INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN SCIENCE, TECHNOLOGY, ENGINEERING & MANAGEMENT

International Conference on

Emerging Trends in Science, Technology, Engineering & Management

ICESTEM'25

25th & 26th April 2025

Bharath Niketan Engineering College

Sri Gowri Nagar, Thimmarasanaickanoor,
Aundipatty - 625 536, Theni Dt., Tamil Nadu, India
www.bnec.ac.in

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MESSAGE

Dr. S. Mohan
Managing Chairman

Greetings to all,

I would like to take this opportunity to express my gratitude to the faculty team of our college and I appreciate all HoDs for the dedication and efforts you have put in to make this International conference a reality.

Engineering has always played a critical role in shaping the world we live in. I'm sure that ICESTEM'25 will serve as a platform for researchers and engineers to share their latest research findings and experiences with the broader community.

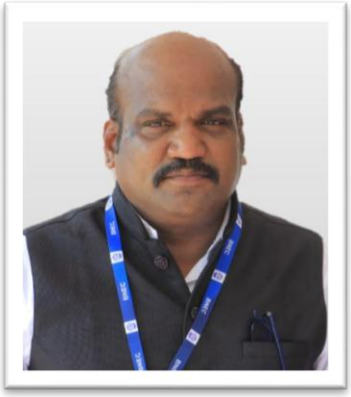
I extend my congratulations to all the participants who have contributed to this conference. Your research work will undoubtedly make a valuable contribution to the field of engineering and will serve as an inspiration to future generations of engineers.

I would also like to acknowledge and appreciate the organizers of this conference for their unwavering commitment and hard work towards ensuring the success of this event. Without their tireless efforts, this conference would not have been possible.

I wish you all the best in your future endeavors and look forward to seeing the impact of your research on the field of engineering.

Thank you.

MESSAGE



Dr.P.V.Arul kumar
Principal

Dear all,

It is my pleasure to announce that the proceedings for the Engineering and Technology International Conference are now available.

I want to express my gratitude to all of the presenters, panelists, and attendees who made this conference a success. Your dedication to the advancement of engineering and technology is inspiring, and I am confident that the ideas and insights shared at this conference will have a lasting impact on our field.

I encourage you all to take the time to review the proceedings and continue the conversations sparked by the conference. Let us use this knowledge to drive progress, innovate solutions, and create a better future for all.

Thank you again for your participation, and I look forward to seeing you at the next Engineering and Technology International Conference.

MESSAGE

Bereket Haile Woldegiorgis, Ph.D.
Faculty Dean
Associate Professor of Industrial Engineering
Faculty of Mechanical and Industrial Engineering
Bahir Dar Institute of Technology (BiT), Bahir Dar University

It is my pleasure to address all of you as a guest speaker for this International conference - ICESTEM'25.

This conference provides an excellent opportunity for all of us to come together and share our knowledge and experiences. The various presentations and discussions during this conference will help us to gain a deeper understanding of the latest technological advancements and their applications in different fields.

As we move forward, it is essential that we continue to collaborate and innovate. Our collective efforts will help us to overcome the challenges we face and pave the way for a better tomorrow. Let us make the most of this conference by engaging in meaningful discussions, sharing our knowledge and experiences, and learning from each other.

Let me congratulate the Management, Principal, Staff and student organizers of the two day International conference.

I wish you all a productive and enlightening conference.

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DEPARTMENT OF CIVIL ENGINEERING

CE001

INTENSIVE SOLAR FLARES AND THEIR ASSOCIATED HALO CORONAL MASS EJECTIONS

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Abstract

We present a statistical study of intense solar flares and their associated activities, particularly halo coronal mass ejections (CMEs), during the year 2024. This period corresponds to the rising phase of Solar Cycle 25. A total of 49 solar flare events of class M and X were recorded in 2024, comprising 22 X-class flares and 27 M-class flares. The average speed of all associated CMEs from these events was 1131 km/s. Specifically, the CMEs associated with M-class flares had a mean speed of 1006 km/s, while those associated with X-class flares exhibited a higher mean speed of 1285 km/s. The halo CMEs linked with these intense flares showed both acceleration and deceleration behaviours. Among the 49 events, 30 CMEs were decelerating, and 19 were accelerating. This indicates that faster CMEs tend to decelerate, while slower CMEs generally undergo acceleration, suggesting an interaction with the ambient solar wind and interplanetary medium. All the CMEs studied were halo-type, meaning they appear to surround the occulting disk of the coronagraph, indicating that they are directed toward Earth. These CMEs are characterized as fast and wide, with an angular width of 360 degrees. The spatial distribution of the flare events across the solar disk is as follows: 6 events originated from the North-East quadrant, 3 events from the North-West quadrant, 23 events from the South-West quadrant, 16 events from the South-East quadrant, and 1 event was identified as a backside event (originating from the far side of the Sun, not directly visible from Earth). This study highlights the significance of intense solar flares and their associated halo CMEs during the active phase of the solar cycle. The analysis provides valuable insight into their dynamic properties, spatial distribution, and implications for space weather forecasting.

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CE002

BOREWELL RESCUE

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Abstract

In past few years, children get trapped into the bore well hole which is left uncovered. The rescue process to save the child from bore well is long and complicated. To avoid this, there have been several rescue robot designs available currently. Even now the existing robots are not satisfactorily used to rescue the child from bore hole. For this reason, a morphological chart is designed from existing and new robot designs. From the morphological chart, various combinations of rescue robot design are formulated. Finally, the designs are compared for the best performance. An additional component like digital oxygen supply system, digital integrated camera, strain measuring pressure sensors, rope and pulley drive are added to the design to improve rescue operation. A lot of other hassles are avoided by this alternative technique. The proposed design is to rescue trapped child from bore well within short period and with safely.

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CE003

QUANTITY SURVEYING FOR RESIDENTIAL BUILDINGS

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Abstract

This report presents a comprehensive quantity surveying analysis for a residential building project, encompassing cost estimation, material take-off schedule management, and budget management. The study aims to provide accurate financial planning and efficient resource allocation throughout the construction process. The methodology involves a detailed examination of architectural and structural drawings, followed by the preparation of Bills of Quantities (BOQ) in accordance with standard measurement practices. Key components assessed include substructure, superstructure, finishes, and external works. Emphasis is placed on cost control strategies, value engineering, and risk management to ensure the project remains within budget while meeting quality and timeline requirements. The findings highlight the crucial role of quantity surveyors in optimizing construction costs and supporting decision-making in residential developments.

ISBN: 978-93-6163-610-3

CE004

EXPERIMENTAL STUDY ON PARTIALLY REPLACEMENT OF FINE AGGREGATE BY WASTE GLASS AND COARSE AGGREGATE BY E-WASTE PLASTIC

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Abstract

Solid waste management is one of the major environmental concerns in the world. Replacement of aggregate in concrete at different percentages has been done in the past. There is a possibility of partial replacement of fine aggregate and coarse aggregate by waste glass and waste plastic (HDPE) respectively. This will help in producing lightweight concrete as well as be effective in utilizing waste products. Different tests will be conducted to find out the appropriate replacement percentage of waste glass and plastic to maintain the strength of concrete. As pozzolanic activity increases strength in concrete due to glass replacement and plastic helps in producing lightweight concrete.

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CE005

EXPERIMENTAL INVESTIGATION OF PAPERCRETE AS A BUILDING MATERIAL

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Abstract

The paper waste collecting from the countries all over the world reflects certain dangerous environmental problems. The present study focuses on utilizing the waste materials like wastepaper into cost effective building bricks and recycle the wastepaper without any serious affects to the surrounding. The study was evaluated regarding the durability, strength and structural properties of papercrete as a building material. The high volume of concrete offers a solution to the problem of meeting the increasing demands for concrete in the future in a sustainable manner. And at the same time reducing the environmental impact of industries that are vital to economical development. As natural sources of aggregates are becoming exhausted, it turns out urgent to development. The majority of abandoned paper waste is accumulated from the countries all over the world cause certain serious environmental problems. This project deals a parametric experimental study which investigates the potential use of paper waste for producing a low-cost and light weight composite brick as a building material. An experimental investigation has been carried out to optimisation of mix for papercrete bricks depending upon the compressive strength, unit weight, and water absorption. Papercrete bricks are light weight and relatively more economic and they can be used for partition walls& non load bearing walls

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CE006

DESIGN AND ANALYSIS OF SHATTER PROOF WALL USING REINFORCED HOLLOW BLOCK FOR FIRE WORKERS INDUSTRIES

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Abstract

In fireworks industry, accidents are occurred due to unsafe acts by the human being sand unsafe conditions present in the working atmosphere. It will lead to loss of human life, building structure damage and business interruption. There are 700 fireworks industries are situated in and around Sivakasi and the livelihood of people who residing in the region depends on the fireworks industries. At most safety precaution needs to be considered during the manufacturing process especially at the time of chemical handling, because most of the accidents are happened due to the improper chemical handling. To achieve safety of fireworks employees as well as surroundings the government framed so many safeties operating procedures and restrictions through the explosive Rules 2008 and Factories act1948.Even though the government framed so many rules and regulations regarding storage of fireworks chemicals storage, the industry people may not follow properly. This will be one of the reasons for fireworks accident leads to catastrophic failure of building structure and human injury. To overcome this problem, the building structure must be designed to resist the blasteffectcausedbytheexplosivechemicals.Theaimofthisprojectworkistoreducetheeffectof damage during fireworks explosion. To achieve this steel fiber reinforced hollow block is replaced by the normal brick work. After completion of load test conducted by this phase I work, concluded that the steel fiber reinforced hollow block will resist the pressure caused by the explosion and act as thermal insulation. By which the shattering and damage of building structure will be reduced. The human injury caused by the shattered brick also will be avoided.

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CE007

AN COMPARATIVE STUDY ON STRENGTH OF REPLACED CONCRETE BY USING NATURAL VS ARTIFICIAL MINERAL ADMIXTURES

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Abstract

Concrete is the world's most versatile, durable and reliable construction material. Ordinary Portland cement production is major generator of carbon-di-oxide which pollute the atmosphere, in addition to that large amount of energy was also consumed for the cement production. Hence it is inevitable to find An Portland cement. In this study, cement is 40% replaced by natural and artificial mineral admixtures such as rice hush ash, sugarcane bagasse ash, silica fume, ground granulated blast furnace slag. This experiment will conclude with comparing difference between the strength of conventional concrete and admixtures replaced concrete of grade M_{20}. The test is taken in 7, 14, 28 days from the cuing is started. The compressive and split tensile strength is calculated. Admixtures are anything added to the mixture other than coarse aggregate, fine aggregate, binding material, and water to modify the property of the mix. Admixtures are the Fourth ingredient, in addition to cement, aggregates, and water. IS: 456 permits the use of Pozzolana as admixture for concrete. Admixtures have increased both compressive strength and durability of concrete through their water/cement (w/c) reduction, hydrophobic effect, pore reduction/blocking, increased density etc. This has tremendously increased their use in the construction industry today.

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CE008

TRAFFIC VOLUME STUDIES AND CONGESTION SOLUTION FROM KALAVASAL TO GORIPALAYAM

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Abstract

A traffic Management System is needed to assure safe and effectual movement of people, good and transportation. Safe and effectual movement of people, goods and transportation depends on the effectiveness of the traffic management system. Without effective planning and traffic management of the city. Understanding the traffic management of the city, the existing road infrastructure cannot meet the future traffic demands of the city. Understanding the traffic volume is one of the most important elements of the traffic management through primary traffic flow surveys as well as skilled observations at Kalavasal to Goripalayam. Determination of the traffic volume was counted by manual counting methods and the level of service was measured by peak hour Factor (PHF) methods is the range of 0.80-0.90 that is D Category. Moreover, calculation of passenger car unit (PCU's) for different types of vehicle had been made. An attempt has been to know the traffic patents of the different time periods are indicated that Auto Rickshaw is most common vehicle. Throughout observation, this work has been found the average lane width and the average widths of shoulder are 9.5 (Two line) and 2.5 feet respectively. Due to insufficient lane and shoulder width as well. Some of the remedial measures to increase the traffic safety by providing adequate lane number (4 to 6) and width proper signaling and restricted scattered parking can be recommended based on the outcomes of the work.

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CE009

DESIGN CONSTRUCTION AND OPERATION OF SEWAGE TREATMENT PLANT

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Abstract

A sewage treatment plant is quit necessary to receive the domestic and commercial waste and removes the materials which pose harm for general public. Its objectives are to produce an environmentally safe fluid waste stream and a solid waste suitable for disposal or reuse (usually as farm fertilizer). The growing environmental pollution needs for decontaminating waste water result in the study of characterization of waste water, especially domestic sewage.

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CE010

URBAN WASTE MANAGEMENT

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Abstract

The generation of urban waste is obvious due to the rapid increase in urbanization. The increase in consumption led to a corresponding increase in waste generation as well. This study used already existing literature to identify the various types of waste generated in urban settings. Besides, the study has also identified the various waste management strategies and methods adopted across the globe to manage urban waste effectively. The outcome of the study revealed that wastes are classified in terms of their physical state (solid, liquid, and gaseous states), bio-degradability (bio-degradable waste and non-bio-degradable waste), and in terms of classification based on effects on human health. These include hazardous waste and non-hazardous waste. The study found that among the various waste management methods and strategies, land filling, compositing, 3Rs (reduce, reuse, recycle), incineration or combustion, and bioremediation are the most widely used waste management methods across the globe. Keywords: solid waste, liquid waste, hazardous waste, land filling, recycling, incineration, bioremediation.

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CE011

WATER SAVING ROAD TO FUTURE

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Abstract

The looming threat of water scarcity necessitates a proactive and multifaceted approach to water conservation. This project investigates the "Road to a Water-Secure Future" by exploring various strategies for water conservation, focusing on Examining the efficiency of existing water infrastructure and identifying opportunities for improvements to minimize leakage and optimize distribution. Exploring the potential of emerging technologies such as rainwater harvesting systems, grey water recycling, and advanced irrigation techniques to augment water resources and reduce consumption. Investigating the effectiveness of public awareness campaigns and educational initiatives to promote water-wise habits in daily life, encompassing domestic, agricultural, and industrial sectors. Analyzing the role of government policies and regulatory frameworks in promoting water conservation and ensuring sustainable water management practices. By combining technological advancements, infrastructure improvements, and behavioural changes, this project aims to develop a comprehensive roadmap towards a water-secure future, ensuring the availability of this vital resource for generations to come.

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COMPUTER SCIENCE & ENGINEERING

CS001

HUMAN EMOTION RECOGNITION USING DEEP LEARNING

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Abstract

Human emotion recognition is a crucial component in the advancement of human-computer interaction, with applications ranging from healthcare and education to security and entertainment. Emotions play a vital role in communication, and the ability for machines to accurately interpret human emotions enhances their effectiveness and user-friendliness. This project aims to develop a system capable of recognizing human emotions through facial expressions using deep learning techniques. The proposed system utilizes convolutional neural networks (CNNs), which are highly effective in image processing tasks. Facial expression datasets such as FER-2013 are employed to train the model to classify key emotional states, including happiness, sadness, anger, fear, surprise, disgust, and neutrality. Data pre-processing techniques such as face detection, greyscale conversion, and normalization are applied to improve model performance. The model architecture is designed to extract meaningful features from facial images and learn patterns associated with different emotions. OpenCV is integrated for real-time face detection and emotion classification using a webcam. The trained deep learning model is deployed to capture live video feed, identify faces, and predict the corresponding emotion for each face in real time. This real-time functionality demonstrates the practicality of the system and its potential application in various real-world scenarios such as mood-based content recommendation, mental health monitoring, and customer experience enhancement. This project demonstrates the potential of deep learning in developing intelligent systems capable of understanding human emotions. With accurate and efficient emotion recognition, machines can become more responsive and empathetic to human needs. Future improvements may involve incorporating multimodal inputs such as voice and text, and expanding the emotion classes for a more comprehensive analysis.

Keywords: *Convolutional neural networks (CNNs), Facial expression datasets such as FER-2013*

 ISBN: 978-93-6163-610-3

CS002

GOBARDHAN - AI DRIVEN SIMPLE CONTROL SYSTEMS FOR SMALL BIOGAS PLANTS

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Abstract

This project presents a Smart and AI-Driven Control System for optimizing small-scale biogas plants, aligned with the GOBARDHAN initiative. It integrates real-time sensors (Pressure, Temperature, Methane, Gas Flow) and a 32-bit Automated Control Unit to continuously monitor plant conditions. The system uses AI algorithms like the NARX model for biogas yield prediction and SFLA (Shuffled Frog Leaping Algorithm) for optimizing feeding schedules. We developed a website and a mobile application (via MIT App Inventor) called Gobar தோழன் to spread awareness and allow real-time monitoring, with a QR code for easy app download. Our solution automatically adjusts feeding and gas flow, resulting in a biogas yield increase of up to 43%, while significantly reducing manual effort and operational costs. It promotes renewable energy, efficient waste management, and is scalable for larger plants with further AI integration.

Keywords: *AI-Driven Control System, Shuffled Frog Leaping Algorithm*

CS003

AI-BASED ERP SYSTEM WITH PREDICTIVE ANALYSIS AND PROCESS AUTOMATION

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Abstract

Traditional ERP systems are often limited in scalability and adaptability. Cloud-based ERP solutions address these issues by offering flexible and remote accessibility. However, most ERP systems still lack intelligent automation, requiring human intervention for decision-making and data processing. This project proposes an AI-powered Cloud ERP model that integrates AI-driven analytics, predictive modelling, and automation for improved efficiency. The AI integration enhances process optimization, error detection, and resource planning, making enterprises more agile and data-driven. Our approach includes AI-powered forecasting, NLP-based chat bots, and automated workflow management, ensuring that businesses operate efficiently with minimal manual effort.

Keywords: *Cloud-based ERP, NLP-based chat bots*

ISBN: 978-93-6163-610-3

CS004

AN AUTOMATED IDENTIFICATION SYSTEM UTILIZING FACE RECOGNITION TECHNOLOGY

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Abstract

The Automatic Attendance System Using Face Recognition is designed to replace manual attendance methods with a more efficient and accurate system. The system uses face detection and recognition algorithms to identify individuals and mark their attendance automatically. It leverages machine learning models and computer vision techniques to ensure high accuracy and real-time processing. This system can be deployed in educational institutions, offices, and other organizations to streamline attendance management, human error, and save time.

Keywords: *Streamline attendance management, Recognition algorithms*

CS005

ANTI-SPOOFING USING GAN WITH REDUCED APCER/BPCER

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Abstract

Facial recognition systems, which are widely used for security purposes, often fall prey to spoofing attacks such as printed photos, video replays, and 3D masks, compromising their reliability. To address these vulnerabilities, this paper introduces a novel pseudo-negative feature generation method aimed at improving the system& ability to identify fake faces more effectively. Unlike traditional techniques that rely solely on fixed features or pre-trained deep learning models, this approach generates synthetic fake samples to enhance the training process. It utilizes CNN-based feature extraction and KL divergence loss to make the generated fake samples more realistic and suitable for training. This method was evaluated on widely used datasets such as MSU-MFSD, OULU-NPU, Replay-Attack, and CASIA-FASD, showing significant improvements in the accuracy of spoofing detection, even for previously unseen attacks. The results indicate that the new method reduces error rates (both APCER and BPCER) and surpasses existing anti-spoofing techniques in terms of performance, providing a more robust solution for security-sensitive applications.

Keywords: *Spoofing attacks, fake face detection, pseudo-negative feature generation, CNN-based feature extraction, KL divergence loss, synthetic fake samples, anti-spoofing techniques, MSU-MFSD dataset, OULU-NPU dataset, Replay-Attack dataset, CASIA-FASD dataset, Emotion-Intelligent Tutoring System (EITS), multi-granular emotion detection, artificial intelligence, real-time emotion recognition, student engagement, adaptive learning, explainable AI.*

 ISBN: 978-93-6163-610-3

CS006

EMOTION AWARE ADAPTIVE EDUCATION SYSTEM

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Abstract

Facial recognition systems, which are widely used for security purposes, often fall prey to spoofing attacks such as printed photos, video replays, and 3D masks, compromising their reliability. To address these vulnerabilities, this paper introduces a novel pseudo-negative feature generation method aimed at improving the system& ability to identify fake faces more effectively. Unlike traditional techniques that rely solely on fixed features or pre-trained deep learning models, this approach generates synthetic fake samples to enhance the training process. It utilizes CNN-based feature extraction and KL divergence loss to make the generated fake samples more realistic and suitable for training. This method was evaluated on widely used datasets such as MSU-MFSD, OULU-NPU, Replay-Attack, and CASIA-FASD, showing significant improvements in the accuracy of spoofing detection, even for previously unseen attacks. The results indicate that the new method reduces error rates (both APCER and BPCER) and surpasses existing anti-spoofing techniques in terms of performance, providing a more robust solution for security-sensitive applications.

