNEAI_151

Open Source Scheduling Infrastructure

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Abstract

Our project, Open Source Scheduling Infrastructure, presents a scalable, customizable, and secure scheduling platform that seamlessly integrates with APIs, databases, and authentication systems. Unlike proprietary solutions, our open-source approach ensures flexibility, cost- effectiveness, and enhanced privacy. This infrastructure enables users to manage appointments effortlessly, leveraging API-driven communication, real-time notifications, and secure authentication mechanisms. The system supports integration with popular platforms like Google Calendar, Outlook, and Zoom, providing an intuitive booking experience. Additionally, our project prioritizes data security and privacy by implementing role-based access control and encryption techniques. With a focus on scalability, our architecture is designed to handle multiple concurrent users, ensuring reliability in high-demand scenarios. This project contributes to the open-source community, encouraging innovation and adaptability in scheduling solutions. Our implementation uses Next.js for frontend development, Node.js for backend logic, Firebase for authentication, and PostgreSQL for database management, deployed on cloud-based platforms like AWS and Vercel. By eliminating subscription costs and offering full customization, our system serves as a robust alternative to commercial scheduling software. This research highlights the benefits of open-source scheduling infrastructures in enhancing productivity, optimizing resource allocation, and promoting digital transformation across various domains.

Keywords: *Open-Source Scheduling, Appointment Management, API Integration, Real-Time Notifications, Secure Authentication, Cloud-Based Deployment, Next.js, Firebase, PostgreSQL, Meeting Platform Integration.*

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Design of Self Sustainable Cooling System for Battery Management System in Electric Vehicle

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Abstract

The enhanced thermal simulation and control strategy for a self-sustaining hybrid cooling system integrating Thermoelectric Cooling (TEC), Phase-Change Materials (PCM), and Thermoelectric Generators (TEG) for advanced battery thermal management. In response to detailed feedback from project assessors and our supervisor, our team refined the computational fluid dynamics (CFD) models to accurately capture the thermal behaviour of the system. Key improvements include updated material parameters for the PCM—specifically, revised latent heat, specific heat capacity, and enhanced thermal conductivity through nanomaterial additives—and refined TEC cooling equations with updated Seebeck coefficient and thermal conductance values. Furthermore, we restructured the control algorithms to incorporate dynamic boundary conditions that simulate real-time thermal fluctuations. By integrating a feedback mechanism for adaptive PWM modulation of TEC power, the system is capable of preventing PCM saturation, thereby maintaining the PCM in a partially solid state and extending its effective cooling duration. These enhancements result in a more robust and accurate simulation framework, enabling precise prediction of the thermal interplay between the battery, PCM, and TEC components. This work not only improves the overall energy efficiency and safety of battery thermal management systems but also contributes to the advancement of sustainable cooling solutions for high-performance energy storage applications.

Keywords: *Battery Management System (BMS), Electric Vehicles (EVs), Thermal Management, Self-Sustaining Cooling, Thermoelectric Cooling (TEC), Phase-Change Materials (PCMs), Nanomaterials, Peltier Effect, Energy Efficiency, Hybrid Cooling System, Passive Cooling.*

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AI-Based Rehabilitation and Training Progress Tracker for Injured and Disabled People

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Abstract

Rehabilitation and fitness training for individuals recovering from injuries or living with disabilities require a personalized approach to ensure safe and effective progress. However, traditional rehabilitation methods often lack real-time feedback and fail to adapt to an individual's changing needs, which can lead to inefficiencies and slow recovery. This paper introduces an AI-powered system designed to enhance rehabilitation by using machine learning and computer vision. The system integrates wearable sensors and AI-driven analytics to assess physical capabilities, track exercises, and adjust training plans based on real-time performance. Through a mobile or web-based platform, users receive guided workouts, posture and movement feedback, and motivational insights to keep them engaged. By continuously learning from user data, the AI model optimizes rehabilitation exercises, helping prevent further injuries and improving recovery outcomes. Our main goal is to make rehabilitation more accessible, effective, and personalized, ultimately enhancing the recovery journey for patients.