Keywords: *Spoofing attacks, fake face detection, pseudo-negative feature generation, CNN-based feature extraction, KL divergence loss, synthetic fake samples, anti-spoofing techniques, MSU-MFSD dataset, OULU-NPU dataset, Replay-Attack dataset, CASIA-FASD dataset, Emotion-Intelligent Tutoring System (EITS), multi-granular emotion detection, artificial intelligence, real-time emotion recognition, student engagement, adaptive learning, explainable AI.*

CS007

AI BASED QUERYING SYSTEM FOR THE COMPETITIVE EXAM MATERIALS USING RAG

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Abstract

Retrieving relevant information from vast competitive exam materials is often time-consuming and error-prone when done manually. This project proposes an AI-driven solution using Natural Language Processing (NLP) and Retrieval-Augmented Generation (RAG) to automate document-based information retrieval. Users can upload documents—such as PDFs, scanned notes, and text files—and submits queries. The system processes these inputs using advanced AI models built with Tensor Flow, PyTorch, and Hugging Face, leveraging Lang chain and SBERT for efficient RAG implementation. Unlike conventional models that may generate inaccurate or hallucinated responses, this system delivers accurate, citation-based answers, clearly referencing document names, page numbers, and highlighted content. Key features include an integrated document viewer, contextual answer generation, and verification through source grounding. With support for common hardware and cross-platform Compatibility this project enhances the speed, accuracy, and reliability of information retrieval for students and professionals alike.

Keywords: *Natural Language Processing, Retrieval-Augmented Generation*

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CS008

VIRTUAL AI AVATARS FOR REAL-TIME COMMUNICATION: A MULTIMODAL CHATBOT APPROACH

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Abstract

With the rise of immersive AI applications, there is an increasing demand for conversational agents that can emulate human-like interaction across multiple modalities. This paper presents a novel and robust AI-driven talking avatar that performs end-to-end speech-based human-computer communication by fusing advanced modules in automatic speech recognition (ASR), voice synthesis, and facial animation. Unlike traditional text or rule-based systems, this model captures spoken input, translates it into accurate transcriptions, and responds through a cloned voice, all while animating a face that synchronizes precisely with the audio output. The ASR module is based on Transformer architecture with Connectionist Temporal Classification (CTC) decoding, enabling real-time, noise-resilient transcription of speech into text. It incorporates data augmentation and multilingual training to improve generalization across various acoustic conditions. Once transcribed, the text is fed into a voice cloning pipeline built using Taciturn 2 and a WaveNet-style vocoder, which generate human-like, emotionally expressive speech while maintaining the speaker's unique vocal characteristics. Fine-tuning techniques are used to preserve prosodic variation and articulation fidelity. For visual synthesis, the system employs a GAN-based lip-sync animation network that maps phoneme-timed audio frames to facial landmarks extracted from a static image. This model uses temporal Convolutional layers to ensure frame continuity and precision. The animation engine aligns mouth shapes to speech dynamics by leveraging an audio-to- landmark regression network, further enhanced by attention mechanisms that stabilize lip movement across varied sentence structures. The final video output presents a fluid, expressive avatar capable of real-time interaction with naturalistic lip motions. This framework demonstrates robust applicability in virtual tutoring, healthcare assistants, AI marketing agents, and assistive communication tools. Experimental evaluation yielded a Word Error Rate (WER) of 5.8% on noisy speech benchmarks, a Mean Opinion Score (MOS) of 4.35% for synthesized voice quality, and a Visual Synchronization Score (VSS) of 91.2% for lip-sync accuracy. These results validate the system's effectiveness in delivering natural, coherent, and expressive human-computer interactions. The modular design further ensures scalability and adaptability to evolving AI and domain-specific requirements While current state-of-the-art models like Wav2Lip typically require 12 to 15 minutes on a GPU-enabled system (e.g., RTX 3060) and 4 to 5 hours on a CPU-only setup, our proposed multimodal chatbot approach is capable of achieving real-time performance.

Keywords: *Speech Recognition, Voice Cloning, Lip-Sync Animation, Talking Avatars, Deep Learning, GANs, ASR, TTS, AI Conversational Systems*

CS009

BIOMETRIC PRECISION: HEMOSCAN'S APPROACH TO BLOOD GROUP IDENTIFICATION

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Abstract

Blood group identification is essential for medical diagnostics, transfusion, and emergency healthcare. Traditional methods rely on invasive serological testing, which is time-consuming and requires specialized personnel. This paper presents a novel, non-invasive approach using deep learning techniques to classify blood groups through fingerprint analysis. The proposed method leverages Convolution Neural Networks (CNNs) and computer vision algorithms to extract unique biometric patterns for accurate blood group identification. While fingerprint recognition is widely used in security and healthcare, its application in blood group identification remains unexplored. This paper addresses this gap by developing a trained CNN- based model on a labelled fingerprint dataset. Pre-processing techniques, such as noise reduction and edge detection, which will enhance feature extraction. The model is trained and validated on diverse data to ensure high precision in classifying major blood groups (A, B, AB, O).A CNN-based deep learning model uses three algorithms that is Manual Net, AlexNet, LeNet was developed to identify blood groups non-invasively using fingerprint images. The model achieved high accuracy in classifying blood groups (A, B, AB, O), showing potential as an alternative to traditional blood tests. This approach enhances medical diagnostics by offering a fast, painless, and risk-free solution, especially useful in emergency and remote settings. Among the three algorithms the proposed LeNet algorithm achieved an overall prediction accuracy of 94.82% in classifying the major blood groups (A, B, AB, and O) using fingerprint images. Future work will focus on improving accuracy by integrating advanced deep learning architectures, such as transformer-based vision models and Generative Adversarial Networks (GANs).Expanding datasets with diverse demographics will enhance generalizability. Ethical concerns, including data privacy, security, and biases in AI-driven biometric systems, will also be addressed. This paper highlights AI's transformative role in medical diagnostics. By utilizing deep learning for blood group identification, it paves the way for non- invasive, efficient, and rapid healthcare solutions while promoting further research in AI-driven personalized medicine and biometric-based diagnostics.

Keywords: *Convolution Neural Networks, Adversarial Networks*

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CS010

ANALYSIS OF CANCER-ASSOCIATED MUTATIONS OF POLB USING MACHINE LEARNING AND BIOINFORMATICS

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Abstract

Cancer-associated mutations in the POLB gene, which encodes DNA polymerase beta, have been implicated in various malignancies. Accurate identification and classification of these mutations are crucial for understanding their role in cancer progression and for developing targeted therapies. In this study, we leverage machine learning and bioinformatics to analyze cancer-associated mutations of POLB. We propose a decision tree algorithm for the classification of these mutations based on their potential impact on protein function and cancer association. This algorithm is compared with the existing one-class support vector machine (OCSVM) approach, a widely used method for anomaly detection in bioinformatics. We curated a comprehensive dataset of POLB mutations from public cancer genomics databases, encompassing a wide spectrum of cancer types and mutation profiles. Each mutation was annotated with features related to its genomic context, predicted structural impact, and clinical significance. Using these features, we trained and validated a decision tree model to classify mutations as pathogenic or benign. The decision tree algorithm demonstrated superior interpretability and comparable accuracy to the OCSVM approach, providing clear decision paths that elucidate the criteria for mutation classification. Furthermore, the decision tree model highlighted specific mutation hotspots and structural domains within POLB that are critically associated with cancer. In contrast, the OCSVM provided a robust baseline for comparison, reinforcing the utility of anomaly detection techniques in mutation analysis. Our findings underscore the potential of decision tree algorithms in the classification of cancer-associated mutations and emphasize the importance of integrating multiple machine learning approaches for comprehensive genomic analysis. This study contributes to the growing body of research aimed at enhancing precision oncology through advanced computational techniques.

Keywords: *Cancer-associated mutations, POLB, DNA polymerase beta, OCSVM*

CS011

APPLYING COMPETITION BASED LEARNING TO STIMULATE STUDENTS PRACTICAL AND COMPETITIVE ABILITY IN A MACHINE LEARNING CURRICULUM

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Abstract

In the context of modern machine learning education, there is a growing emphasis on equipping students not only with theoretical knowledge but also with practical skills that prepare them for real-world applications and competitions. This study proposes the integration of competition-based learning as a pedagogical approach to enhance students' practical and competitive abilities in artificial intelligence (AI) within the framework of a machine learning curriculum. The research focuses on the implementation and evaluation of two specific ML algorithms: random forest regression and lasso regression. These algorithms are employed to predict students' practical AI proficiency, measured by their GPA or other relevant metrics that reflect their mastery of AI concepts and techniques. The rationale behind using competition-based learning lies in its ability to simulate real-world scenarios where students are challenged to apply their knowledge and skills in competitive environments. By engaging in competitions and practical exercises that utilize ML algorithms like random forest and lasso regression, students not only deepen their understanding of AI principles but also develop critical thinking, problem-solving, and teamwork skills. These skills are essential for success in the rapidly evolving field of AI, where practical expertise and innovation are highly valued.

Keywords: *modern machine learning education, GPA, AI, ML algorithms.*

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CS012

ANALYSIS OF BRAIN IMAGING DATA FOR THE DETECTION OF EARLY AGE AUTISM SPECTRUM DISORDER

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Abstract

This study presents a deep learning-based approach for the early diagnosis of Autism Spectrum Disorder (ASD) through the classification of input data, utilizing various neural network architectures. We explore the efficacy of Convolutional Neural Networks (CNN 1D), Multi-layer Perceptrons (MLP), Long Short-Term Memory (LSTM) networks, and Deep Neural Networks (DNN) in predicting the presence of ASD. The input data encompasses behavioral, cognitive, and developmental features, which are crucial for accurate classification. By harnessing the strengths of these models, we aim to identify patterns that are indicative of ASD, thereby facilitating timely intervention. Our methodology involves preprocessing the data to enhance model accuracy, followed by training and validation to optimize performance metrics. The results demonstrate that these deep learning techniques can effectively differentiate between affected and non affected individuals, offering a promising tool for clinicians and researchers in the early detection and diagnosis of autism. This work not only contributes to the field of neuro developmental disorder research but also highlights the potential of advanced machine learning methods in clinical applications, paving the way for improved diagnostic practices and personalized treatment strategies.

Keywords: *Autism Spectrum Disorder (ASD), CNN 1D, MLP, LSTM, DNN.*

CS013

BIOWISH: BIOMETRIC RECOGNITION USING WEARABLE INERTIAL SENSORS DETECTING HEART ACTIVITY

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Abstract

Biometric recognition is an emerging field leveraging physiological and behavioral characteristics for identification and verification purposes. The BIOWISH system utilizes wearable inertial sensors to capture and analyze heart activity, providing a novel approach to biometric recognition. Specifically, this system employs Random Forest and one-dimensional Convolutional Neural Network (CNN-1D) algorithms to process the collected biometric data. These sophisticated machine learning techniques are adept at handling the nuances of heart activity signals, ensuring accurate recognition outcomes. The system is designed to predict three distinct states: interruption, no stress, and time pressure. By discerning these states, BIOWISH offers valuable insights into an individual's physiological and psychological condition in real-time. This capability is particularly beneficial in environments where continuous monitoring and quick identification are critical, such as in high-stress workplaces, healthcare settings, and security applications. The use of wearable sensors makes BIOWISH a non-invasive, user-friendly solution, facilitating widespread adoption and integration into various daily activities and professional routines. The use of wearable sensors in BIOWISH ensures that the biometric recognition process is non-invasive and user-friendly, promoting ease of use and comfort for continuous monitoring. This makes the system particularly useful in high-stress environments such as workplaces, healthcare settings, and security applications, where constant monitoring is crucial for safety and efficiency. Furthermore, the portability and unobtrusiveness of wearable technology enable seamless integration into daily life, ensuring that biometric recognition can be conducted without interrupting regular activities.

Keywords: *BIOWISH, Biometric recognition, Convolutional Neural Network (CNN-1D), wearable technology.*

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CS014

AI BASED FACE RECOGNITION SYSTEM FOR SECURITY PURPOSE

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Abstract

In the era of digital banking, where financial transactions are increasingly conducted online, ensuring robust security mechanisms has become a critical necessity. This project introduces a comprehensive Bank Security System leveraging Face Recognition Technology to facilitate secure and seamless banking operations. The system is designed to prevent unauthorized access and identity spoofing by implementing a two-step face recognition process integrated with advanced biometric and cryptographic techniques. The first phase of authentication involves face recognition to identify and verify the user. To enhance accuracy and prevent spoofing attempts through photographs or videos, the second phase incorporates liveness detection using deep learning-based models that assess real-time facial movements and physiological cues. This two-layered facial verification process significantly minimizes the risk of impersonation and fraudulent logins. In addition to facial recognition, the system employs biometric verification methods such as fingerprint or iris scanning, adding another security layer to the authentication process. To protect sensitive banking information, a number system-based encryption algorithm is introduced, ensuring that user data and transaction details are safeguarded against cyber-attacks and breaches. The proposed system not only improves the overall security architecture of digital banking platforms but also offers a user-friendly experience by reducing dependency on traditional passwords and OTPs. An extensive evaluation of the system is conducted, focusing on metrics such as recognition accuracy, liveness detection success rate, encryption robustness, and system response time. The results reveal high reliability and resilience against common attack vectors, demonstrating the system's viability for real-world banking applications.In conclusion, this project showcases a next-generation security framework that blends biometric recognition, artificial intelligence, and encryption to protect digital financial services. The integration of face recognition and biometric data ensures multi-factor authentication, thereby strengthening trust and security in modern banking ecosystems.

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CS015

CRYPTO SHIELD-HIGH SECURE FINANCE WEB APP

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Abstract

The High Secure Finance Application enhances financial security, transparency, and efficiency by leveraging block chain technology. This system ensures tamper-proof transactions, real-time financial tracking, and automated processes for income management, invoicing, budget planning, and payroll. By integrating advanced encryption technologies such as AES-256, Elliptic Curve Cryptography (ECC), and post-quantum cryptography, along with SHA-3 for data integrity, the application ensures robust protection of sensitive financial data. Smart contracts automate transactions, reducing the risk of fraud and eliminating intermediaries.

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CS016

ECOTRACK: A LIFE-ALIGNED PLATFORM FOR SUSTAINABLE BEHAVIOR ANALYSIS USING K-MEANS CLUSTERING AND ISOLATION FOREST

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Abstract

EcoTrack is a digital platform that connects individual eco-friendly actions with large-scale environmental policies, supporting the LIFE (Lifestyle for Environment) initiative. Focusing on key areas such as energy and water conservation, waste reduction, and sustainable living, it allows users to log activities, track progress, and contribute to national sustainability efforts. By leveraging clustering algorithms and anomaly detection models, EcoTrack personalizes recommendations and ensures data authenticity. This enables the Ministry of Environment to monitor trends, optimize resources, and implement data-driven policies, while also helping industries align eco-friendly product development with consumer behavior. Unlike traditional systems that rely on intermediaries and manual processes, EcoTrack streamlines participation by directly involving citizens and fostering collaboration with eco-conscious companies. Through its integrated, user-friendly design, the platform empowers individuals to drive meaningful environmental change and supports a transparent, data-driven green economy.

Keywords: *Sustainability, LiFE Initiative, Behavioral Analytics, K-Means Clustering, Isolation Forest, Environmental Monitoring, Citizen Engagement, Data-Driven Governance, Environmental Data Science*

CS017

SECURE REAL-TIME CHAT APPLICATION USING DJANGO AND N-TEA ENCRYPTION

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Abstract

This project aims to develop a secure real-time chat application using Django, WebSockets, and the XChaCha20-Poly1305 encryption algorithm. The application enables users to communicate instantly while ensuring message confidentiality and authentication. Unlike traditional chat apps, this system integrates Web Sockets for low latency communication and XChaCha20 encryption for stronger security against attacks. The system includes user authentication, encrypted message storage, and an admin panel for monitoring and moderation.

Keywords: *Real-Time Communication , Secure Chat Application , Django , Web Sockets , XChaCha20-Poly1305 , End-to-End Encryption , Message Authentication , Encrypted Messaging*

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CS018

FACE BIOMETRIC AUTHENTICATION SYSTEM FOR ATM USING DEEP LEARNING

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Abstract

Online social systems have become an important part of everyday life. Peoples used to share personal content with friend's circle in the social networks. Unfortunately, Social Networks provide very little support to prevent from a cyber bully or harassment and unwanted messages on user walls. To overcome this issue, the Deep Long Short-Term Memory (LSTM) algorithm is proposed in this system. This algorithm automatically blocks the unwanted text post message efficiently. This method is implemented in java platform with the front end Net beans compiler and Mysql database as backend.

Keywords: *Aluminium 6061, lightweight, durable, vehicles, disabilities, mobility, independence, energy efficiency, manoeuvrability, corrosion resistance, vehicle design.*

CS019

SECURING FULL STACK WEB APPLICATIONS AGAINST OWASP TOP 10 THREATS

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Abstract

Web applications are a primary target for cyber threats due to increasing reliance on online platforms. This paper presents a secure full stack architecture designed to mitigate the OWASP Top 10 vulnerabilities using modern development frameworks. The system is built using React for the frontend, Node.js for the backend, and PostgreSQL/MySQL for data management. Key security measures include Role-Based Access Control (RBAC), JWT (JSON Web Token) authentication, input validation, password encryption, and protection against Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF) attacks. The implemented security features are validated through vulnerability scanning tools and manual testing. The proposed approach demonstrates enhanced protection and provides a solid foundation for developing secure web applications.

Keywords: *Full Stack Web Development, Cyber security, OWASP Top 10, JWT Authentication, Role-Based Access Control, React.js, Node.js, PostgreSQL, XSS, CSRF.*

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CS020

PREVENTION FROM E-PHISHING NETWORKS USING CLASSIFICATION TECHNIQUES

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Abstract

Anti-phishing detection solutions employed in industry use blacklist-based approaches to achieve low false-positive rates, but blacklist approaches utilizes website URLs only. The concept is an end-host based anti-phishing algorithm, called the SVM, by utilizing the generic characteristics of the web links. This algorithm is finding the phishing link provide by the attackers to grasp the information of the end user.SVM is based on the careful analysis of the characteristics of attackers hyperlinks. Each end user is implemented with SVM algorithm. After doing so the end user recognizes the link and can avoid accessing the link .It is used to detect and prevent not only known phishing attacks but also unknown ones.

Keywords: *An end-host based anti-phishing method using SVM analyzes hyperlink characteristics to detect both known and unknown phishing attacks*

CS021

SKIN LESIONS DETECTION AND CLASSIFICATION USING DEEP LEARNING

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Abstract

Skin cancer is one of the most common types of cancer worldwide, and early detection is critical for effective treatment and improved patient outcomes. In recent years, deep learning techniques have shown significant promise in the automated analysis of derma to logical images. This study presents a deep learning-based approach for the detection and classification of skin lesions into benign and malignant categories. Using Convolutional neural networks (CNNs), the model was trained and evaluated on a publicly available dataset such as the ISIC archive. The proposed system pre-processes dermoscopic images, segments the lesion area, and classifies the lesion type with high accuracy. Performance metrics such as accuracy, precision, recall, and F1-score were used to evaluate the model's effectiveness. The results demonstrate that deep learning models can assist dermatologists by providing reliable second opinions, thus enhancing diagnostic accuracy and reducing the risk of human error. Future work will focus on improving classification for multiple lesion types and integrating the model into real-time diagnostic tools.

Keywords: *Skin Lesions, Deep Learning, Convolution Neural Network(CNN), Image Classification, Medical Imaging, Skin Cancer Detection, Dermoscopic Images, Lesion Segmentation, Benign vs malignant, ISIC Dataset, Computer-Aided Diagnosis, Artificial Intelligent in Healthcare, Dermatology, Image Pre-processing, Automated Diagnosis.*

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CS022

VARIATIONAL AUTOENCODERS USING CONVOLUTIONAL NEURAL NETWORK FOR HIGHLY ADVANCED CYBER THREATS

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Abstract

Cyber threats are becoming increasingly complex and harder to detect with conventional security tools. To address this challenge, we propose a novel framework that combines Variational Auto encoders (VAEs) and Convolutional Neural Networks (CNNs).The system is designed to detect sophisticated cyber threats by analyzing anomalies in network traffic A VAE is first trained to learn a compressed, probabilistic latent representation of network behaviour. This representation captures the essential features of both normal and malicious traffic .The latent vectors generated by the VAE are then fed into a CNN. The CNN is optimized to detect patterns, deviations, and outliers that may indicate cyber attacks. This two-stage architecture blends representation learning and powerful pattern recognition. By integrating VAEs and CNNs, the system improves detection accuracy for complex threats. It adapts over time to evolving attack patterns, making it highly suitable for modern cyber security needs. The model was evaluated using standard metrics like precision, recall, and F1-score.Results show high accuracy and a low false positive rate in threat detection. Additionally, it can be enriched by connecting with external threat intelligence sources. This enhances its ability to recognize emerging or previously unseen threats.

Keywords: *Cyber security, Anomaly Detection, Variational Auto encoder (VAE) Convolutional Neural Network (CNN), Network Traffic, Threat Detection, Latent Representation*

CS023

A ROBUST MODEL FOR CYBERBULLYING DETECTION AND PRECAUTION IN SOCIAL MEDIA

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Abstract

Online social systems have become an important part of everyday life. Peoples used to share personal content with friend's circle in the social networks. Unfortunately, Social Networks provide very little support to prevent from a cyber bully or harassment and unwanted messages on user walls. To overcome this issue, the Deep Long Short-Term Memory (LSTM) algorithm is proposed in this system. This algorithm automatically blocks the unwanted text post message efficiently. This method is implemented in java platform with the front end Net beans compiler and Mysql database as backend.

Keywords: *Online social systems, Everyday life, Social networks, Cyber bully, Deep Long Short-Term Memory (LSTM), Block unwanted text, MySQL database.*

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CS024

FACIAL EXPRESSION RECOGNITION FOR HUMAN COMPUTER INTERACTION

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Abstract

Facial expressions are very important in understanding one's state of mind. We aim to incorporate this notion in our learning assistant application in order to provide a rich user experience. The query of the user is matched against all the titles of Wikipedia and the information under the title that achieves the maximum score of similarity with the query is provided. A deep learning model trained using the FER-2013 dataset on a Convolutional neural network consisting of residual blocks is used to predict the facial expressions of the user in the frames captured by the camera. The model classifies each frame into any of the seven classes: angry, disgust, sad, surprise, happy, neutral, and fear. The first half of the predictions are given a weight age of 0.5 and the second half of the predictions are given a weight age of 1.0. A score for each class is calculated by performing a cumulative addition of weights and the class with the maximum score is determined to be the predominant expression of the user while reading through the provided information

Keywords: *Facial Expression Recognition (FER), Human Computer Interaction (HCI), Emotion detection, Computer vision, Image processing, Machine learning, Deep learning, Convolutional Neural Networks (CNN),Real-time recognition.*

CS025

CYBER SECURITY BASED PUBLIC AND PRIVATE E-MAIL SERVICES FOR SPAM SPOILERDETECTION SYSTEM

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Abstract

In recent years, cyber security incidents have occurred frequently. In most of these incidents, attackers have used different types of spam email as a knock-on to successfully invade government systems, well-known companies, and websites of politicians and social organizations in many countries. The detection of spam mail from big email data has been paid public attention. However, the camouflage technology of spam mail is becoming more and more complex, and the existing detection methods are unable to confront the increasingly complex deception methods and the growing number of emails. In this project, we proposed to design a novel efficient approach named Spam Spoiler for big e-mail data classification into four different classes: Normal, Fraudulent, Harassment, and Suspicious E-mails by using LSTM-based GRU. The new method includes two important stages, the sample expansion stage and the testing stage under sufficient samples. This project the LSTM-based GRU efficiently captures meaningful information from E-mails that can be used for forensic analysis as evidence. Experimental results revealed that Spam Spoiler performed better than existing ML algorithms and achieved a classification accuracy of 98% using the novel technique of LSTM with recurrent gradient units. As different types of topics are discussed in E-mail content analysis. Spam Spoiler effectively outperforms existing methods while keeping the classification process robust and reliable

Keywords: *Cyber security, Spam Email Detection, Big Email Data, Email Classification, LSTM (Long Short-Term Memory), GRU (Gated Recurrent Unit), Deep Learning*

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CS026

BREAST CANCER PREDICTION USING HISTORICAL DATA WITH LONG SHORT-TERM MEMORY (LSTM) NETWORKS

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Abstract

Breast cancer remains a major health challenge with significant implications for patient outcomes. Leveraging historical patient data for predictive modelling can enhance early detection and treatment strategies. This study presents a novel approach using Long Short-Term Memory (LSTM) networks, a type of recurrent neural network adept at handling sequential data, to predict breast cancer outcomes. The model is trained on a comprehensive dataset comprising various clinical and diagnostic features, including to more characteristics, hormone receptor statuses, and patient demographics. Through rigorous data pre-processing, feature engineering, and model optimization, the LSTM network demonstrates the capability to capture complex temporal relationships and improve prediction accuracy. The results indicate that the LSTM-based model offers a promising tool for early diagnosis and personalized treatment planning, potentially leading to better patient management and improved outcomes in breast cancer care.

Keywords: *Breast cancer, Health challenge, Patient outcomes, Predictive modelling, Early detection, Treatment strategies, Long Short-Term Memory (LSTM), Personalized treatment, Patient management.*

CS027

SMART TRAVEL PLANNING FOR SHORT STAY IN POPULAR TOURIST DESTINATION

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Abstract

As the global population ages, neurocognitive disorders like the Alzhemier's disease which is a form of dementia, and several other forms of dementia are becoming more common place. These conditions significantly impair the quality of life for patients and present a growing challenge for healthcare systems worldwide. Early detection is critical to improving patient outcomes, yet traditional diagnostic methods often struggle to catch on to the very early and subtle signs of decline in cognitive function. In this paper, a deep learning algorithm, Tab Net,is used on clinical data to detect neurocognitive impairment. Before applying the algorithm ,Exploratory Data Analysis is also performed to get a better understanding of the dataset. This research is mainly focused on people with family history. The Tab Net model, designed especially for tabular data easily and effectively learns the importance of each feature and their inter-dependencies. In future work, it is aimed to make this research more holistic by using Vision Transformer models to analyse MRI images. This study currently focuses on clinical data, which includes demographic, lifestyle, and cognitive assessments, and demonstrates how Tab Net can be used to identify signs of cognitive impairment. Working with critical features, this study also focuses on data pre-processing and feature selection. This project's main aim is to utilize AI in healthcare to help with diagnoses that are otherwise somewhat difficult to make.

Keywords: *Neurocognitive Disorders, Alzheimer's Disease, Deep Learning, Tab Net, Early Detection, Clinical Data Analysis.*

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CS028

DETECTION OF NEURO - COGNITIVE IMPAIRMENT IN THE ELDERLY USING TABNET ALGORITHM

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Abstract

In the context of rapidly increasing global tourism, optimizing short-term stays in mass tourist destinations has become crucial for enhancing traveller experiences while reducing environmental and social strain on host communities. This study focuses on developing a strategic approach to travel planning that balances efficiency, satisfaction, and sustainability during brief visits. Using a combination of data-driven itinerary planning, predictive analytics, and behavioural tourism models, we explore methods to personalize travel schedules based on visitor preferences, peak congestion periods, and spatial distribution of attractions. A multi-objective optimization framework is proposed, integrating time constraints, crowd dynamics, local infrastructure capacity, and attraction popularity. Case studies in popular destinations such as Barcelona, Venice, and Bangkok illustrate the application of our model, revealing significant improvements in both visitor satisfaction and destination management. The findings contribute to smarter tourism strategies and offer practical tools for travellers, tour operators, and policymakers aiming to make short stays in high-demand destinations more enjoyable, efficient, and sustainable

Keywords: *Travel optimization, short-term tourism, mass tourism, tourist itinerary planning, smart tourism, destination management, sustainable tourism, travel behaviour, multi-objective optimization, visitor experience, crowd management, urban tourism, personalized travel planning, tourism congestion, smart city tourism.*

CS029

HEART ATTACK PREDICTION USING LINEAR REGRESSION ALGORITHM

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Abstract

The top-tier disease which makes unanticipated demise for the people in medical field is the myocardial infarction (heart attack). It is very crucial to forecast the disease at a premature phase. Nowadays, Prediction of heart disease is a challenging factor faced by doctors and hospitals. Accuracy of the heart disease prediction plays a vital role. There are various researches going on to accelerate the prediction of heart disease with the help of machine learning algorithms. Machine learning algorithms are used for prediction. The proposed heart disease prediction system utilizes Linear Regression algorithm to predict the chances of heart related diseases for any person. Linear Regression algorithm provides a better accuracy than the other classifications Data Mining algorithms. Heart related real datasets are picked from UCI Machine Learning Repository. The main objective of this paper is predicting the myocardial infarction of a person using linear regression algorithm. The proposed Linear Regression algorithm provides 85% accuracy in heart attack prediction

Keywords*: Linear Regression, Machine Learning, Predictive Modelling, Risk Factors, Healthcare Analytics, Data Science, Patient Health Data, Medical Diagnosis, Supervised Learning, Regression Analysis,*

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CS030

AWS EVENT -DRIVEN FULL STACK APPLICATIONS USING SERVER LESS FRAME WORK AND AWS LAMBDA

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Abstract

This session explores the architecture and implementation of a scalable, event-driven Fullstack application using the Serverless Framework in conjunction with AWS Lambda. Leveraging the power of cloud-native services, this approach eliminates the need for traditional server management while enabling dynamic, real-time interactions between frontend and backend components. The architecture is centered around AWS Lambda functions that respond to various striggers—including HTTP requests via API Gateway, database events via DynamoDB Streams, and object uploads through S3. The frontend, developed using modern frame works such as React or Vue.js, interacts with the backend through secure RESTful APIs and event-driven messaging. Additional AWS services like SQS, SNS, and Event Bridge orchestrate a synchronous communication and business workflows.

Keywords: *Serverless Architecture, AWS Lambda, Event-Driven Architecture, Serverless Framework, Fullstack Development, AWS API Gateway, AWS S3, Micro services, CI/CD for Serverless, RESTful APIs, Scalable Applications, Real-Time Applications.*

CS031

A SMART LUNG CANCER DETECTION SYSTEM USING DEEP LEARNING AND CT IMAGE DATABASES

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Abstract

Lung cancer is one of the leading causes of cancer-related deaths worldwide, emphasizing the need for early and accurate detection. This study proposes a smart lung cancer detection system leveraging deep learning techniques and computed tomography (CT) image databases. The system utilizes a Convolutional Neural Network (CNN) to analyze CT scans and identify malignant nodules with high precision. By extracting and learning critical features from the images, the CNN model achieves robust performance in differentiating between cancerous and non-cancerous tissues. Extensive experimentation on publicly available CT image datasets demonstrates the system's effectiveness, achieving high accuracy, sensitivity, and specificity. The proposed approach offers a reliable, automated, and non-invasive solution for assisting radiologists in early lung cancer detection, potentially improving patient outcomes.

Keywords: *Lung Cancer Detection, Deep Learning, Convolutional Neural Networks (CNN), image pre-processing, tumour identification, medical imaging, automated diagnosis, computer-aided detection, healthcare AI.*

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CS032

A VIRTUAL SOUND CONTROL SYSTEM FOR VISUALLY BLIND PEOPLE

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.

Abstract

This project presents a Virtual Sound Control System designed to assist visually impaired individuals in managing and interacting with audio-based technology through voice commands and intelligent feedback. Built using Python and integrated with Artificial Intelligence techniques such as speech recognition, natural language processing, and machine learning, the system enables users to control devices, applications, and audio functions without the need for visual interfaces. The cores components of the system include voice input processing, intent recognition, and contextual response generation, providing a seamless and intuitive user experience. This AI-driven solution enhances accessibility, promotes independence, and improves the quality of life for visually impaired users by transforming how they interact with digital systems through sound and voice alone.

Keywords: *Assistive Technology, Virtual Sound Interface, Accessibility Tools, Sound Based Navigation, Audio User Interface(AUI),Inclusive Design, Haptic Feedback (it applicable), Voice Controlled Interface, Speech Recognition, Screen Reader Compatibility.*

CS033

DEPRESSION DETECTION IN SOCIAL MEDIA USER FOR USING MACHINE LEARNING

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Abstract

Depression is a very severe and grave mental disorder, which is affecting most of the population nowadays because of various reasons like stress at work, school, college, personal life, other diseases, etc. It is also called as Major depressive disorder. Though it is a very common disease, it is still a taboo to talk about depression in this world. People are reluctant to talk about this disease, thinking that people will take them like a crazy person. This reluctance can sometimes become very harmful for the patient, taking him to a point where he can't be treated back to normal. The proposed system employs natural language processing and machine learning algorithms to analyze user-generated content, identifying linguistic cues and contextual information associated with depression. Various models, including deep learning approaches, are employed to enhance accuracy. Ethical considerations, such as privacy and data security, are carefully addressed. The system utilizes a labelled dataset to train and validate models, with the ultimate goal of creating a scalable tool for early identification of individuals at risk of depression. The research contributes to mental health informatics by leveraging machine learning to proactively address mental health concerns in the online space.

Keywords: *Depression detection, Mental health, social media analysis, Machine learning, Natural Language process, text classification, Recurrent Neural Networks (RNN), Convolutional Neural Networks(CNN),Data Pre-processing. Lexicon-based Approach*

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CS 034

WIRELESS BODY AREA NETWORK

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Abstract

Wireless Body Area Networks (WBANs) represent an emerging technology designed to enable seamless communication among sensors and devices placed on, in, or around the human body. These networks facilitate continuous health monitoring, real-time diagnostics, and remote medical support, playing a critical role in modern telemedicine and personalized healthcare systems. WBANs consist of lightweight, low-power sensors that collect physiological data such as heart rate, body temperature, blood pressure, and motion patterns. Despite their significant potential, WBANs face several challenges, including energy efficiency, data security, interference management, and reliable communication in dynamic environments.Thispaperexploresthearchitecture,applications,designchallenges,andfuturedirections of WBANs, aiming to provide a comprehensive overview of their role in advancing healthcare technologies.

Keywords: *Wireless Body Area Network (WBAN), Health Monitoring, Biomedical Sensors, Telemedicine, Energy Efficiency, Data Security, Wearable Devices, Sensor Networks, Healthcare IOT, Real-Time Monitoring*

CS035

DRONE TECHNOLOGY

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Abstract

Drone technologies, also known as Unmanned Aerial Vehicle (UAV) technology, represent one of the most rapidly advancing sectors in modern engineering and innovation. Drone technology, originally developed for military purposes, has rapidly expanded into civilian applications such as agriculture, surveillance, logistics, and disaster management. With advancements in sensors, flight systems, and automation, drones are transforming how industries operate. This study explores the evolution, current applications, and future potential of drones through a qualitative review of academic literature, technical reports, and real-world case studies. Findings reveal that drones offer significant advantages, including improve defficiency, cost reduction, and high data accuracy. In agriculture, they support precision farming; in infrastructure, they enable safer inspections; and in emergencies, they provide rapid situational awareness. Logistics is also benefiting from their role in last-mile deliver. Despite their benefits, drones face challenges like limited battery life, regulatory hurdles, and privacy concerns. However, ongoing innovations in AI and auto mationareexpectedtoovercomethesebarriers.Asdronetechnologycontinuesto evolve; it holds immense promise for transforming various sectors and improving operational capabilities across the globe.

Keywords: *Autonomous flight, Precision agriculture, Remote sensing, UAV (Unmanned Aerial Vehicle), Flight control system, Drone mapping, GPS navigation*

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CS036

VIRTUAL REALITY AND AUGMENDTED REALITY

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Abstract

Virtual and augmented realities technologies have entered a new near-commodity era, accompanied by massive commercial investments, but still are subject to numerous open research questions. This special issue of IEEE Computer Graphics and Applications aims at broad views to capture the state of the art, important achievements, and impact of several areas in these dynamic disciplines. The first one well look at is Virtual Reality VR. Think of it as a complete immersion in a simulated world the Oculus Rift, work by completely covering your vision and projecting images onto a display, creating a stereoscopic 3D image. They often use head tracking so if you turn your head, the view inside the headset changes accordingly along with motion tracking and other input methods to create a believable virtual world. The video gives the example of connecting these headsets to a computer with an HDMI cable to power the experience. Now lets move on to Augmented Reality AR. This is a very different approach. Instead of replacing your reality, AR overlays digital information onto your real-world view. You're still aware of your surroundings, but digital elements are added to the picture. Imagine looking at your kitchen table and seeing a virtual dinosaur walking across it that AR in action. Its about enhancing your existing reality. The transcript described AR as adding a layer of computer-generated graphics onto the real world. Initially, many associate VR and AR with entertainment think immersive gaming and interactive movies. However, the discussion quickly pivots to a much broader application: industries like architecture, engineering, and construction AEC. These sectors are recognizing VR and ARs transformative power. For example, imagine architects using VR to walk clients through a building before its even built, allowing for real-time feedback and design adjustments.

Keywords: *Virtual Reality, Augmented Reality, Real Time a Visualization, Immersive Technology, Digital Overlay, Head Tracking.*

CS037

BRAIN COMPUTER INTERFACE

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Abstract

Brain Computer Interface (BCI) establishes a direct communication pathway between the brain and external devices, enabling real time interpretation of neural activity. Traditionally used in neuro rehabilitation and assistive technologies, BCls are now explaining into security, gaming, and emotion detection, offering a potential alternative to conventional polygraphs tests. This system would analyze neural signatures associated with, such as conflict monitoring and cognitive load, particularly in regions like the prefrontal Cortex. Techquines like EEG and LNlRS can detect changes in brain wave pattern, oxygenation and attention that may indicate false responses. Machine learning algorithms can be trained on truth and lie data sets to classify deteption with improved accuracy over torrent methods. BCl lie detection could be used in high states interrogation, border security, and psychological evaluation, minimizing human bias. However, individual variability and ethical concerns must be addressed. Future enhancement may include multimodal BCls that combine brain signals with eye tracking and speech analysis. Real time feedback systems can refine results and reduce false positives. Integrating explainable Al into BCI systems can build trust and transparency in interpretations. As neural decoding evolves, BCI based lie detection could redefine how we assess honesty and intent.

Keywords*: Prefrontal Cortex ,Lie Detection ,EEG, Polygraphs.*

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CS038

SAFEGUARDING THE DIGITAL AGE: CYBER SECURITY AND PRIVACY

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Abstract

In our increasingly interconnected world, cyber security and privacy have become critical concerns. With technological advancements, the likelihood of cyber threats and data breaches is rising dramatically. This highlights the significance of strong cyber security measures and privacy protections in safeguarding sensitive information. It delves into the relationship between technology, law, and human behavior, stressing the necessity for a comprehensive approach to mitigate risks and ensure a secure digital environment. Key topics include threat detection, encryption, data protection regulations, and individual privacy rights. By grasping the intricacies of cyber security and privacy, we can navigate the digital realm more effectively and safeguard our online lives.

Keywords: *Cyber security, privacy, data protection, threat detection, encryption, digital security*

CS038

SATELLITE COMMUNICATION

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Abstract

Satellite communication utilizes artificial satellites in orbit to transmit information between Earth locations. These satellites act as relay stations, receiving signals from ground stations, amplifying them, and then retransmitting them to other ground stations. This technology enables communication across vast distances, providing coverage for areas where terrestrial infrastructure is limited. Benefits: Satellites can provide communication links across vast distances and in areas where terrestrial infrastructure is limited. Limitation: Signals travel long distances in space, which can introduce delays (latency) in communication. By using satellite communication, we can able to find the missing & incontestable person who he is anywhere in that area and also we got a alert message from that connection who he is in the danger situation. Since that use of this aspect, we can prevent the peoples from the criminal issues

Keywords: *utilizes artificial, amplifying, terrestrial infrastructure, latency, prevent, criminal Issues, orbit to transmit information.*

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ELECTRONIC COMMUNICATION ENGINEERING

EC 001

DIABETIC RETINOPATHY DETECTION USING ROBUST PRINCIPAL COMPONENT ANALYSIS AND CLASSIFICATION

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Abstract

Diabetic Retinopathy (DR) is the most common cause of eyesight loss that affects millions of people worldwide. Although there are recognized screening procedures for detecting the condition, such as fluoresce in angiography and optical coherence tomography, the majority of patients are unaware and fail to have such tests at the proper time. Glaucoma is one of the eye diseases that affect the optic nerves which connect the eye to the human brain. Optic disc (OD) detection is an important process for identifying the diseases in the retinal fundus image. Detection of glaucoma in the early stages prevents loss of vision. Automatic detection of glaucoma; becomes a technical challenge for image processing using convex approximation. Fundus images of the eye are taken by a fundus camera through which automatic detection is possible. The retinal fundus imaging process suffers from non uniform illumination problems due to the curved surface of the retina and pupil dilation, which affects glaucoma detection. The OD location helps to avoid false positives in the detection of exudates associated with diabetic retinopathy. Here a new method is proposed to extract the optic disc contour. It is mainly based on mathematical morphology along with robust Principal component analysis (RPCA) in machine learning. The robust process which makes an impact on fully automation results avoiding user intervention. The RPCA is applied in the grey scale image. For locating the Optic disc several operations based on mathematical morphology such as dilation and erosion are implemented.