Keywords: *AI-powered rehabilitation, machine learning, computer vision, wearable sensors, personalized recovery*

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Digital Agriculture for Empowering Farmer using Cutting-Edge Technology

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Abstract

The proposed application, AgriAssist, is an all-in-one mobile solution aimed at empowering farmers by uniting cutting-edge technologies in a single, easy-to-use platform. This app integrates six essential features: a Chatbot that provides step-by-step guidance for crop cultivation and addresses farming-related questions, a Camera for identifying diseases and recommending pesticides through image recognition, a Profit and Loss Margin Calculator that forecasts crop profitability based on user data, a Crop Rotation Advisor that recommends the best crop sequences for maintaining soil health, a Soil Monitoring system linked to IoT sensors for analyzing real-time soil data, and a Farmer-to-Buyer Marketplace that connects farmers directly with purchasers for crop sales. With a scalable and secure architecture, the app utilizes machine learning, IoT, and cloud technologies to deliver actionable insights, enhance crop yields, and improve farmers' livelihoods. AgriAssist aspires to transform agricultural practices by providing a comprehensive solution for crop management, disease management, soil health, and market access, ultimately closing the gap between traditional farming methods and modern technology.

Keywords: *AgriAssist, smart farming, IoT in agriculture, machine learning, crop management*

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The Real-Time Heart Monitoring System Using Blynk integrated with IoT

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Abstract

The Real-Time Heart Monitoring System Using Blynk is an Internet of Things (IoT)-based project developed to provide continuous, real-time monitoring of crucial health parameters: heart rate and blood oxygen saturation (SpO_2). The importance of personal health monitoring is increasingly evident, as individuals seek convenient, reliable solutions to manage their health independently and stay informed about their vital signs. This system addresses that need by leveraging IoT technology to allow users to track their heart health remotely and continuously, empowering proactive health management from the comfort of their home. This project combines hardware components with an intuitive software platform to deliver health data in real time. It operates through a MAX30100 pulse oximeter sensor paired with an ESP8266 microcontroller. The MAX30100 sensor is designed to accurately detect heart rate and SpO_2 levels, providing reliable, up-to-the-minute readings. The ESP8266 microcontroller, with its integrated Wi-Fi capabilities, acts as the data-processing unit and enables seamless wireless data transmission to the cloud. Data collected from the sensor is then sent to the Blynk IoT platform, a mobile-friendly application that visualizes health data on a user's smartphone or other connected devices. Through the Blynk app, users can view their heart rate and SpO_2 readings in real time, allowing them to assess their health status conveniently and from any location with internet access. The primary objectives of this project are to provide an easy-to- use, portable solution for real-time heart monitoring, facilitate wireless data connectivity for remote access, and offer a user-friendly interface for health data visualization via Blynk. By integrating the MAX30100 sensor and ESP8266 microcontroller with the Blynk IoT platform, this system delivers a scalable and cost-effective solution to track critical health metrics continuously. This project has wide-reaching applications, from personal health monitoring and elder care to fitness tracking and sports health management, as it enables users to stay informed about their health and make timely decisions based on accurate, accessible data. Key components of this system include the MAX30100 pulse oximeter sensor for detecting heart rate and SpO_2, the ESP8266 microcontroller for data processing and Wi-Fi connectivity, and the Blynk IoT platform for data visualization and remote monitoring.