EC 002

HYBRID FRAMEWORK FOR MULTI-CLASS LUNG DISEASE DETECTION USING DEEP LEARNING ARCHITECTURES

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Abstract

This paper presents a comprehensive hybrid deep learning framework designed for multi-class lung disease detection using chest X-ray imagery. With the increasing prevalence of respiratory diseases such as COVID-19, pneumonia, tuberculosis, and various chronic lung conditions, there is a critical need for accurate, efficient, and scalable diagnostic tools in the healthcare sector. Manual interpretation of chest radiographs is not only time-intensive but also prone to variability depending on radiologist experience, especially in resource-limited settings.Our proposed system integrates three powerful deep learning architectures to overcome current limitations: Convolutional Neural Networks (CNNs) enhanced with Convolutional Block Attention Modules (CBAM) for spatial focus, VGG-19 for deep hierarchical feature extraction, and CX-Ultranet based on efficient net to ensure high performance with reduced computational load. This multi-layered architecture is trained on large-scale, balanced datasets sourced from NIH, SIRM, and Mendeley repositories.

Extensive preprocessing techniques such as grayscale normalization, image augmentation, and under-sampling were applied to prepare the data for optimal training. The final model achieved impressive accuracy (95.81%) and multi-class Area Under Curve (AUC) score of 0.964 across 13 lung disease categories. Moreover, visualization techniques like Grad-CAM were employed to enhance the interpretability of model predictions.

This framework not only provides fast and reliable diagnosis but also empowers clinical decision-making in underserved and remote areas. With its ability to process diverse lung pathologies efficiently, this system has the potential to serve as a robust Computer-Aided Diagnosis (CAD) tool and contribute significantly to public health screening initiatives in the future.

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EC 003

EFFICIENT DATA GATHERING WITH VELACT SCHEME FOR WSN

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Abstract

WSN depends on data collection scheme such as multipath, chain, tree, cluster and hybrid topologies. A Velocity Energy-efficient and Link-aware Cluster-Tree (VELACT) scheme for data collection is proposed It mitigates the problems of coverage distance, mobility, delay, traffic, tree intensity, and end-to-end connection. VELACT constructs the Data Collection Tree (DCT) based on the cluster head location. The data collection node in the DCT does not participate in sensing on this particular round, however, it simply collects the data packet from the cluster head and delivers it to the sink. The designed VELACT scheme minimizes the energy exploitation, reduces the end-to-end delay and traffic in cluster head in WSNs by effective usage of the DCT. The strength of the VELACT algorithm is to construct a simple tree structure, thereby reducing the energy consumption of the cluster head and avoids frequent cluster formation. It also maintains the cluster for a considerable amount of time. Simulation results have demonstrated that VELACT provides better QoS in terms of energy consumption, throughput, end-to-end delay, and network lifetime for mobility-based WSNs.

EC 004

DESIGN AND PERFORMANCE OF TEXTILE ANTENNA FOR BODY WEARABLE APPLICATION

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Abstract

Utilization of wearable textile materials as antenna substrate has been speedy due to their cent miniaturization of wireless devices. A wearable antenna is to be a part of the clothing used for wireless communication purposes, which include tracking and navigation, mobile and wearable computing and public safety. For user convenience there is an increasing need for integrating antennas on or in the clothing. The conventional antennas are not flexible and difficult for user to movements. There is a need of antennas made of flexible textile materials that can be part of user clothing defined as wearable antennas. In particular, the micro strip patch antennas are good candidates for body-worn applications, as they mainly radiate perpendicularly to the planar structure and also their ground plane efficiently shields the body tissues. This project shows research on wearable patch antennas designed and developed for various applications at 5.2 GHz frequency. Here at 5.2 GHz frequency patch antenna is designed and simulated using HFSS.

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EC 005

MALIGNNOMA: GNN-BASED MALICIOUS CIRCUIT CLASSIFIER FOR SECURE CLOUD FPGAS

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Abstract

The increasing adoption of cloud Field-Programmable Gate Arrays (FPGAs) has raised concerns about the security of intellectual property (IP) cores and the potential for malicious circuit insertions. Existing detection methods often rely on manual inspection or traditional machine learning techniques, which can be time-consuming and ineffective.This work proposes MaliGNNoma, a Graph Neural Network (GNN)-based malicious circuit classifier designed to detect and classify malicious circuits in cloud FPGAs. By leveraging the structural properties of digital circuits represented as graphs, MaliGNNoma can effectively identify and distinguish between benign and malicious circuits.The proposed approach offers several advantages, including:- Improved detection accuracy: MaliGNNoma's GNN-based architecture can learn complex patterns and relationships in circuit graphs, leading to more accurate detection of malicious circuits.- Efficient classification: The classifier can quickly and accurately classify circuits as benign or malicious, enabling real-time detection and response.- Robustness to variations: MaliGNNoma's graph-based approach can handle variations in circuit design and implementation, reducing false positives and negatives.By providing a robust and efficient solution for detecting malicious circuits in cloud FPGAs, MaliGNNoma can help ensure the security and trustworthiness of IP cores and prevent potential attacks.

EC 006

GSM BASED PREPAID ELECTRICITY METER

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Abstract

Traditional post paid electricity metering systems often suffer from issues like delayed billing, inaccurate meter readings, and power theft, resulting in significant revenue losses forutilities. Existing prepaid metering systems, while improving upon these issues, often rely on cumbersome manual recharge processes or limited communication technologies. This project proposes a GSM-based prepaid electricity meter that overcomes these limitations. By leveraging GSM technology, our system enables seamless, real-time communication between the meter and the central server, allowing for automatic recharge, accurate billing, and remote monitoring of energy consumption. Compared to existing systems, our solution offers enhanced convenience, accuracy, and efficiency, reducing the likelihood of human error and power theft.

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EC 007

SMART SWITCHING TECHNOLOGY

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Abstract

Smart switch technology is revolutionizing home automation by integrating IoT and advanced control mechanisms to enhance convenience, energy efficiency, and safety. Unlike traditional switches, smart switches enable remote operation via mobile apps, voice assistants, and manual interfaces. By leveraging microcontrollers like ESP32 and cloud platforms such as ESP RainMaker, users can monitor and control home appliances in real time. Additionally, smart switches incorporate environmental sensors to detect temperature, humidity, and gas leakage, ensuring a safer living environment. This technology not only optimizes power consumption but also provides scalability for future smart home integrations, making it a sustainable and intelligent solution for modern households.

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EC 008

MOBILE VIRTUAL REALITY SERVICE

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Abstract

Mobile Virtual Reality (VR) Service is an innovative technology that delivers immersive virtual experiences through smar tphones and portable VR headsets. By integrating advanced graphics, motion tracking, and interactive content, mobile VR enables users to explore simulated environments in real time without the need for high-end computing hardware. This service finds wide applications in gaming, education, virtual tourism, healthcare, and remote collaboration. The portability and accessibility of mobile VR make it a cost-effective and scalable solution for bringing virtual experiences to a broad audience, revolutionizing the way people interact with digital content.

Keywords: *Mobile VR, virtual reality, immersive experience, smart phone-based VR, interactive content, virtual tourism, remote collaboration, portable VR technology.*

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EC 009

3-DIMENSIONAL PRINTING

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Abstract

3-Dimensional (3D) printing, also known as additive manufacturing, is a revolutionary technology that enables the creation of physical objects from digital models by layering materials. This technique allows for rapid prototyping, customization, and efficient production across various industries such as healthcare, aerospace, automotive, and consumer products. Unlike traditional subtractive methods, 3D printing minimizes material waste and shortens the design-to-production cycle. Recent advancements in materials, software, and printer capabilities have expanded its applications, including bioprinting, construction, and even food printing. This paper explores the principles, techniques, applications, environmental impact, economic benefits, and future prospects of 3D printing technology in modern manufacturing.

Keywords: *3D printing is a cutting-edge manufacturing technology that builds objects layer by layer from digital models, revolutionizing design, prototyping, and production across industries.*

EC 010

AUTOMATED ATTENDANCE SYSTEM USING RFID TECHNOLOGY

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Abstract

The traditional method of recording attendance, which typically involves manual sign-ins or roll calls, is time-consuming, labour-intensive, and highly prone to human errors and manipulation, making it inefficient and outdated in modern educational and organizational settings. This project proposes the design and implementation of an automated attendance system utilizing Radio Frequency Identification (RFID) technology to streamline the process while enhancing security and accuracy. Each student or employee is issued a unique RFID tag, which contains a digital identification number. When this tag is brought within the range of an RFID reader installed at the entrance or in a classroom/office space, the system automatically detects and verifies the individual's identity and logs their attendance into a centralized database in real time.It provides a scalable, flexible, and cost-effective solution that can be extended to include biometric verification, mobile application support, or cloud integration for broader accessibility and data management. Overall, the RFID-based attendance system contributes to enhanced operational efficiency, better accountability, and a more organized and transparent attendance management process.

Keywords: *RFID, attendance system, automation, real-time tracking, database management, smart attendance, RFID reader, time efficiency.*

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EC 011

AUDIO SPOTLIGHTING

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Abstract

Audio spotlighting is a cutting-edge sound technology that allows audio to be projected in a narrow, focused beam, enabling sound to be heard only by targeted individuals or areas without disturbing the surrounding environment. This is achieved using highly directional ultrasonic waves that convert into audible sound at a specific location. Unlike traditional loudspeakers, audio spotlight systems offer precise sound control, creating "private listening zones" in public or shared spaces. This technology has promising applications in museums, retail stores, public transportation, advertising, and personal audio experiences, offering a new level of audio privacy and directional sound delivery.

Keywords*: Audio spotlighting is a technology that uses directional sound to focus audio in specific areas, enhancing targeted listening experiences without disturbing the surrounding environment.*

EC 012

HOME APPLIANCE CONTROL BY MOBILE

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Abstract

The integration of mobile technology with home automation systems has led to the development of efficient, intelligent, and user-friendly solutions for controlling household appliances remotely. This project focuses on designing a robust and cost-effective system that enables users to control and monitor home appliances such as lights, fans, air conditioners, and other electronic devices using a mobile phone through wireless communication technologies like Bluetooth, Wi-Fi, or GSM. By using microcontrollers and sensor modules, the system ensures seamless interaction between the user and the appliances, promoting enhanced convenience, energy efficiency, and security. Real-time control allows users to manage their home environment from virtually anywhere, reducing energy consumption and improving lifestyle comfort. The system can also incorporate scheduling features, voice command integration, and feedback mechanisms for better performance and automation. This paper explores the system's architecture, hardware and software implementation, communication protocols, user interface design, and the practical benefits of mobile-based home appliance control systems in the context of smart home development and the Internet of Things (IoT).

Keywords: *Mobile control, home automation, smart appliances, wireless communication, IoT, remote monitoring, energy efficiency, Bluetooth, Wi-Fi, GSM.*

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EC 013

OPTICAL CAMOUFLAGE

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Abstract

Optical camouflage is an advanced technology that creates the illusion of invisibility by projecting the background image onto the surface of an object or person, effectively making them appear transparent. This system typically uses a combination of retro-reflective material, digital cameras, image processing units, and projectors to capture and display real-time background visuals from the observer's viewpoint. The projected image is dynamically adjusted to match the perspective, enabling seamless blending with the environment. The technology has potential applications in military stealth, augmented reality, medical imaging, wearable displays, surveillance, and entertainment industries. By seamlessly integrating objects with their surroundings, optical camouflage pushes the boundaries of visual perception, enhances situational awareness, and opens new possibilities for innovation in both civilian and defence sectors, paving the way for futuristic concepts like invisible clothing and immersive mixed reality experiences.

Keywords: *Optical camouflage, invisibility, retro-reflective material, augmented reality, image projection, real-time processing, stealth technology.*

EC 014

AUTOMATIC SOLAR TRACKER

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Abstract

This project presents the design and implementation of an automatic solar tracking system aimed at increasing the efficiency of solar panels by ensuring optimal alignment with the sun throughout the day. Conventional fixed solar panels often suffer from reduced efficiency due to varying sun angles, especially during morning and evening hours. To address this issue, the proposed system incorporates a dual-axis mechanism controlled by a microcontroller, allowing real-time tracking of the sun' s position. Light Dependent Resistors (LDRs) are strategically placed to detect sunlight intensity and provide feedback to the controller, which adjusts the panel's orientation using servo or stepper motors. The system is powered by a renewable energy source and built with energy-efficient components, making it suitable for remote and off-grid applications. Experimental results demonstrate that the tracker significantly increases energy output compared to static systems. This project not only contributes to improving solar energy utilization but also promotes sustainable and eco-friendly energy solutions, aligning with global efforts to reduce carbon footprints and dependence on fossil fuels.

Keywords*: Solar Panel, Light Dependent Resistor (LDR), Microcontroller, Dual-Axis Tracking, Renewable Energy, Energy Efficiency, Real-Time Sun Tracking.*

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EC 015

EMPOWERING ELECTRONICS PROJECTS WITH ARDUINO

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Abstract

The project titled "Empowering Electronics Projects with Arduino" aims to explore the vast potential of the Arduino platform in simplifying and accelerating the development of modern electronic systems. Arduino, being an open-source microcontroller platform, offers a user-friendly interface, flexible hardware capabilities, and extensive community support, making it an ideal foundation for both educational and real-world applications. This project focuses on designing and prototyping a series of electronics-based solutions that demonstrate how Arduino can be used to create intelligent, interactive, and automated systems. By integrating various sensors (such as temperature, humidity, motion, heart rate, and gas sensors), actuators (relays, motors, buzzers), and communication modules (Bluetooth, Wi-Fi,GSM), the project showcases the use of Arduino in developing smart applications. Areas of application include home automation, healthcare monitoring, environmental sensing, and assistive technology, each highlighting how Arduino can empower users to build cost-effective, reliable, and scalable solutions. Additionally, the project introduces basicity capabilities, where data collected from the sensors is transmitted to cloud platforms real-time monitoring and control using smart phones or web interfaces. Ultimately, this project embodies the spirit of open innovation, demonstrating how Arduino empowers students, educators, and hobbyists to bring their electronic ideas to life with creativity, accessibility, and efficiency.

Keywords*: Arduino, IoT, Sensors, Automation, Embedded Systems, Smart Devices, Wireless Communication, Real-time Data.*

EC 016

GESTURE- CONTROLLED HOME AUTOMATION SYSTEM

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Abstract

This project presents the development of an intelligent home automation system that is controlled entirely through hand gestures, combining RF communication with IoT capabilities for enhanced functionality and flexibility. At the core of the system lies an accelerometer- based gesture sensor, such as the MPU6050, which captures the user' s hand movements in Realtime. These gestures are interpreted by an Arduino-based microcontroller and transmitted via Radio Frequency (RF) modules to a central control unit. This control unit is responsible for managing home appliances like lights, fans, and other electronic devices based on the gesture commands received. In addition to local gesture-based control, the system is integrated with an IoT platform such as Blynk or Thing Speak, enabling users to monitor and control the system remotely using a smartphone. This dual-mode functionality ensures that the system remains operable both in offline (RF-based) and online (IoT-based) environments, improving reliability and user convenience. The primary advantage of this project is its seamless fusion of gesture recognition, embedded systems, and modern wireless communication protocols. It not only enhances the comfort and accessibility of smart living environments but also introduces an innovative approach to Human-Machine Interaction (HMI). By removing the dependency on traditional switches and voice commands, this gesture-based automation system paves the way for futuristic, intuitive control mechanisms in smart homes—especially beneficial for elderly or differently-abled individuals.

Keywords*: Home Automation, Gesture Control, MPU6050, RF Communication, IoT, Arduino, Blynk, Thing Speak, Smart Home, HMI, Embedded Systems, Real-time Monitoring, Remote Access.*

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EC 017

MANAGING O-RAN NETWORKS WITH AI, ML, AND NEW ENERGY INTEGRATION

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Abstract

This paper explores the transformative potential of artificial intelligence (AI) and machine learning (ML) in managing Open Radio Access Networks (O-RAN), with a particular focus on the integration of renewable energy sources. As telecommunications infrastructure evolves toward disaggregated, vendor-neutral architectures, network operators face unprecedented complexity in optimization, resource allocation, and energy management. Our research demonstrates how AI/ML techniques can be leveraged across multiple domains within O-RAN networks, including RAN Intelligent Controllers (RICs), network slicing orchestration, and dynamic spectrum allocation. This research highlights both technical challenges and strategic opportunities at the intersection of telecommunications, artificial intelligence, and sustainable energy systems, providing a roadmap for future network architectures that are not only open and intelligent but also environmentally sustainable.

Keywords: *Open Radio Access Network (O-RAN), Artificial Intelligence (AI), Machine Learning (ML), RAN Intelligent Controller (RIC), Renewable Energy Integration.*

EC 018

AUTONOMOUS OBSTACLE AVOIDANCE ROBOT USING ULTRASONIC SENSOR

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Abstract

This project focuses on the design and implementation of an autonomous obstacle avoid ancerobot capable of navigating through unknown environments without human intervention. The primary goal is to develop a mobile robot that can sense obstacles in its path and intelligently makeover around them using real-time sensor feedback. The system is built around an Arduino UNO microcontroller, which serves as the central control unit. The robot employs one or more ultrasonic sensors to continuously monitor the surroundings by emitting sound waves and measuring the reflected distance from nearby objects. When an obstacle is detected within a certain range, the Arduino processes the data and sends control signals to the motor driver to adjust the robot's direction, allowing it to avoid collisions and select an alternate path. The chassis is powered by DC motors and controlled using an L298N motor driver, providing smooth and responsive movement. The robot can perform basic navigation tasks such as forward movement, stopping, and turning left or right, depending on the proximity of obstacles. The integration of sensors and control logic enables the robot to make intelligent decisions in dynamic environments. By combining simple hardware components and efficient programming, this obstacle avoidance robot showcases how intelligent behavior can be achieved using microcontroller-based systems, paving the way for future developments in smart robotics and automated navigation technologies.

Keywords: *Autonomous robot, obstacle avoidance, Arduino UNO, ultrasonic sensors, DC motors, L298N motor driver, real-time navigation, path planning, collision detection intelligent behaviors, embedded systems, smart robotics.*

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EC 019

PLANT MOISTURE MONITORING SYSTEM

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Abstract

The Plant Moisture Monitoring System is an automated solution designed to monitor and maintain optimal soil moisture levels for plant health. This system utilizes a soil moisture sensor to detect the water content in the soil and provides real-time data to users through microcontroller-based setup, often integrated with IoT for remote monitoring. When moisture levels drop below a predefined threshold, the system can trigger alerts or automatically activate a water pump for irrigation. The goal of this project is to reduce manual effort, prevent over- or under-watering, and promote efficient water usage, making it ideal for both home gardening and agricultural applications. By leveraging low-cost components and automation, this system offers a sustainable and scalable approach to smart farming.

Keywords: *Soil Moisture Sensor, Microcontroller, IoT, Smart Irrigation, Automated Watering, Real-time Monitoring, Water Pump Control, Remote Monitoring, Sustainable Farming, Smart Agriculture.*

EC 020

TRAFFIC SIGNAL CONTROL SYSTEMS

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Abstract

The rapid growth of urban population and vehicle density has led to severe traffic congestion and increased travel times. Traditional traffic signal systems operate on fixed-time intervals and lack adaptability to real-time traffic conditions, often resulting in inefficient flow and longer waiting periods. To address these challenges, the Title less Traffic Signal Control System proposes a smart, adaptive solution that eliminates dependence on conventional labelled signals and manually operated mechanisms. This system intelligently manages traffic using real-time inputs gathered from sensors installed at intersections. It dynamically allocates green signal time based on the traffic density in each direction, thus improving traffic efficiency and reducing idle time. The system can also detect the presence of emergency vehicles and provide instant clearance by overriding normal signal operation. At the core of this system lies a microcontroller programmed with a decision-making algorithm that processes live sensor data to control the timing of each signal. This adaptive approach not only improves traffic flow but also reduces fuel consumption and pollution caused by idling vehicles. The design is highly scalable and can be implemented in smart cities where real-time data plays a crucial role in urban management. This innovative approach to traffic control demonstrates how automation and real-time analytics can create a more responsive and efficient traffic system without relying on traditional signal naming ormanual operation. The system's simplicity, adaptability, and low-cost implementation make it suitable for deployment in both urban and semi-urban areas

Keywords: *IR Sensors, Ultrasonic Sensors, Microcontroller (Arduino/STM32), Traffic Light LEDs, Camera Module (Optional), Wi-Fi/Bluetooth Module, Power Supply, Software Algorithm.*

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EC 021

SMART GAS DETECTING AND ALARM SYSTEM

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Abstract

The increasing number of gas-related accidents in residential, industrial, and commercial settings necessitates the development of an intelligent and reliable gas detection system. This project presents a Smart Gas Detecting and Alarm System that leverages the capabilities of Arduino and Raspberry Pi for real-time monitoring and alerting. The system uses gas sensors (such as MQ-series sensors) to detect the presence of hazardous gases like LPG, methane, and carbon monoxide. The Arduino handles sensor data acquisition and immediate response actions like activating buzzers or exhaust fans, while the Raspberry Pi manages data logging, remote monitoring via a web interface, and sending alert notifications (SMS/Email) using Wi-Fi or GSM modules. The integration of IoT features allows users to monitor gas levels in real time from any location, significantly improving safety and response times. This smart system is scalable, cost-effective, and suitable for deployment in smart homes, industrial plants, and laboratories.

Keywords: *Gas Detection, Arduino, Raspberry Pi, MQ Sensor, IoT, Smart Home, Real-time Monitoring, Alarm System, Safety System, Hazardous Gas Detection, Remote Alert, GSM*

EC 022

SMART HEALTH MONITORING SYSTEM USING IOT AND ML

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Abstract

In today's rapidly advancing technological world, digital health is transforming traditional healthcare methods. This project proposes a Smart Healthcare Monitoring System that integrates Internet of Things (IoT) and Machine Learning (ML) to monitor and analyse apatient 's health in real-time. Using a combination of wearable IoT sensors, such as those for heart rate, blood pressure, body temperature, and oxygen levels, the system continuously tracks and transmits the data wirelessly to a cloud platform for real-time analysis. The data collected is processed by machine learning algorithms, which detect patterns and predict potential health risks, such as abnormal heart rates or blood pressure variations. This allows healthcare professionals to receive timely alerts for early intervention, ensuring proactive care. The system provides users with a mobile application for easy access to health data, enabling remote monitoring and real-time feedback for both patients and healthcare providers. This project's key innovation is its potential to improve remote healthcare, offering affordable, scalable, and accessible solutions to underserved regions where healthcare infrastructure may be limited. By utilizing IoT and ML, the system can not only predict health anomalies but also help reduce healthcare costs by avoiding unnecessary hospital visits and providing more efficient care. Ultimately, the Smart Healthcare Monitoring System bridges the gap between traditional healthcare and modern technology, paving the way for personalized, data-driven, and proactive health management. This solution is not just futuristic but practical and scalable, making healthcare more accessible and efficient for everyone.

Keywords: *IoT Sensors, Heart Rate, Blood Pressure, Temperature, Oxygen Levels, Arduino, Raspberry Pi, ESP32, Wi-Fi, Bluetooth, Machine Learning, Anomaly Detection, Mobile App, Cloud Integration, Real-time Alerts, Wearable Devices.*

 ISBN: 978-93-6163-610-3

EC 023

EXPLAINABLE BREAST CANCER DETECTION IN HISTOPATHOLOGICAL IMAGES USING SELF-SUPERVISED TRANSFER LEARNING AND CROSS-DOMAIN ADAPTATION

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Abstract

Early and accurate detection of breast cancer remains a critical challenge in computational pathology due to data scarcity, annotation costs, and domain variability across histopathological imaging devices. In this study, we introduce a novel framework that combines self-supervised pretraining with cross-domain transfer learning to detect breast cancer in histopathological images. Our model builds upon a lightweight DenseNet backbone, enhanced with an attention-guided feature refinement module and explainable AI (XAI) tools to ensure interpretability in clinical contexts. To address limited labeled data, a self-supervised contrastive learning approach is first applied to unlabeled images, enabling robust feature extraction. This is followed by fine-tuning on a labeled target dataset through domain-adaptive learning. Evaluations on publicly available histopathology datasets demonstrate superior performance, achieving over 87% classification accuracy and providing visual explanations aligned with expert pathology. The proposed approach sets a new benchmark in trustworthy and transferable medical AI for breast cancer diagnostics.

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EC 024

IoT –BASED WEATHER STATION IN COGNITIVE RADIO NETWORKS WITH ENERGY HARVESTING

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Abstract

In this paper, we explore the recent research and developments in CRN IOT-based systems, including the architecture, key technologies, and potential applications. Mainly, we will focus on the key aspects of spectrum sensing and routing in CRNs integrated with the IoT. Recent research and technology trends are shifting toward IoT and CRNs. However, we think that the things-oriented, Internet-oriented, and semantic-oriented versions of IoT are meaningless if IoT objects are not equipped with cognitive radio capability. Equipping IoT objects with CR capability has lead to a new research dimension of CR-based IoT. In this article, we present an overview of CR-based IoT systems. We highlight potential applications of CR-based IoT systems. We survey architectures and frameworks of CR-based IoT systems. We furthermore discuss spectrum-related functionalities for CR-based IoT systems. Finally, we present open issues, research challenges, and future direction for these CR-based IoT networks. This paper provides an overview of the cognitive radio environment, including a dynamic spectrum access strategy, as well as additional information on the cognitive capabilities operating in combination IoT communication technologies. We investigate the utilization of cognitive radio in the Internet of Things along with the significant role that cognitive radio plays in making the Internet of Things possible. Cognitive radio will provide a comprehensive examination of spectrum sensing, which will cover the many types of sensing, sensing that is based on machine learning, as well as open topics that still need to be addressed further in this sector. This research paper is written in a way that provides detailed instructions for the purpose of assisting new researchers in the area of Cognitive Radio Networks.

Keywords: *Cognitive radio; internet of things; software define radio; spectrum sensing*

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EC 025

PROCESSING ARCHITECTURE FOR CONTINUOUS ECG MONITORING USING SUBSAMPLING

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Abstract

This project presents a processing architecture for continuous ECG monitoring using a sub sampling-based classifier. The system is designed to reduce the computational complexity and power consumption of traditional ECG monitoring systems by incorporating a sub sampling technique that minimizes redundant data. The architecture extracts relevant ECG features using efficient signal processing methods and classifies cardiac conditions with reduced latency. Implemented in Verilog, the design targets real-time monitoring applications in resource-constrained wearable devices, ensuring accuracy while maintaining energy efficiency.

EC 026

UPI FRAUD DETECTION USING MACHINE LEARNING

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Abstract

Unified Payments Interface (UPI) has revolutionized digital transactions in India, enabling fast, real-time payments. However, the surge in usage has also led to a rise in fraudulent activities. This project focuses on developing an effective machine learning-based system to detect and prevent UPI fraud in real-time. By analysing transaction patterns, user behaviour, and historical data, we aim to identify anomalies indicative of fraud. Techniques such as supervised learning, unsupervised anomaly detection, and ensemble methods are employed to enhance prediction accuracy. Feature engineering plays a key role in distinguishing legitimate transactions from suspicious ones. The model is trained on a labelled dataset comprising both genuine and fraudulent transactions. Evaluation metrics such as precision, recall, F1-score, and ROC-AUC are used to assess model performance. Real-time deployment considerations are addressed using scalable and low-latency architectures. The system aims to minimize false positives while maximizing fraud detection rates. It also provides an alert mechanism to notify users and financial institutions. The solution is designed to integrate seamlessly with existing UPI infrastructure. Ethical considerations, including user privacy and data security, are also prioritized. The goal is to foster trust and enhance security in the growing UPI ecosystem. This work demonstrates the potential of AI in combating financial fraud effectively.

Keywords: *Unified Payments Interface (UPI), Fraud Detection, Machine Learning, Data Privacy, Transaction Analysis, Real-time Detection, Financial Security.*

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EC 027

LICENSE PLATE RECOGNITION WITH OPENCV AND TESSERACT OCR

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Abstract

License Plate Recognition (LPR) is a crucial technology in intelligent transportation systems, enabling automated vehicle identification. This study explores the integration of OpenCV and Tesseract OCR to develop a robust LPR system. OpenCV is utilized for image pre processing, including gray scale conversion, noise reduction, and contour detection. These steps facilitate accurate localization of license plates in diverse lighting and environmental conditions. After isolating the plate region, image thresholding and morphological operations enhance character clarity. Tesseract OCR, an open-source text recognition engine, is employed for extracting alphanumeric characters from the processed plate image. Techniques like resizing, padding, and contrast enhancement further improve OCR accuracy. The system demonstrates efficiency in recognizing plates from various angles and resolutions. It is tested on real-world datasets containing different vehicle types and plate styles. Performance metrics such as precision, recall, and processing time are evaluated. Results indicate high recognition rates in both day and night conditions. This implementation is scalable and cost-effective for parking systems, toll booths, and law enforcement. Limitations include occasional errors with dirty or heavily occluded plates. Future improvements may involve deep learning-based detection and multilingual OCR support. The framework offers a practical solution for real-time license plate recognition using accessible technologies.

Keywords: *License Plate Recognition (LPR), Open Computer Vision (CV),Tesseract Optical Character Recognition (OCR).*

EC 028

AI-BASED PERSONALIZED LEARNING SYSTEM FOR ADAPTIVE EDUCATION

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Abstract

With the increasing integration of Artificial Intelligence (AI) in modern technology, the education sector is witnessing a transformative shift towards intelligent learning systems. This paper presents a conceptual model for an AI-Based Personalized Learning System (AIPLS) designed to cater to the unique learning styles, pace, and interests of individual students. The system leverages machine learning algorithms to analyze student performance, engagement patterns, and feedback to dynamically adjust content delivery and assessment methods. Features such as real-time progress tracking, natural language interaction, and predictive performance analysis are incorporated to enhance both teaching efficiency and student outcomes. Although this work is presented as a theoretical framework, it highlights the significant potential of AI to create adaptive, inclusive, and effective educational environments, paving the way for the future of smart learning.

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EC 029

LIGHT WEIGHT MESSAGING PROTOCOL FOR PRECISION AGRICULTURE

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Abstract

Traditional agricultural irrigation systems often rely on manual operations that are not only labor-intensive and time-consuming but also lack efficiency, often resulting in over-irrigation or under-irrigation. These inefficiencies lead to water wastage, reduced crop yield, and increased operational costs. To address these challenges, this project presents the design and development of an IoT-based Smart Irrigation System that leverages automation and real-time monitoring to optimize water usage in agricultural fields. The core of this system is built around the Arduino UNO microcontroller, which serves as the central processing unit to collect and analyze sensor data. The system is equipped with soil moisture and temperature sensors that continuously monitor environmental conditions. Based on predefined thresholds, the Arduino processes the incoming data to determine whether the crops require watering. If irrigation is needed, the microcontroller activates a relay module that switches on the water pump, ensuring timely and precise water delivery.To prevent pump damage and unnecessary energy consumption, the water level in the storage tank is continuously measured using an ultrasonic sensor. If the sensor detects a critically low water level, the system automatically disables the pump operation, thus conserving water resources and protecting hardware components from dry run damage. This proactive feature enhances the reliability and sustainability of the system.For effective communication with the user, a GSM800L module is integrated into the system. This module sends real-time SMS alerts regarding the system's status, including updates about soil conditions, pump activity, and water levels. Such alerts ensure that the user remains informed about their irrigation system even when they are not physically present on the field.Furthermore, an I2C LCD display module is included to provide live feedback and status updates directly at the field level. It displays sensor readings such as soil moisture percentage, temperature, and tank water levels, along with pump activity status. This on-site display enhances the usability of the system by offering an at-a-glance view of critical data.This IoT-based smart irrigation solution not only minimizes human intervention but also promotes the sustainable use of water, making it a highly cost-effective and eco-friendly alternative to traditional irrigation methods. By automating the irrigation process based on real-time data and providing timely alerts to the user, the system improves agricultural productivity, reduces resource wastage, and supports modern farming practices aligned with the principles of precision agriculture.

ELECTRICAL AND ELECTRONICS ENGINEERING

EE001

LAKE GUARDIAN: AUTONOMOUS ROBOTIC BOATS FOR DEBRIS CLEANUP AND POLLUTION PREVENTION

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Abstract

The growing concentration of floating debris and Water pollution in freshwater habitats is a critical environmental issue to both aquatic organisms and human health. . Lake Guardian is an autonomous robotic boat system to scout, avoid pollution and recover debris, as it is applicable to this issue. The Lake Guardian system utilizes an ESP32 microcontroller as its component and employs GPS and GSM models of the microcontroller-specific to get an accurate location and serve for remote communication processing as requirement needed while programming. The system has a pre-scheduled outdoor platform and ultrasound sensors to detect obstruction and uses an ESP32 camera module for necessary object detection and recognition. The whole system uses object classification methods and image pre-processing methods to detect waste material and classify it. The drive board provides control of the DC motors for both navigating and the collection mechanisms on-board. The system proposal has an optimal scan setting for best area coverage in its movement. It uses an LCD interface, to show real-time updates on the system and detected object. The compact and energy-efficient system is powered 50% via solar energy, and can operate remotely, which reduces operational cost and offers a baseline for smart environmental cleanup alternative. Lake Guardian has promised its design and operation that automates processes with vision systems it can assist in the sustainability of water management.

Keywords: *Autonomous Robotic Boat, Water Pollution Control, Floating Debris Collection, Object Detection and Classification, IOT.*

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EE002

SMART MEDICINE DISPENSER BASED ON QR

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Abstract

The proposed automated drug dispenser integrates QR code technology to revolutionize medication management by reducing patient wait times, easing congestion, and optimizing pharmacists' efficiency during peak hours. Upon receiving a prescription, the doctor's input is converted into a QR code via a mobile application, which transmits the data to the dispenser using Bluetooth. The QR code acts as a unique identifier for the prescribed medication, simplifying and accelerating the retrieval process. Once scanned, the system displays essential details—such as medicine name and quantity—on the application to ensure accuracy and transparency. A helical spring mechanism is then activated, pushing the selected medicine from its compartment to the outlet for patient collection. This streamlined process ensures a secure, efficient, and user-friendly experience. By incorporating QR code technology, the system supports greater accuracy, reduces workload pressure on pharmacists, and enhances overall patient care, aligning with the evolving demands of modern healthcare systems.

Keywords: *Patient, Medication, Healthcare, Code, Prescription, Medicine, Drug, Qr, Retrieval, Outpatient*

EE003

PORTABLE SMART-SCAN ELECTRONIC DICTIONARY FOR READERS

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Abstract

A dictionary is a compilation of words, their corresponding synonyms, and the context in which they are utilized. Many students and readers struggle to comprehend words while reading, leading them to rely on carrying and using a dictionary. However, it's impractical to carry a dictionary everywhere. Traditional dictionaries and translation methods can be time-consuming and disruptive to the reading experience. Although smart phones can offer the same functionality, they often prove to be distracting over extended periods. Therefore, there is a crucial need for a portable device with minimal distractions that can interpret printed text, and capture text in books to display the translated meaning of the word. The Portable Smart-Scan Electronic Dictionary for Readers addresses this need by providing instant text recognition and bilingual translation in a compact, pen-like device. Using Optical Character Recognition (OCR), the device scans printed text using a microcontroller with a camera module and retrieves accurate translations from a database, ensuring seamless operation it out internet dependency. Designed for portability and ease of use, it enhances reading efficiency by enabling real-time, distraction-free word lookup and translation and also it operates in a rechargeable battery to minimize electronic waste. This system bridges the gap between printed text and digital accessibility, making learning more intuitive and efficient.

Keywords: *Electronic Dictionary, Optical Character Recognition(OCR), Printed Text, Translation, Database, Microcontroller with Camera Module, Digital Accessibility.*

ISBN: 978-93-6163-610-3

EE004

IoT-BASED TEMPERATURE AND HUMIDITY MONITORING SYSTEM FOR PERISHABLE GOODS IN FOOD PROCESSING

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Abstract

In the food processing industry, ensuring the quality and safety of perishable goods during transportation and storage is critical to minimize spoilage and maintain product standards.ThisprojectpresentsanIoTbasedTemperatureandHumidityMonitoringSystemdesigned to continuously track environmental conditions and secure the cold chain of perishable items. The system utilizes an ATmega328 microcontroller integrated with various sensors, including a temperature sensor, methane gas sensor, and battery voltage sensor, to monitor key parameters in real-time. An RFID card reader is employed for authentication and tracking of goods, while a GPS module provides location updates throughout transportation. In the event of temperature fluctuations or hazardous gas detection, the system automatically activates cooler controls and sends instant alerts via GSM and IoT modules to relevant stakeholders. Additionally, a display and keypad interface allows on-site monitoring and manual input. By continuously monitoring environmental conditions, this system helps reduce food spoilage, enhances safety, and ensures regulatory compliance. The solution is ideal for smart logistics, food supply chains, and cold storage management, contributing to a more reliable and efficient food distribution process.

Keywords: *IoT (Internet of Things), Temperature Monitoring, Humidity Monitoring, Perishable Goods, Real-time Data, Wireless Sensor, RFID Card Reader, Quality Control.*

EE005

DESIGN OF A MULTIPORT BIDIRECTIONAL DC/DC CONVERTER IN E-VEHICLE CHARGING SYSTEMS

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Abstract

High-voltage conversion DC/DC converters have been recognized in different power electronics applications recently. This research examines a modified configuration of non-isolated multi-port power electronic interfaces applicable to electric vehicle (EV) applications. The primary attribute of this converter is its capacity to handle energy sources with varying voltage and current specifications. The proposed architecture may deliver both buck and boost outputs concurrently during operation. The proposed multi-port converter is designed with a decreased component count and an uncomplicated control method, enhancing its reliability and cost-effectiveness. Furthermore, this converter has bidirectional power flow capabilities, rendering it appropriate for charging the battery during the idle state of an electric vehicle. The steady state of the converter is analyzed to evaluate its performance with different passive components. The converter design's validity and performance are confirmed by MATLAB simulation across several operating conditions.

Keywords: *Eelectric vehicles (EVs), bidirectional dc–dcconverter, widevoltage range, high voltage gain*

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EE006

DESIGN ANDFABRICATION OF PEDAL ASSISTED E-VEHICLE

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Abstract

This is because fuel costs and pollution are increasing daily due to typical vehicles. Each vehicle will emit its own gas, but problems arise when the emissions exceed standardized values. These emissions from the vehicle cannot be completely avoided, but they can also be implemented by implementing a solar bike. Energy from the panel loads the battery and drives the BLDC engine. Also if sufficient solar power is not available, it can be done by using a wall charger. It can also be driven by normal pedaling methods.By using of solar powered E-vehicle, pollution can be decreased and mainly it will save large amount fossil fuels It can be used all age group people up to the weight of 120 Kg. It can be travel up to 25 to 35 km with one full charge. In future we can improve speed of the E-vehicle up to 25 to 30 km/h. Charging time can be reduced up to 2 to 4 hours.

Keywords: *Solar Panels, E-Vehicle, BLDC Motor, Converter, Motor controller*

EE007

OPTIMIZED E-WASTE COLLECTION, SEGREGATION, AND RECYCLING SYSTEM FOR SUSTAINABLE DEVELOPMENT

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Abstract

Electronic waste (e-waste) management is a growing environmental concern due to the increasing disposal of electronic devices. Existing systems rely heavily on manual segregation, leading to inefficiencies, increased labor costs, and improper disposal of hazardous materials. The lack of real time monitoring and automation results in delayed waste collection and ineffective recycling, contributing to environmental pollution. Therefore, this project proposes an Optimized E-Waste Collection, Segregation, and Recycling System for Sustainable Development is designed to enhance electronic waste management using smart technology. The system integrates an Arduino Uno microcontroller with multiple sensors to detect and classify e-waste efficiently. An ultrasonic sensor measures the fill level of waste bins, ensuring timely collection, while an MQ-7 gas sensor detects harmful gases emitted by deteriorating electronic waste, preventing environmental hazards. The Node MCU Wi-Fi module connects the system to the Internet of Things (IoT), enabling real-time monitoring and automated alerts to waste management authorities. A servo motor facilitates automated bin segregation based on detected parameters, optimizing recycling processes. This intelligent system ensures efficient waste disposal, minimizes manual intervention, and enhances environmental sustainability by reducing e-waste pollution. IoT integration allows authorities to track waste levels and hazardous gas emissions remotely, facilitating proactive waste management. By automating waste segregation and optimizing collection schedules, the system reduces operational costs and enhances resource recovery. The combination of sensors and microcontrollers ensures high accuracy in waste classification, leading to improved recycling outcomes. Overall, this system serves as a scalable and sustainable solution to modern electronic waste management challenges, supporting a cleaner and greener future.