Keywords: *blynk, Max30100, oximeter, IoT, ESP8266, SpO_2*

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Usage of Blockchain in Distributed Cloud Garage

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Abstract

The "decentralized cloud garage using blockchain" project is a peer-to-peer network in which each node provides storage for the client's data. The developed system is concerned with keeping pieces of a single encrypted file, with each component being stored on separate nodes such that only the client may get the parts in order to recreate the original file. The system's goal is to experiment with and show a workable Secure File Storage system. Cryptography and Blockchain technology are used to create a system for tiny credential files. The Kademlia protocol, which allows each node to communicate with each other, is used to create the P2P network. You are free to join and leave the network at any time, find the nearest nodes, update the routing table, and search for any node. Various encryption and network algorithms are used. Cloud storage is one of the most popular ways to store large amounts of data, but cloud computing's centralized storage approach is not secure. On the other hand, blockchain is a decentralized, peer-to-peer system where every node in the network keeps a copy of the blockchain, making it immutable. Decentralized cloud storage technology guarantees data protection, reducing user dependency on centralized authorities.

Keywords: *Blockchain, SHA256, Cloud, Decentralized.*

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Enhancing Cybersecurity Measures Through AI-Driven Intrusion Detection Systems using deep learning

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Abstract

The increasing adoption of Internet of Things (IoT) devices has led to heightened security concerns, particularly regarding Distributed Denial-of-Service (DDoS) attacks. Traditional security measures often fail to keep up with the evolving nature of these threats. This study proposes a deep learning (DL)-based approach for real-time DDoS attack detection and mitigation in IoT networks, enhancing security and ensuring minimal network disruption. The system is implemented using a mesh network of three NodeMCU microcontrollers. One node simulates an intruder generating malicious traffic, while the other two collect environmental data using DHT11 and LDR sensors. The fused sensor and network data are transmitted to the cloud platform ThingSpeak for real-time analysis. A deep learning model, trained on IoT traffic patterns, detects anomalous behavior and identifies potential DDoS attacks. Upon detection, an IoT controller dynamically deploys mitigation strategies to maintain network stability. This approach leverages deep learning to improve detection accuracy, reduce false positives, and adapt to evolving attack strategies. The lightweight model is designed for resource-constrained IoT devices, ensuring scalability and efficiency. Experimental results demonstrate high detection accuracy and effective real-time mitigation, outperforming traditional rule-based systems. By integrating IoT, cloud computing, and AI-driven analytics, this framework provides a robust and scalable defense against DDoS attacks. Future work will focus on optimizing energy efficiency, expanding datasets for better generalization, and incorporating additional security measures for comprehensive threat defense.

Keywords: *IoT Security, DDoS Detection, Deep Learning, Mesh Network, Real-Time Mitigation, ThingSpeak, NodeMCU, Cybersecurity.*

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IoT-Based System for Rain Detection Windows Control and Gas Leak Safety Using Machine Learning

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Abstract

This project, **IoT-Based System for Rain Detection - Windows Control and Gas Leak Safety Using Machine Learning**, aims to automate window movement for enhanced safety and convenience. The system senses rain, gas leaks, temperature, humidity, and air quality using sensors. When it is raining, the windows automatically close, and if there is a gas leak, they open to ventilate. It predicts the weather in the form of rain, clear, and cloud and adjusts windows as per it. It also predicts pollution to ensure better air inside. The windows open in case of cool weather to get fresh air inside. They also open automatically each morning at 6 AM to provide ventilation. It is controlled remotely through the mobile application. It is an energy-saving and cost-effective solution that suits middle-class houses.

Keywords: *IoT, smart window, ESP32, machine learning, home automation, gas leak detection.*

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AERS ABS

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Abstract

The Accident Emergency Response System (AERS) is a real-time ambulance dispatch and navigation system designed to enhance emergency response efficiency using Flutter and Firebase. The system consists of a user app for emergency booking and a driver app for ambulance dispatch. Bookings are stored in Firebase Realtime Database, while user and driver details are managed in Firestore. The system features live tracking, push notifications, in-app chat, and booking history. Upon a booking request, only available drivers within a 10 km radius receive the request. The driver sees the accident location, distance, and user details before accepting. Once accepted, the driver is routed to the accident site using shortest path algorithms with live traffic optimization. After reaching the incident, the system automatically navigates the driver to the nearest hospital. Drivers can update booking status through predefined stages: On the way, At incident location, On the way to hospital, Completed. The app retains the active booking on the home screen and prevents drivers from accepting multiple bookings simultaneously. Additionally, an availability toggle ensures only available drivers receive requests. Security features include document upload and verification. Canceled bookings are reassigned to other drivers, and bookings expire after 12 hours if unaccepted. The AERS system optimizes ambulance dispatch, reducing emergency response time and improving patient survival rates.