Keywords*: IoT (Internet of Things), NODE MCU (wi-fi module), Servo Motor, Arduino UNO Micro Controller, Ultrasonic Sensor, MQ-7 Gas Sensor, Power Supply(+5v)*

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EE008

IOT BASED SMART AGRICULTURE IRRIGATION SYSTEM FOR OPTIMAL WATER MANAGEMENT

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Abstract

The Smart Agriculture Irrigation system integrates Soil Moisture sensor, Temperature and Humidity sensor and Node MCU-ESP8266 Micro controller and cloud-based platforms to monitor and manage soil moisture, temperature, humidity, and other environmental factors in real-time. By automating the irrigation process based on precise data, the system aims to minimize water wastage, reduce labor costs, and enhance the over all productivity and profitability of agricultural operations. The core of the project involves selecting appropriate sensors to gather field data, a microcontroller to process this data, and communication modules to transmit information to a cloud platform. The cloud platform plays a crucial role in visualizing the data, allowing farmers to monitor field conditions remotely and make informed decisions. The system also includes a user-friendly web interface for controlling irrigation schedules and accessing real-time alerts, ensuring that the irrigation process is both automated and customizable based on specific crop needs and environmental changes. Through rigorous testing and calibration, the project aims to deploy a fully functionalIoT-basedirrigationsystemcapableofscalingacrossdifferenttypesof farms and crops. By leveraging IoT technology, this project demonstrates how modern tools can address traditional farming challenges, promoting more efficient, sustainable and environmentally friendly agricultural practices.

Keywords: *Smart Agriculture Irrigation system, Soil Moisture sensor, Temperature and Humidity sensor, NodeMCU-ESP8266 Microcontroller, Minimize water wastage, User-friendly Web Interface.*

EE009

IOT BASED BATTERY MONITORING SYSTEM FOR HYBRID AND ELECTRICAL VEHICLES: ENHANCING SAFETY AND PERFORMANCE

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Abstract

Solar-Powered EV Vehicle Monitoring and Fault-Finding System using a microcontroller, IoT, and various sensors to enhance efficiency, reliability, and sustainability. A solar panel charges the vehicle's battery, reducing dependency on external power sources. The system continuously monitors key parameters such as battery voltage, current consumption, and motor speed using voltage and current sensors. A speed control mechanism ensures optimal motor performance while preventing overload conditions. Data from these sensors is processed by the microcontroller and transmitted to an IoT-based platform, allowing users to monitor the EV's status remotely. Additionally, a fault detection system to identify failures, triggering alerts for maintenance. This system enhances the reliability and efficiency of solar- powered electric vehicles, making them smarter and more sustainable.

Keywords: *IoT (Internet of Things), Battery Management System, Battery Monitoring, State of Charge (SOC),State of Health (SOH),Remote Monitoring, Thermal Management, Cloud Computing.*

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EE010

SIMULATION OF PWM INVERTER FOR SUPPLYING RELUCTANT ELECTRIC MOTORS USING LABVIEW

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Abstract

The paper is an experimental approach of a new type of PWM inverter for unipolar supplying of reluctant electric motors used in board servo-systems. The structure of the inverter is presented as well as details of acquisition system, which allows the investigation of its performances. The inverter test is made using labVIEW virtual instrumentation environment. Modes of investigation are indicated and also experimental results obtained with the tested inverter are shown.

***Keywords*:** *Reluctant motors, PWM inverter, LabView, Instumentation*

EE011

IOT BASED SMART ENERGY GRID

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Abstract

In the era of digital transformation and smart technologies, energy management has become a critical concern. Traditional analog meters lack real-time monitoring, remote access, and intelligent control, which limits user awareness and efficient energy use. This project proposes an IoT-based smart energy meter system that leverages the capabilities of the NodeMCU ESP32 microcontroller and the Blynk cloud platform. The system measures key electrical parameters—voltage and current—using the ZMPT101B voltage sensor and the SCT-013-030 current sensor, respectively. These readings are processed by the ESP32 and used to calculate instantaneous power consumption. The data is then displayed on a 20x4 LCD screen using an I2C interface for local monitoring. Additionally, the ESP32 transmits the data over Wi-Fi to the Blynk mobile application, allowing users to access real-time energy data remotely. This empowers users to track energy usage, identify wastage, and make informed decisions about power consumption. The use of resistors and capacitors ensures signal conditioning and accuracy of sensor readings. A breadboard and jumper wires are used for prototyping, while a bulb is used as a test load to demonstrate functionality. The system is compact, cost-effective, and easy to deploy in residential or small industrial setups. It also lays the groundwork for advanced energy analytics, anomaly detection, and integration with smart home systems. The project contributes to the development of sustainable technologies by promoting energy awareness and optimization. Through remote monitoring and real-time alerts, users can take corrective actions immediately. This model enhances the traditional metering approach by introducing intelligence, connectivity, and automation. The proposed smart energy meter aligns with the global shift toward smarter, greener, and more efficient energy systems.

 ISBN: 978-93-6163-610-3

EE012

ENERGY TRANSFER FROM GRID TO VEHICLE AND VEHICLE TO GRID USING BIDIRECTIONAL DC-DC AND SINGLE-PHASE BIDIRECTIONAL AC-DC CONVERTER

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Abstract

In order to transfer electrical power from the grid to an electric vehicle (EV) and from an EV to the grid while maintaining an increased grid power factor, a single-phase bidirectional AC-DC converter and a bidirectional DC-DC converter configuration are suggested in this work. A single-phase bidirectional AC-DC converter is used in the first stage to convert a 230 V 50 Hz AC supply to 380 V dc. The battery of the Plug-in Hybrid Electric Vehicle (PHEV) is then charged and discharged in the second stage using a bidirectional buck-boost dc-dc converter. It returns energy to the grid at 230V, 50 Hz while in discharging mode. In PHEVs, a battery with a 1.2 kW charging capacity at 120V is utilized. The battery is charged using the buck-boost DC-DC converter in buck mode and discharged using boost mode. The charging voltage and current are managed by a proportional-integral (PI) controller. The efficacy of the suggested algorithm and the system's viability are confirmed by the simulation results.

Keywords: *Plug-in Hybrid Electric Vehicle (PHEV), Bidirectional AC-DC Converter, DC-DC Converter, Vehicle to grid (V2G), Electric drive vehicle (EDVs)*

EE013

A THREE-PHASE MODULAR MULTILEVEL CASCADED INVERTER FOR HYBRID RENEWABLE ENERGY ENVIRONMENTS

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Abstract

This paper introduces a three-phase hybrid cascaded modular multilevel inverter (MLI) based on a modified H-bridge (MHB) module. The proposed topology reduces the number of power switches, losses, installation area, voltage stress, and overall system cost. Designed for renewable energy applications—particularly photovoltaic (PV) systems integrated into microgrids—it enables transformerless operation while improving power quality. The hybrid multilevel inverter serves as an efficient and effective power electronic interface for renewable energy systems. The working principle of a single module and the cascaded hybrid configuration is described, along with an analysis of its symmetrical and asymmetrical operating modes. A comparative evaluation with conventional cascaded H-bridge (CHB) and flying capacitor (FC) multilevel inverters highlights its advantages. Gate signals for the semiconductor switches are generated using the Nearest Level Control (NLC) method. To validate the performance of the proposed topology in PV-based renewable energy systems, MATLAB/Simulink simulations are conducted under steady-state and dynamic conditions. Experimental results further corroborate the simulation findings, confirming the feasibility of the design.

Keywords: *Fuzzy control, hybrid energy storage system (HESS), model predictive control (MPC), new model predictive current control (new MPCC), proportional-integral (PI) inner control loop, state of charge (SOC).*

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EE014

A NOVEL MODEL PREDICTIVE CURRENT CONTROL APPROACH FOR HYBRID ENERGY STORAGE SYSTEMS WITH SUPER CAPACITOR STATE-OF-CHARGE CONSIDERATION

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Abstract

Proportional-integral (PI) control and model predictive control (MPC) are widely used in hybrid energy storage systems (HESS) comprising batteries and supercapacitors (SCs) for DC microgrids. However, PI controllers suffer from slow regulation time, while MPC introduces significant current ripples under low system frequencies. To address these limitations, this paper proposes a **novel model predictive current control (MPCC) strategy** that combines MPC and PI control, enhancing system stability, response speed, and ripple suppression.In the proposed method, MPC acts as the outer loop to generate reference values for the inner PI current loop, improving dynamic performance. Additionally, a fuzzy control-based approach is introduced to optimize the SC's reference power by accounting for its state of charge (SOC). First, the HESS topology and mathematical model in a DC microgrid are analyzed. Then, the new MPCC strategy is developed and compared with conventional PI and MPC methods. Finally, fuzzy logic adjusts the SC reference current based on SOC, ensuring efficient power distribution between the battery (high energy density) and SC (high power density).Simulation and experimental results demonstrate that the proposed control strategy significantly reduces current ripples, shortens dynamic response times, and effectively leverages the complementary advantages of batteries and SCs.

Keywords: Fuzzy control, hybrid energy storage system (HESS), model predictive control (MPC), new model predictive current control (new MPCC), proportional-integral (PI) inner control loop, state of charge (SOC).

EE015

A SINGLE-PHASE 15-LEVEL INVERTER WITH MINIMAL COMPONENTS FOR SOLAR PV SYSTEMS: DESIGN AND IMPLEMENTATION

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Abstract

This paper proposes a novel single-phase 15-level inverter with a reduced component count for solar PV applications. The design integrates a boost converter to maximize energy extraction from PV modules, enabling the inverter to generate fifteen stepped output voltage levels with lower total harmonic distortion (THD)**.** The proposed system enhances efficiency while reducing losses, cost, and overall complexity.A conventional boost converter, coupled with perturb-and-observe (P&O) MPPT, elevates the PV output voltage to the required level. The inverter's performance is validated experimentally using a dSPACE RTI 1104 controller and MATLAB/Simulink. A detailed comparison with existing multilevel inverters (MLIs) demonstrates the advantages of the proposed topology.Experimental results confirm the inverter's high efficiency and robustness under both linear and non-linear loads, as well as its stability in grid-connected systems.

Keywords: Inverter, MPPT, converter, solar PV, total harmonics distortion (THD)

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EE016

SUSTAINABLE ELECTRIC VEHICLE TECHNOLOGY: HIGH-EFFICIENCY GAN CONVERTERS, ADAPTIVE ENERGY MANAGEMENT, AND GRID-STABLE V2G INTEGRATION

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Abstract

The rapid adoption of electric vehicles (EVs) necessitates advancements in efficiency, performance, and sustainability. This paper presents a novel multi-objective optimization framework for EV power trains, integrating machine learning-based energy management with ultra-fast charging compatibility to enhance battery longevity and system efficiency. Unlike conventional approaches, the proposed strategy dynamically balances power distribution between the battery and super capacitor hybrid energy storage system (HESS) using reinforcement learning (RL**)**, reducing peak current stress and improving regenerative braking recovery by up to 18%.Additionally, the study introduces **a** new bidirectional DC-DC converter topology with GaN-based switching devices, achieving 98.7% efficiency and enabling seamless vehicle-to-grid (V2G) integration. A real-time thermal management system leveraging predictive control further mitigates battery degradation under high-load conditions. Experimental validation using a 1:5-scale prototype EV demonstrates a 12% increase in driving range under urban conditions compared to state-of-the-art systems. Simulation and hardware results confirm the framework's adaptability to diverse driving cycles while maintaining grid stability during V2G operation. This work bridges critical gaps in EV technology by addressing energy efficiency, battery lifespan, and fast-charging challenges in a unified control architecture.

Keywords: *AI-Driven Energy Management, Next-Gen Power Electronics, Thermal-Aware Operation, V2G Integration*

DEPARTMENT OF INFORMATION TECHNOLOGY

IT 001

BIOMETRIC MONITORING SYSTEM FOR ELDERLY PEOPLE INTEGRATED WITH SMARTWATCH

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Abstract

As the global elderly population continues to rise, ensuring their health and safety is becoming an increasingly urgent priority. The Biometric Monitoring System for Elderly People integrated with a Smart watch addresses the challenge of continuous health monitoring, particularly for those with chronic medical conditions. This system tracks vital health parameters such as heart rate, blood pressure, oxygen levels, and body temperature in real-time, providing caregivers with up-to-date health profiles of the elderly individual. The innovative Alert and Notification Feature immediately sends alerts to caregivers or family members in case of abnormal biometrics, facilitating timely medical intervention. Additionally, the system incorporates location tracking, allowing caregivers to monitor the elderly person's whereabouts in emergencies. Designed to be simple, intuitive, and accessible, this solution promotes elderly independence while ensuring enhanced safety and health management. By allowing caregivers to monitor the well-being of their loved ones from anywhere, the system reduces the risk of health complications going unnoticed and ensures rapid response in case of emergencies. Furthermore, the integration of cloud-based data storage enables continuous tracking and analysis of health trends over time, offering insights that can inform proactive health management strategies. This holistic approach not only provides real-time monitoring but also fosters peace of mind for both elderly individuals and their caregivers, improving overall quality of life and emergency responsiveness.

Keywords: *Biometric Monitoring, Smart watch, Alert, Location Tracking, Caregiver, Emergency Response, Independence, Health Management, Cloud Storage.*

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IT 002

CROPDEFENSE 360: SMART PEST DETECTION, MAPPING, AND DETERRENCE WITH DRONES

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Abstract

This paper introduces an advanced intelligent pest detection and deterrence system designed to revolutionize agricultural pest management through the integration of artificial intelligence, robotics, and geospatial analysis. The proposed system employs multimodal sensors—including optical cameras, thermal imaging, and acoustic detectors—to enable real-time pest identification in diverse and dynamic field conditions. AI-driven classification models ensure high accuracy in detecting and categorizing pests. Autonomous drones equipped with onboard AI processors and non-lethal deterrent mechanisms (such as light, sound, and motion) are deployed for proactive pest control, operating individually or in coordinated swarms. These drones navigate agricultural fields using intelligent algorithms, while real-time geo-mapping and temporal modeling provide spatial and predictive insights into pest behavior. A unified mobile and web-based dashboard offers farmers live monitoring, historical trends, analytical insights, and operational control. Cloud integration ensures seamless data synchronization and continuous model learning via feedback loops. This innovative solution enhances pest management efficiency, reduces reliance on chemical pesticides, and supports sustainable farming practices.

Keywords: *Intelligent pest detection, AI-powered drones, Precision agriculture, Multimodal sensing, Sustainable farming*

IT 003

VR BRAILLE EDUCATION HUB

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Abstract

The VR Braille Education Hub is an innovative, AI-powered solution designed to bridge the educational gap for blind students by integrating advanced Braille translation with immersive Virtual Reality (VR) technology. This system combines two essential components: a smart Braille translator that converts text, images, videos, and emotions into dynamic tactile Braille, accompanied by voice feedback for enhanced sensory interaction, and a VR platform that enables blind students to explore 3D environments, such as historical sites or interactive educational content. By offering multi-sensory feedback through Braille, voice, and VR immersion, this platform provides a holistic learning experience, empowering blind students with the tools to engage academically, socially, and creatively. The VR Braille Education Hub fosters greater accessibility and interaction, promoting inclusivity and enabling blind students to participate in modern educational practices, ultimately supporting their academic, social, and personal growth.

Keywords: *VR Braille Education Hub, Braille Translator, Virtual Reality, Tactile Feedback, Inclusive Education.*

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IT004

MAXIMO SHOP PROJECT

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Abstract

This project is a basic implementation of an Online Shopping Website developed using HTML, CSS, and JavaScript. This website will show all product and can browse any products for its price and other details and can order the product. The structure of the website is designed using HTML, providing the semantic layout and content. The header is contains the website logo, navigation menu (Home, Shop, Blogs, Contacts), sign in and sign out. The Home page is display the Shop Now button. By click on the Shop Now button it will show the product page. The Shop page is contains Top Sales, New Arrivals, Hot Sales. The Blogs is display the latest News. The Contacts is contains map, address of the shop, feedback. The footer is contains the website logo, email. CSS is used to style the pages, ensuring a modern and responsive design that works well on different screen sizes. The price and rating are included. Sign in, Sign out, Payment, Feedback forms are included.

Keyword: *Web Development, Shopping Cart, Front-end Application, Online Store, Web Design.*

IT 005

BRAIN COMPUTER INTERFACES: RESTORING MOVEMENT AND COMMUNICATION ABILITIES IN PARALYZED INDIVUDUALS

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Abstract

Brain-Computer Interfaces (BCIs) hold revolutionary promise for paralyzed people by making direct communication and control of devices possible via brain signals. BCIs interpret neural activity, enabling people to drive devices, write messages, or control prosthetic devices with their minds. Electroencephalography (EEG), intracortical electrodes, and other neuroimaging modalities record brain signals, which are interpreted with the help of machine learning algorithms to convert intentions into commands. Advances over the past few years have enhanced BCI speed, accuracy, and usability, with some systems delivering real-time communication in locked-in syndrome patients. Invasive BCIs, such as neuralinks implants, allow high-resolution signals, whereas non-invasive EEG-based ones promise greater accessibility. Signal noise, training users, and long-term stability are still hurdles to overcome. Nevertheless, experiments show text typing, wheelchair control, and robotic arm manipulation with paralyzed users.Future work concentrates on improving decoding algorithms, shrinking hardware, and embedding AI to facilitate adaptive learning. Ethical implications, like privacy and informed consent, will also need to be considered. BCIs are not only poised to restore mobility and communication but can also enhance the quality of life for persons with severe motor disability. More innovation may bring BCIs within reach as an assistive technology of choice for paralysis in the near future.

Keywords: *Brain-computer Interface, Electroencephalography (EEG), Neuralinks, Assistive technology.*

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IT 006

SMART OBSTACLE DETECTION AND AVOIDANCE ROBOT POWERED BY ARDUINO AND ULTRASONIC SENSOR

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Abstract

This paper presents the design and implementation of a smart obstacle detection and avoidance robot using an Arduino microcontroller and an ultrasonic sensor. The primary objective of the project is to enable autonomous navigation in dynamic environments by identifying and avoiding obstacles in real time. The hardware setup of the system consists of an ultrasonic sensors, Arduino micro controller,motors, a motor driver, and apower supply, all integrated into a compact mobile platform and the software setup consist of the Arduino coding. Here the HC-SR04 ultrasonic sensors used to measure distances and detect nearby objects, and an Arduino microcontroller is used to process the sensor data and the robot's movement is controlled by an L298N motor driver. When an obstacle is detected within a predefined range, the robot stops, evaluates alternative paths, and navigates around the object without any manual intervention. This project demonstrates a cost-effective and efficient solution for autonomous mobility applications and can serve as a foundational model for more advanced robotic systems involving path planning, AI integration and real-world deployment. The robot was tested in various indoor scenarios to validate its responsiveness, accuracy, and stability during obstacle avoidance.

Keywords: *Obstacle Detection, Ultrasonic Sensors, Arduino Microcontroller, Autonomous Robot, L298N Motor Driver, Embedded System, Automation, Real-Time Navigation, Smart Mobility, Obstacle Avoidance, Path Planning.*

IT 007

LOW-LATENCY BIG DATA ANALYTICS WITH EDGE COMPUTING

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Abstract

Low-Latency Big Data Analytics with Edge Computing IN ABSTRACT: Recently, edge computing has become an emerging architectural pattern for mobile network operators (MNOs) to host services and perform related processing tasks at the base stations (BSs), which can reduce the volume of data transferred to the cloud via the network backhaul. The potential of edge computing can be fully exploited by coordinating the resources, such as computing, storage, and net working, at the BSs in a cooperative manner. In this paper, we explore this collaborative framework in the context of big data transfer. In particular, we aim to minimize the transfer cost by jointly optimizing the routes of the raw data, the services hosted in the BSs, and the amount of data to be processed. To this end, we formulate an optimization problem that captures the structures of both the network flow problem and the services placement problem. Given the NP-hardness of the formulated problem, a local search-based heuristic is proposed, consisting of a diversification phase that generates multiple promising solutions and an intensification phase characterized by a hill climbing strategy. Numerical results are presented to demonstrate the effectiveness of the proposed approach. Index Terms—cooperative edge computing, big data, C-RAN, local search heuristic..

Keywords: *Edge Computing, Big Data, Data Processing, Latency Reduction, IoT (Internet of Things), Real-time Analytics, Distributed Computing, Cloud Integration, Data Storage, Network Optimization, Data Security, Scalability, Machine Learning, Data Visualization, Fog Computing, Sensor Networks*

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IT 008

ANEFFICIENT PATH PLANNING TECHNIQUE FOR UAV TO IMPROVE QOS

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Abstract

The advancement of Unmanned Aerial Vehicle(UAV) networks has opened up unprecedented possibilities across diverse industries. These networks, vital for surveillance, disaster management, agriculture, and tele communications, offer rapid deployment, maneuverability, and access to remote regions. One of the crucial challenges in networked Unmanned Aerial Vehicles (UAVs) is to configure them to serve as aerial base stations (BSs) for collecting data from distributed Internet of Things (IoT) devices in a region devoid of backbone connectivity. To address this challenge, it is required to compute optimized trajectories of UAVs to collect data while considering the different activation patterns of underwater communication. We propose a efficient solution scheme named Effective Data Aggregation for UAV-Enabled Networks (EDAUN) in terms of delay and power. The formulated cost minimization problem is the capacitated single depot vehicle routing problem(CSDVRP), which is NP-hard. Data aggregation applied in order to eliminate redundant data either from different sensor nodes at the same time or from the same sensor node at various time steps .NS2 simulator tool has been used to evaluate existing and proposed system performance. Finally, a route adjustment algorithm applies the cost function and rearranges the order of visiting each Hovering Locations. Then, efficient data aggregation allowing the redundancy elimination at the cluster and sensor node level improves more the results and reduces the energy consumption.

Keywords: *Under Water Wired Sensor Network, Sensor Network, Acoustic Sensor Network, Wireless Sensor Network*

IT 009

CREDIT CARD DEFAULT PREDICTION BY INTEGRATING DEEP LEARNING WITH XAI TECHNIQUES

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Abstract

The increasing reliance on credit cards has heightened the need for accurate and interpretable credit risk assessment models. This paper introduces CreditNetXAI, a novel credit scoring system that combines deep learning with explainable artificial intelligence (XAI) to enhance both predictive accuracy and transparency in default prediction. Using a real-world dataset, the model identifies critical risk factors—such as recent payment delays and high bill amounts—while achieving superior performance metrics: 83.50% accuracy, 88.23% sensitivity, and 98.79% specificity. By leveraging SHAP values for model explanation, CreditNetXAI offers clear insights into feature importance and decision-making rationale. This hybrid approach not only improves financial institutions' ability to assess borrower risk but also fosters trust and compliance through model interpretability.

Keywords: *Credit risk assessment, Deep learning, Explainable artificial intelligence (XAI), Financial risk modelling, Machine learning; SHapley Additive exPlanations (SHAP)*

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IT 010

HYBRID DEEP LEARNING BASED FEATURE SELECTION FOR CYBER ATTACK DETECTION IN SMART GRIDS

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Abstract

The increasing integration of smart grids with communication and information technologies has significantly enhanced the efficiency, reliability, and sustainability of modern energy systems. However, this convergence has also exposed the grid to various cyber-attacks, which can compromise its integrity and functionality. Detecting these cyber-attacks in real-time is crucial for maintaining the security and stability of smart grids. Machine learning (ML) techniques have emerged as powerful tools for automating and improving the detection of cyber threats. This review evaluates the role of feature selection in improving machine learning-based cyber-attack detection systems for smart grids. It explores various feature selection techniques, including filter, wrapper, and embedded methods, and examines how these methods impact the accuracy, efficiency, and interpretability of attack detection systems.

Keywords: *Smart grid, Cyber-attacks, Detection methodologies, Anomaly detection, Machine Learning*

IT011

ARTIFICIAL NEURAL NETWORKS BASED BREAST CANCER PREDICTION AND ANALYSIS

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Abstract

Breast cancer is a disease where cells in the breast begin to grow abnormally and form tumors. It is the most common cancer among women and affects both genders globally. The disease arises from the abnormal growth of tissue composed of malignant cells.This study aims to develop a machine learning (ML) model to classify breast cancer cases and provide interpretability for the model's decisions. Such insights can enhance understanding of breast cancer diagnosis and treatment by identifying the most influential features of tumors and how they contribute to malignancy classification. The best-performing ML model achieved an accuracy of 97.7% using k-nearest neighbors (KNN) and a precision of 98.2% based on the Wisconsin Breast Cancer Dataset (WBCD). An artificial neural network (ANN) model reached an accuracy of 98.6% and precision of 94.4% using the Wisconsin Diagnostic Breast Cancer Dataset (WDBC). Model-agnostic interpretability methods revealed that the 'bare nuclei' feature in the WBCD and the 'worst area' feature in the WDBC were the most important in predicting malignancy. These findings highlight specific characteristics relevant to breast cancer diagnosis and offer a foundation for future investigation into the biological mechanisms underlying the disease.

Keywords: *Breast Cancer, Machine Learning, Artificial Intelligence, Early Diagnosis, Classification, K-Nearest Neighbors (KNN), Artificial Neural Networks (ANN), Model Interpretability, Feature Importance, Wisconsin Breast Cancer Dataset (WBCD), Wisconsin Diagnostic Breast Cancer Dataset (WDBC), Medical Diagnostics, Explainable AI (XAI), Precision Medicine, Healthcare Analytics.*

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IT 012

FACE EXPRESSION-BASED STRESS DETECTION USING MODIFIED VGG ARCHITECTURE

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Abstract

Stress is a significant factor affecting human health and productivity, and its early detection can prevent various mental and physical health issues. This project presents a novel approach for stress detection through facial expression analysis using a modified VGG (Visual Geometry Group) architecture. The system leverages deep learning to extract and classify facial features associated with different stress levels. By enhancing the traditional VGG network with additional convolutional and dropout layers, the model achieves improved accuracy and robustness against variations in lighting, angle, and facial expressions. The dataset comprises labelled facial images categorized by stress levels, and the model is trained and validated on this dataset. Experimental results demonstrate that the proposed model effectively distinguishes between stressed and non-stressed facial expressions with high precision. This stress detection system has potential applications in healthcare monitoring, workplace well-being, and human-computer interaction.

Keywords: *Stress Detection, Facial Expression Recognition, Deep Learning, Modified VGG Architecture, Convolutional Neural Networks, Emotion Analysis, Mental Health Monitoring, Image Classification.*

IT 013

FETAL ECG SIGNAL EXTRACTION AND ANALYSIS USING A TWO WAVELET DENOISING METHODS

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Abstract

Developing an intelligent technique for fetal heartbeat detection to monitor the cardiac function of the fetus in the early stages of pregnancy is crucial for ensuring maternal and fetal health. This research proposes two hybrid algorithms that combine the Recursive Least Squares (RLS) algorithm and Stationary Wavelet Transform (SWT) for fetal ECG extraction. The primary goal is to enhance the fetal ECG signal by reducing noise and artifacts, and to accurately detect R-peaks using the improved Spatially Selective Noise Filtration (ISSNF) method or a threshold-based denoising approach in the wavelet domain. Accurate fetal R-peak detection is critical for diagnosing and monitoring fetal heart conditions. The abdominal signal is decomposed into multiscale components using SWT, with wavelet decomposition levels chosen based on the noise content at each scale. The RLS algorithm is applied to remove maternal ECG interference, while the ISSNF or threshold-based denoising algorithms are used to reduce noise in the wavelet domain. The effectiveness of the proposed method is evaluated using both synthetic and clinical data, with qualitative and quantitative measures, including visual inspection, Signal-to-Noise Ratio (SNR) computation, and QRS complex detection. Experimental results indicate that the proposed method outperforms conventional adaptive filtering techniques in terms of signal clarity, SNR, and minimal distortion, demonstrating its potential for accurate fetal ECG extraction and enhanced clinical decision-making.

Keywords: *ECG Extraction, Fetal ECG, Improved Spatially Selective Noise Filtration, Recursive Least Square Algorithm, Stationary Wavelet Transforms, Threshold-Based Algorithm.*

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IT 014

HEART DISEASE PREDICTION USING CONVOLUTIONAL NEURAL NETWORKS IN A DEEP LEARNING FRAMEWORK

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Abstract

The Heart Disease Prediction Application uses real-time data preprocessing, missing value handling, and standardized patient inputs to ensure accurate predictions. It allows healthcare professionals to upload records in various formats and visualize trends via interactive dashboards. The system provides confidence scores for each prediction and supports model retraining for improved accuracy over time. By integrating machine learning and deep learning, it adapts to evolving trends in cardiovascular health, supporting both individual care and public health planning. Its predictive capabilities aid in efficient resource allocation and decision-making in heart disease prevention and management.

Keywords: *Heart Disease Prediction, Machine Learning, Deep Learning, Healthcare Data, Predictive Analytics, Real-time Preprocessing, Health Dashboard, Clinical Decision Support, Data Integration, Patient Care*

IT 015

EXTENDED REALITY (XR) IN SMART LEARNING ENVIRONMENTS: TRANSFORMING THE FUTURE OF EDUCATION

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Abstract

Extended Reality (XR), which includes Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR), represents a transformative force in modern education. By merging digital and physical environments, XR fosters deeper engagement, interactivity, and personalized learning. This paper explores the core components of XR, its technological foundation, real-world applications, and case studies demonstrating its effectiveness in education. Furthermore, the document highlights the benefits, challenges, and future outlook of XR as a tool for smart learning environments.

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IT016

FUTURE CRIME PREDICTION OF CRIME DATA USING COMBINED ARIMA & LSTM

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Abstract

Accurate future crime prediction plays a crucial role in enhancing public safety and supporting proactive policing strategies. This project proposes a hybrid model that combines ARIMA (Auto Regressive Integrated Moving Average) and LSTM (Long Short-Term Memory) networks to predict future crime trends based on historical crime data. ARIMA effectively captures linear patterns and seasonality in time-series data, while LSTM, a type of recurrent neural network, excels in modeling nonlinear and long-term dependencies. The integration of both models leverages their individual strengths to produce more accurate and reliable predictions. The system is trained on real-world crime datasets, and its performance is evaluated using standard metrics such as RMSE and MAE. Experimental results demonstrate that the combined ARIMA-LSTM model outperforms traditional models in predicting crime occurrences, making it a valuable tool for law enforcement and policy planning.

Keywords: *Crime Prediction, Risk Analysis, Time-Series Forecasting, ARIMA, LSTM, Hybrid Model, Deep Learning, Public Safety, Crime Data Analytics, Forecasting Model.*

IT017

AI-DRIVEN CLOUD MANAGEMENT

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Abstract:

AI-Driven Cloud Management refers to the integration of artificial intelligence technologies into cloud computing environments to automate and optimize operations. By leveraging machine learning algorithms and predictive analytics, AI can monitor workloads, manage resource allocation, detect anomalies, and ensure optimal system performance with minimal human intervention. This approach enhances scalability, reduces operational costs, and improves security and reliability. As cloud infrastructure becomes more complex, AI-driven management is emerging as a crucial solution for maintaining efficiency, resilience, and agility in modern IT ecosystems.

Keywords: *AI-Driven Cloud Management, Artificial Intelligence (AI)Cloud Computing, Automation, Machine Learning (ML), Resource Optimization, Predictive Analytics, Anomaly Detection, Auto-scaling, Monitoring, Intelligent Monitoring.*

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IT 018

EXPLORING NLP IN MODEL-TO-MODEL TRANSFORMATIONS

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Abstract

In this paper, we explore the possibility to apply natural language processing in visual model- to-model (M2M) transformations. Therefore, we present our research results on information extraction from text labels in process models modeled using Business Process Modeling Notation(BPMN) and use case models depicted in Unified Modeling Language (UML) using the most recent developments in natural language processing(NLP).Here, we focus on three relevant tasks, namely, the extraction of verb/noun phrases that would be used to form relations, parsing of conjunctive/disjunctive statements, and the detection of abbreviations and acronyms. Techniques combining state-of-the-art NLP language models with formal regular expressions grammar-based structure detection were solve relation extraction task. To achieve these goals, we benchmark the most recent state-of-the-art NLP tools (Core NLP, Stanford Stanza, Flair, Spacy, Allen NLP, BERT, ELECTRA), as well as custom BERT-BiLSTM-CRF and ELMo- BiLSTM-CRF implementations, trained with certain data augmentations to improve performance on the most ambiguous cases; these tools are further used to extract noun and verb phrases from short text labels generally used in UML and BPMN models. Furthermore, to improve these extract or by solving the abbreviation/acronym detection problem using machine learning-based detection, as well as process conjunctive and disjunctive statements, due to their relevance to performing advanced text normalization. The obtained results show that the best phrase extraction and conjunctive phrase processing performance was obtain educing Stanza based implementation, yet, our trained BERT-BiLSTM-CRF out performed it for the verb phrase detection task. While-to-model transformations, we believe it to be applicable in other areas requiring similar text processing capabilities as well.

Keywords*: Information extraction relation extraction, acronym detection, process models, use-case models, natural language processing, and model-to-model transformation.*

IT 019

LIBRARY MANAGEMENT SYSTEM (LMS) USING PHP AND MYSQL

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Abstract

The Library Management System (LMS) is a web-based software solution designed to streamline and automate the core functions of a library using PHP for server-side scripting and MySQL for database management. This system addresses the limitations of traditional, manual library operations, offering a more efficient, reliable, and scalable platform to manage the day-to-day activities of libraries. The LMS enables librarians and administrators to manage various tasks including cataloging books, tracking borrow and return transactions, monitoring due dates, and calculating fines. It supports user account management, allowing students or members to register, search the catalog, place book requests, and check the availability of resources in real-time. The role-based access control ensures that users interact with the system based on their permissions: administrators can manage users and books, librarians can issue and receive books, and members can view and request items. Security features such as login authentication, input validation, and user session management help protect sensitive data. Furthermore, the system is designed with scalability in mind, allowing it to be extended or integrated with other systems as needed. This paper explores the Library Management System which offers a comprehensive and practical solution for modern libraries, enhancing operational efficiency, ensuring data integrity, and improving the overall user experience.

Keywords: *PHP, MySQL, Web Application, Admin Dashboard, Book Issuing and Secure Login System, User Management, Online Library System, Database Management, Library Portal,*

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IT 020

TRASH TIDY- A SUSTAINABLE SMART BIN TECHNOLOGY

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Abstract

Trash Tidy is a sustainable smart bin technology aimed at advancing waste segregation and public hygiene through automation. The system is divided into two models: the Primary Model, designed for household use, and the Secondary Model, intended for public environments. The Primary Model functions independently and includes an Arduino, IR sensor, raindrop sensor, metal sensor, servo motor, stepper motor with driver, and a three-bin system. When the IR sensor detects an object, the servo motor opens the lid for disposal. The raindrop sensor identifies wet waste, which is sent to the blue bin, the metal sensor detects metal waste and directs it to the black bin, and dry waste is directed to the green bin. Each bin is associated with a matching color-coded wrapper to assist in manual sorting. The stepper motor rotates the bin assembly to align with the correct bin for accurate waste segregation. e automatic sanitizer ensures hygienic operation after each disposal. TrashTidy offers an intelligent and sustainable solution to waste management by combining automation, sensor-based sorting, and real-time monitoring for cleaner homes and smarter cities. TrashTidy is a sustainable smart bin technology aimed at advancing waste segregation and public hygiene through automation. The raindrop sensor identifies wet waste, which is sent to the blue bin, the metal sensor detects metal waste and directs it to the black bin, and dry waste is directed to the green bin. Each bin is associated with a matching color-coded wrapper to assist in manual sorting. It identifies waste based solely on the color of the wrapping—blue for wet, green for dry, and black for metal—using the color sensor. The IR sensor confirms object presence, and the servo motor opens the lid accordingly. The stepper motor rotates the bins for correct placement. Additionally, a GPS module tracks bin locations, and a dedicated web portal provides real-time data on bin fullness, location, and the ability to add and manage bins. The automatic sanitizer ensures hygienic operation after each disposal. TrashTidy offers an intelligent and sustainable solution to waste management by combining automation, sensor-based sorting, and real-time monitoring for cleaner homes and smarter cities.

IT 021

COOL DRINK DETECTION AND ANALYSIS USING AI

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Abstract

In the beverage manufacturing industry, ensuring the quality and authenticity of cool drinks is critical for maintaining brand reputation and customer satisfaction. This project, Cool Drink Detection and Analysis Using *AI*, presents an intelligent, automated system that leverages deep learning to accurately identify drink brands, flavors, colors, ingredients, and detect defects such as damaged packaging. The system utilizes YOLOv8-based object detection models trained on curated datasets to perform real-time and offline inspections. A Flask-powered web application serves as the user interface, supporting role-based authentication for employees and administrators. Employees can conduct detections and view dashboards, while administrators gain additional access to detailed database records. An integrated analytics dashboard, developed with Streamlit, offers comprehensive visualizations, including shift-wise and brand-wise detection statistics. The system also supports automated and manual image capturing, enabling flexibility across different production scenarios. Detection data is stored in structured databases, ensuring traceability and historical analysis. By enabling consistent, high-speed, and accurate quality control, this project enhances operational efficiency and minimizes the risk of defective products reaching consumers. The solution is designed to be lightweight, scalable, and adaptable for real-world deployment in beverage production environments.

Keywords: *Cool Drink Detection, Deep Learning, YOLOv8, Object Detection, Defect Analysis, Quality Control, AI in Manufacturing.*

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IT 0 22

STOCK PRICE PREDICTION USING MACHINE LEARNING AND SENTIMENT ANALYSIS

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Abstract

The stock market is a very dynamic market where nothing is as stable as a rock but as the technology is upgrading there are many ways and methods one can try to learn this dynamic change and be prepared accordingly. This paper focuses on such different methods of dynamically learning the market and its trends. We have used three different models for this paper and have also performed sentiment analysis on the tweets regarding the company or the stock, the model with the least error is the ideal and the most preferred method for prediction. The results of this classification have given a clear and insightful idea about the random ups and downs of the market and also a new approach for investors so that they know where they can be their money. The ARIMA model is giving the best accuracy for every stock.

Keywords: *LSTM, ARIMA, Gradient boosting machine, support vector machine, Lexicon-Based Methods, MAE.*

IT 0 23

INTELLIGENT FORECASTING OF PAYMENT DUE DATES USING MACHINE LEARNING

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Abstract

Payment date prediction is a critical process for businesses and financial institutions to manage their cash flow and financial planning effectively. Accurately forecasting the date when a payment will be made is crucial to ensure timely payment of bills and invoices, maintain a healthy cash flow, and prevent payment delays or defaults. Various methods can be used to approach payment date prediction, including rule-based algorithms, statistical models, or machine learning techniques. These methods consider several factors such as payment history, payment patterns, and external factors such as holidays or weekends that can affect the payment processing time. For instance, rule-based algorithms involve defining specific rules and criteria to predict payment dates based on past payment records and patterns. Statistical models use historical payment data to establish a probability distribution of payment dates. On the other hand, machine learning techniques employ algorithms that learn from past payment records to predict payment dates accurately. Accurate payment date prediction plays a crucial role in improving financial operations, reducing payment delays or defaults, and enhancing customer satisfaction. It helps businesses manage their cash flow effectively, avoid late payment penalties, and ensure timely payment to suppliers and vendors. Additionally, it provides a clear overview of the financial situation, allowing businesses to make informed financial decisions and plan for the future.

Keywords: *Payment date, Forecasting, Payment history*

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IT 024

DEEP LEARNING FOR DIAGNOSIS OF BRAIN TUMOR, PNEUMONIA AND LUNG CANCER FROM MRI, CT AND XRAY IMAGES

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Abstract

This project presents a deep learning-based diagnostic system to detect Pneumonia, Lung Cancer, and Brain Tumors using X-rays, CT scans, and MRI scans. These life-threatening diseases require early diagnosis, yet access to radiologists and advanced tools is limited in many regions. To bridge this gap, the system uses Convolutional Neural Networks (CNNs) for faster, more accessible disease detection. The custom CNN architecture is trained and fine-tuned on medical image datasets to accurately classify normal and abnormal cases. Preprocessing techniques such as normalization, resizing, and data augmentation are applied to enhance model performance and ensure generalization across different imaging conditions. A user-friendly web-based interface allows patients, doctors, and healthcare workers to upload medical images and receive real-time predictions, confidence scores, and Grad-CAM heatmaps that visually highlight the regions influencing the model's decision. The backend, developed using Flask or Django, handles model inference and heatmap generation efficiently with minimal latency. The system has been evaluated on publicly available datasets such as ChestX-ray14 and other open sources for CT and MRI scans, using performance metrics including accuracy, precision, recall, and F1-score to ensure dependable diagnostic support. Designed to function as a second-opinion tool and improve access to care in under-resourced regions, the system supports remote healthcare facilities. Future developments include expanding coverage to other conditions like tuberculosis and diabetic retinopathy, integrating with Electronic Health Records (EHR), enabling real-time detection through mobile cameras, and optimizing the platform for offline use in rural areas with limited internet access.