Keywords: *Emergency Response, Ambulance Dispatch, Real-Time Tracking, Flutter, Firebase, Shortest Path Algorithm, Live Navigation, Firestore, Patient Survival, Automated Booking.*

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Compact Printed Quadruple Antenna for UWB Applications

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Abstract

This project introduces a cost-effective Wireless Patient Monitoring System for hospital applications using a custom-designed quadruple-band microstrip patch antenna. The system enables real-time monitoring of vital signs like heart rate, temperature, and SpO_2, ensuring reliable data transmission across Wi-Fi bands (2.4 GHz, 5 GHz, 6 GHz). By leveraging an ESP32 microcontroller and affordable sensors, it provides seamless communication in high- interference environments. This solution enhances healthcare efficiency by offering real-time data access on smartphones or dashboards, reducing staff workload and improving emergency response..

Keywords: *Wireless Patient Monitoring, Microstrip Patch Antenna, ESP32, Real-Time Monitoring, IoT in Healthcare, Wi-Fi Bands.*

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Enhanced Wavelet-Based Denoising Method for Improving Spectral Signature Curves

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Abstract

Spectral signature curves play a crucial role in remote sensing applications, but noise from environmental and instrumental factors can significantly impact their accuracy. Wavelet-based denoising techniques have been widely used to enhance signal quality by effectively preserving important spectral features while removing unwanted noise. In this study, we proposed a modified wavelet-based denoising method that improved the accuracy and reliability of spectral signature curves. The proposed approach optimized wavelet decomposition levels and thresholding strategies to adaptively suppress noise while maintaining the integrity of spectral characteristics. Comparative analysis with traditional wavelet denoising methods demonstrated that our modified technique achieved superior signal-to-noise ratio (SNR) and enhanced feature preservation. The results revealed that this method can be effectively applied to hyperspectral and multispectral data for improved classification, target detection, and environmental monitoring.

Keywords: *Spectral Signature Curve, Wavelet Denoising, Modified Method, Remote Sensing, Noise Reduction, Hyperspectral Data*

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Integrating MRI and CT Through CNN and Wavelet-Based Fusion Techniques for Enhanced Diagnostic Accuracy

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Abstract

The integration of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) was identified as a promising approach in medical diagnostics, utilizing the complementary strengths of both imaging techniques. A novel framework for the fusion of MRI and CT images was developed, which employed Convolutional Neural Networks (CNNs) combined with wavelet transformation techniques. The methodology began with the decomposition of MRI and CT images using discrete wavelet transform (DWT), capturing multi-resolution features from both types of images. The wavelet coefficients were then fused strategically to enhance important structural and texture information while preserving crucial diagnostic details. A CNN was used to further process the fused coefficients, allowing for the learning of complex patterns and features associated with pathological conditions. Extensive experiments were conducted to evaluate the performance of the proposed fusion technique compared to traditional methods, such as pixel-based averaging and maximum selection strategies. Quantitative evaluations, including Peak Signal-to-Noise Ratio (PSNR), Structural Similarity Index Measure (SSIM), and visual assessments, demonstrated that the CNN and wavelet-based fusion significantly outperformed existing approaches, resulting in improved image quality and diagnostic accuracy. The results indicated that the fusion method effectively combined the superior soft tissue contrast of MRI with the high spatial resolution of CT, leading to better visualization of anatomical structures and detection of pathologies. This study revealed that the potential of integrating advanced deep learning techniques with traditional image processing methods, inferred the way for improved diagnostic tools in medical imaging.

Keywords: *Wavelet Transform, Convolutional Neural Networks (CNN), Image Fusion, Structural Similarity Index Measure (SSIM)*

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