Keywords: *Deep Learning, CNN, Medical Imaging, Pneumonia Detection, Lung Cancer, Brain Tumor, Grad-CAM, ChestX-ray14, Diagnostic Tool, Healthcare Accessibility, Mobile Health, Remote Diagnosis.*

IT 025

COMPREHENSIVE RESTAURANT AND FOOD SUPPLY CHAIN SOLUTIONS FOR EFFICIENT OPERATIONS AND SUSTAINABILITY

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Abstract

The "Comprehensive Restaurant and Food Supply Chain Solutions" project is designed to help restaurants manage their food supply chains more efficiently while ensuring sustainability and security. This system provides a centralized management framework that oversees crucial processes such as inventory tracking, purchase reporting, quality assurance, and sustainability monitoring. By integrating these functions, the platform ensures that food products meet high standards of quality and environmental responsibility. Restaurants can register on the platform, browse available food products, and seamlessly add items to their cart. The system automatically calculates the total cost, simplifying the purchasing process for restaurant owners. Additionally, a real-time stock management feature allows restaurants to track available inventory and make informed purchasing decisions The Random Forest Repressors implemented to evaluate food storage methods, raw material sustainability, and expiration dates. This predictive capability helps restaurants minimize food waste by ensuring that perishable items are utilized before they spoil. Furthermore, the Random Forest Regressor is used in Quality Assurance & Quality Checking to assess factors such as freshness, safety, and nutritional value. By leveraging machine learning models, the system provides accurate predictions that enhance food quality control measures. Once food items pass sustainability and quality checks, they are integrated into the supply chain, ensuring that only high-quality and safe products reach restaurants. By combining centralized management, machine learning-based quality assessment, and automated purchasing features, it creates a robust and intelligent solution that supports restaurants in making better, more sustainable food supply decisions.

Keywords: *Food Supply Chain, Inventory Management, Sustainability, Machine Learning, Random Forest Regressor, Quality Assurance, Food Waste Reduction.*

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IT 026

DATA-DRIVEN SOLUTIONS FOR PAIN ASSESSMENT, THERAPY OPTIMIZATION, AND EFFECTIVENESS ANALYSIS

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Abstract

The system is designed to manage and alleviate back and knee pain through a structured workflow. Clients begin by registering on the platform, providing personal details and symptom data (including pain percentages). The admin reviews the registration, verifies the details, and either approves or rejects it. Upon approval, the client receives login credentials and accesses the platform. Once logged in, the client uploads detailed symptom data, such as severity percentages for pain, swelling, and stiffness. This data is processed by the system, which evaluates the severity and classifies the pain into a specific type. Based on this analysis, the system suggests a personalized therapy and its duration. After completing the therapy, the client uploads updated symptom data to reflect improvements. The system compares the initial and updated symptom percentages to calculate therapy effectiveness, measuring the improvement in the client's condition. Throughout the process, the admin oversees the workflow, manages approvals, monitors progress, and reviews reports. At the end, the admin generates a comprehensive final report summarizing the client's journey, from symptom upload to therapy outcome, ensuring a data-driven approach to managing and recovering from back and knee pain.

Keywords: *Pain Assessment, Therapy Optimization, Effectiveness Analysis*

IT 027

ADVANCED END TO END SYSTEM FOR NEW AGE FORMERS USING MACHINE LEARNING

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Abstract

This report presents the development of a Payment Day Prediction Model using the XGBoost algorithm to forecast the number of days it takes for an invoice to be paid. Late payments can significantly impact a company's cash flow and financial planning, making accurate payment predictions a valuable asset for accounts receivable and finance teams. The model is trained on historical invoice and payment data, incorporating features such as invoice amount, issue and due dates, customer payment history, and transaction patterns. Through extensive preprocessing and feature engineering, the model is optimized to capture complex relationships in the data. By identifying pattern sin customer behaviour, the model aims to provide accurate predictions that can support better cash flow management, enhance the efficiency of accounts receivable processes, and reduce the risk of delayed payments. XGBoost was chosen for its speed, accuracy, and ability to handle complex, structured datasets. This report outlines the complete workflow from data preprocessing and feature engineering to model training and evaluation highlighting the role of machine learning in financial forecasting and operational decision-making. XG Boost is selected for its speed, scalability, and ability to handle missing values and non-linearities. The model is evaluated using standard regression metrics like MAE, RMSE, and R^2 score, demonstrating strong predictive performance. The final solution offers actionable insights to enhance credit risk management, prioritize collections, and improve financial forecasting accuracy.

Keywords: *Precision Agriculture, Smart Farming, Machine Learning Models, Gaussian Naïve Bayes, Crop Recommendation, Crop Yield Prediction, Recommended Tools and Fertilizers*

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DEPARTMENT OF MECHANICAL ENGINEERING

ME001

DESIGN AND NUMERICAL ANALYSIS OF FRICTION STIR WELDING WITH ALUMINUM AND NYLON PLATES BY ANSYS

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Abstract

Friction stir welding (FSW) is a promising solid-state joining technique that offers several advantages over conventional fusion welding methods, particularly in the context of dissimilar material welding. This study focuses on the design and numerical analysis of FSW with aluminum and nylon plates using Catia and ANSYS software, respectively. The design aspect involves the utilization of Catia software to create a precise FSW tool geometry suitable for joining aluminum and nylon plates. The tool geometry is optimized to ensure efficient material flow and heat dissipation during the welding process, thereby facilitating high-quality weld formation. Subsequently, structural and thermal analyses are conducted using ANSYS software to evaluate the performance of the FSW joint. The numerical investigation reveals that the nylon material exhibits low deformation and melts easily under applied loads, resulting in minimal stress generation during the welding process. These characteristics of nylon contribute to the formation of high-quality welds with good flow characteristics. Overall, the findings from the numerical analysis suggest that friction stir welding with nylon demonstrates favorable attributes for joining aluminum and nylon plates, including low deformation, easy melting, and reduced stress generation. This underscores the potential of FSW as an effective joining technique for dissimilar material combinations, offering enhanced weld quality and structural integrity.

Keywords: *Friction stirs welding, aluminum and nylon plates, Dissimilar Material Joint, CATIA and ANSYS software.*

ME002

VEHICLE EMERGENCY BRAKING SYSTEM TO REDUCE COLLISION

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Abstract

A Vehicle emergency braking system (EBS) is a critical safety feature designed to reduce the risk of collisions by automatically applying the brakes when a potential collision is detected. Vehicle emergency braking systems (EABS) are advanced safety technologies designed to reduce the likelihood and severity of collisions by automatically applying the brakes when a potential collision is detected. These systems utilize a combination of sensors, cameras, radar, and lidar to monitor the road environment, identify obstacles, and assess collision risks in real-time. When a threat is detected, the system alerts the driver and, if necessary, autonomously initiates braking to mitigate or prevent an accident. EABS is particularly effective in scenarios such as sudden stops, pedestrian crossings, and low-visibility conditions. By enhancing driver reaction times and providing an additional layer of safety, emergency braking systems significantly contribute to reducing road accidents, injuries, and fatalities. This paper explores the working principles, key components, benefits, and limitations of EABS, as well as future advancements in the field, highlighting its critical role in modern vehicle safety and the transition toward autonomous driving.

Keywords: *Emergency Braking System, Safety, Sensors, Radar, and Lidar.*

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ME003

ANDROID CONTROL OIL SKIMMER MACHINE

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Abstract

The Android Control with Oil Skimmer project enables remote monitoring and control of an oil skimmer system via an Android app. By using a microcontroller (like Arduino or ESP32), the system communicates with sensors that track oil levels and motor status. The app allows users to control the skimmer, adjust motor speeds, and view real-time data, improving efficiency and reducing manual effort in oil separation tasks. This integration of Android technology and IOT components offers a user-friendly solution for managing oil skimming operations. The Android Control with Oil Skimmer project aims to provide a remote and efficient solution for managing oil skimming systems. By integrating an Android application with a microcontroller (such as Arduino or ESP32), users can control and monitor the oil skimmer remotely. This setup allows for easy control of the skimmer, improving operational efficiency and reducing the need for manual intervention in oil separation processes.

Keywords: *Oil skimmer, Microcontroller, Motor, IOT.*

ME004

IOT BASED GRASS CUTTER WITH SOLAR POWER SYSTEM

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Abstract

This project presents an IOT-based grass cutter powered by solar energy, designed to automate and optimize lawn maintenance. The system integrates a solar power setup to ensure sustainable energy usage, while IOT technology enables remote monitoring and control. The grass cutter is equipped with sensors for navigation and obstacle detection, allowing it to operate autonomously. The IOT platform provides real-time updates on the cutter's status, battery levels, and performance, which can be accessed via a mobile app. This solution aims to provide an eco-friendly, efficient, and convenient method for maintaining lawns with minimal human intervention. The IOT-based grass cutter with a solar power system is a modern solution that combines automation, renewable energy, and smart technology to simplify lawn care. This system uses solar panels to power the grass cutter, making it an eco-friendly and energy-efficient alternative to traditional gas or electric-powered lawn mowers. The integration of Internet of Things (IOT) technology enables the grass cutter to operate autonomously, with sensors for navigation, obstacle detection, and precise cutting. Users can remotely monitor and control the device through a mobile app, providing real-time updates on its status and battery levels. This innovative system reduces human intervention, improves efficiency, and minimizes environmental impact, offering a sustainable approach to lawn maintenance.

Keywords: *Gross Cutter, Solar Power, Solar Energy, IOT, Optimize, Maintenance*

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ME005

ELECTRICAL POWER GENERATION USING SHOCK ABSORBER

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Abstract

This project convert's wasted shock absorber energy into electricity using a DC Motor and Rack & Pinion Mechanism. When the vehicle moves, the shock absorber motion moves a rack, which rotates a pinion connected to a DC motor. The generated electricity can be stored in a battery and used for vehicle electronics.This system improves energy efficiency by converting mechanical vibrations into electrical energy instead of wasting it as heat.Powering vehicle lights, sensors, and small electronics. Charging batteries in electric vehicles (EVs).Used in public transport & military vehicles for energy recovery.We use a Rack & Pinion Mechanism connected to a DC Motor. When the vehicle moves, the rack moves up & down, rotating the pinion. This rotational motion spins the DC motor, generating electricity.Shock absorbers normally convert vibrations into heat, wasting energy. Instead of losing this energy, our system captures it and converts it into useful electricity.

Keywords: *Electrical Power, Electrical Vehicle, Shock Absorbers, Rack and Pinion, DC Motor*

ME006

SCOTCH YOKE MECHANISM BASED WATER PUMPING SYSTEM

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Abstract

The Scotch Yoke mechanism, known for its simplicity and efficiency in converting rotary motion into linear motion, has been adapted for use in a water pumping system. This paper presents the design, development, and analysis of a water pumping system driven by a Scotch Yoke mechanism. The system utilizes the rotary motion of an input motor, which is converted into linear motion through the Scotch Yoke, thereby driving a piston in a cylindrical pump to lift water. The key advantages of this system include its compact design, reduced mechanical complexity, and energy efficiency compared to traditional pumping systems. The design process focuses on optimizing the Scotch Yoke mechanism for smooth motion, minimizing friction, and improving the overall efficiency of the pump. Parameters such as the length of the crank, the yoke, and the piston stroke are considered to ensure that the pumping system can operate effectively across a range of conditions. Additionally, the system's performance is evaluated in terms of its flow rate, pressure output, and power consumption.

Keywords: *Scotch Yoke, Rotary motion, Linear motion, Pumping system, Crank*

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ME007

SAFETY IMPLEMENTATION IN SAND MIXER AND FURNACE LOADING ACTIVITY

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Abstract

In any industrial or commercial activity; Health, Safety and Environment is a major concern which need to be addressed with special attention to make the process or activity to be free from risk of serious personal injury or loss to environment. In this project, I have chosen two major life-threatening activity that is in practice in a green sand molding foundry unit. In this unit, green sand is used to prepare mold cake in which molten metal is poured to make casting which is then processed to make various engine component. Green sand is prepared in a sand mixture which need to be cleaned by entering into the mixing chamber which is a confined space. In furnace loading worker is loading the crushed metal scrap bundles manually which has an imminent threat to life and health of the worker. These two hazardous activities have been chosen on the basis of old accident/ incident report, site survey, interviewing the workers involved in that particular activity. To make these finding quantitative and precise, HIRA study also conducted for evaluating risk. I have suggested and recommended some control measure based on the hierarchy to make these activities free of imminent threat to life and health.

ME008

CONSTRUCTION SAFETY MANGEMENT

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Abstract

The aim of this research is to identify and evaluate the safety management in construction projects to minimize and control health and safety (H&S) of construction workers. Questionnaire is used to collect a wide range of opinions from experienced professionals working in different construction sites for comparison between them. The reviews of the related literature are the first step in obtaining information from previously related studies. The literature reviews provide a theoretical background about safety management that guided the design of the questionnaire. This research concludes that the construction industry has a high number of fatalities and long-term injuries. This is unacceptable in a modern society and it also makes the industry inefficient, with days lost due to injuries. This research shows that the high rates of accidents are due to several common factors, such as poor construction planning, lack of safety in design, inadequate safety training, worker behavior, inherent safety H&S risk of construction and lack of knowledge of site rules.

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ME009

REPORT FOR HAZARD EVALUATION AND MITIGITAION OF RISKS IN CONSTRUCTION WORK

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Abstract

The construction industry is one of the most hazardous sectors globally, with a high incidence of occupational accidents and injuries. This project aims to systematically analyse safety practices in construction work and develop strategic interventions to minimize risks and enhance worker safety. By identifying key hazards such as work at height hazards like fall from height and fall of materials from height due to unprotected barriers, and unsecured material stacking on top floors. Hazards in lifting & Shifting work job (erection of steel cage, beam, shifting of required materials). Confined- Space hazards (Oxygen deficiency, toxic gas inhalation) and during excavation contact of Electrical lines (UG Cable and also the Sagged Overhead live lines in the street areas., the study adopts a risk-based approach that combines hazard identification, risk assessment, and control measures in line with standards. Through field observations, safety audits, and stakeholder interviews, the project evaluates the effectiveness of existing safety protocols and highlights gaps in implementation. The outcome will be a comprehensive safety management framework tailored for construction sites, focusing on proactive risk mitigation, training programs, personal protective equipment (PPE) compliance, and safety culture development. The findings aim to support construction firms in improving their safety performance, reducing accidents, and promoting a safer working environment.

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ME010

EMPLOYEE & TRUCK DRIVER SAFETY MANAGEMENT IN THE TRUCK MOVEMENT AREAS INISDE THE FACTORY PREMISES

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Abstract

This study aims employee & truck driver safety management in the truck movement areas inside the factory premises. Employee & Truck driver Safety Management is an OSHA standard that requires employers to identify, evaluate, and control the hazards associated with the truck safety management for loading and unloading processes. The process in the truck movement leads to fatal, or major injury in the factory. As per ISO 45001 who are all inside the factory premises (employees, visitors, outsider) their health & safety factory management is responsible. The aim of the project is to identify the hazards associated with the truck movement inside the factory premises for loading and unloading process and the truck driver activities. The main types of requirements are categorized as functional requirements, performance requirements, monitoring requirements. Truck safety focuses on preventing incidents and accidents during movement inside the factory premises and monitoring the preparedness for the loading and unloading activity. In this process the majorly unintentional accidents will happen and that leads to fatal accidents. Currently there is no controls in the truck movement for loading and unloading activities. Preparing standard procedures for managing the process and truck management should be made as per the OSHA requirement to prevent the employees, driver accidents inside the factory premises.

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ME011

PREVENTIVE MAINTENANCE SYSTEM FOR MACHINE SAFETY

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Abstract

This study covers new trends and techniques in the field of predictive maintenance, which has been superseding traditional management policies, at least in part. It also presents suggestions for how to implement a predictive maintenance programme in a factory/premise and so on. Predictive maintenance primarily involves foreseeing breakdown of the system to be maintained by detecting early signs of failure in order to make maintenance work more proactive. In addition to the aim of acting before failure, it also aims to attend to any fault, even if there is no immediate danger of failure, to ensure smooth operation and reduce energy consumption. Predictive maintenance has been adopted by various sectors in manufacturing and service industries in order to improve reliability, safety, availability, efficiency and quality as well as to protect the environment. It also has created a separate sector, which specializes in developing predictive maintenance instruments, offering dedicated predictive maintenance solutions and training predictive maintenance experts. Predictive maintenance techniques are closely associated with sensor technologies but for efficient predictive maintenance applications, a comprehensive approach, which integrates sensing with subsequent maintenance activities, is needed to be adapted in accordance with the needs of the particular organization. Recent advances in information, communication and computer technologies, such as Internet of Things and radio-frequency identifications, have been enabling predictive maintenance applications to be more efficient, applicable, affordable, and consequently more common and available for all sorts of industries. Researches on remote maintenance and e-maintenance have been supporting predictive maintenance activities especially in unsafe working environments and scattered locations.

ME012

ENHANCING SAFETY IN THE CEMENT PACKING UNIT

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Abstract

The cement industry in India is considered one of the most crucial industries for the country's economic development, ranking as the second largest cement producer globally. Cement is essential to make a building, it is mainly used in construction sites. The cement industry has different processes such as crushing, grinding, blending, burning, cooling, packing, and storing to make cement from raw material to final outcome. The final process is that the cement packing and conveyor transport contributes to several hazards such as cement dust, noise ,electrical hazard, fire, machinery hazard, etc. to cause harm to the workers and property damage. These hazards create skin irritation, eye injury, lung disease, hearing loss, and other hazards to the workers. The primary goal is to identify the various hazards and risks in the packing and conveyor transport area in the cement industries by using hazard identification and analyzing existing safety protocols are effectively protecting the workers and organization and then providing effective control measures to reduce hazard and risk to save workers life and company property against hazards in the cement industry packing unit.

By enhancing safety protocols in the cement packing unit we can prevent workers life, save cost, machines and properties and also we can enhance organization reputation among clients and people.

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ME013

INCULCATING STRATEGIES TO REDUCE RISK IN VCM

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Abstract

The main objective of this paper is to understand the health and safety of employees in a chemical plant where toxic hazards occur due to the polymerization reaction in PVC production. To achieve personal and professional goals in any industry, it is necessary to consider the health and safety of employees. In PVC production, the polymerization of VCM occurs where exposure to excess VCM causes severe effects on the environment and product economy. It also affects the health of personnel, making it completely unsafe. VC affects human health through inhalation, and exposure causes CNS depression. It is proven to be a human carcinogen. Our paper deals with health risk assessment, exposure prevention, maintenance, health surveillance, and instructional training for employees in various ways to reduce hazards.

Keywords: *Health, Safety, Employees, VCM, Risk Assessment, Toxic Hazards, etc*

ME014

DEVELOPMENT OF AN INTEGRATED SAFETY MANAGEMENT SYSTEM FOR TRANSMISSION LINE CONSTRUCTION USING IOT, WEARABLE TECHNOLOGY, AND PREDICTIVE ANALYTICS

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Abstract

The construction of transmission lines involves significant risks due to the hazardous environment workers are exposed to, including working at heights, proximity to live electrical components, and fluctuating weather conditions. Despite existing safety protocols, accidents continue to occur, often due to the limitations of traditional safety systems, which rely on manual checks and periodic inspections. This thesis proposes the development of an integrated Safety Management System for transmission line construction that leverages wearable sensors, Internet of Things (IoT) technology, and predictive analytics to enhance worker safety in real-time. The system is designed to continuously monitor critical parameters such as vital signs (heart rate, body temperature, fatigue levels), environmental conditions (wind speed, temperature, gas levels), and the worker's location relative to hazardous zones (e.g., high-voltage electrical lines). Wearable devices equipped with these sensors will send real-time data to a centralized monitoring system, enabling instant alerts for both workers and safety managers in the event of dangerous conditions or health anomalies.

Additionally, the system integrates predictive analytics to assess potential risks based on environmental factors and worker health data, enabling proactive safety measures. Through the use of real-time monitoring, automated hazard detection, and location-based alerts, this system aims to reduce accidents, improve response times, and provide safety managers with actionable data for decision-making. The development and implementation of this system offer a novel approach to industrial safety in the high-risk environment of transmission line construction, contributing to the reduction of workplace injuries and fatalities. The research will also explore the technological challenges involved in integrating multiple sensor types and the effectiveness of the system in real-world conditions, with the potential to set new standards for safety practices in high-risk construction environments.

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ME015

DUST HAZARD MANAGEMENT AND RESPIRATORY SAFETY IN CEMENT MANUFACTURING

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Abstract

Cement manufacturing is a high-risk industry where workers are regularly exposed to hazardous airborne particles, including particulate matter ($PM_{2.5}$ and PM_{10}) and respirable crystalline silica (RCS). Prolonged exposure to these dusts poses serious health risks, particularly to the respiratory system, potentially leading to chronic bronchitis, silicosis, and chronic obstructive pulmonary disease (COPD). This study aims to evaluate dust exposure levels in a cement manufacturing facility and assess the respiratory health status of workers through dust monitoring, health surveys, and medical evaluations.

Engineering and administrative controls, including the use of dust collection systems and implementation of workplace safety policies, were assessed for effectiveness. The use of personal protective equipment (PPE), particularly respiratory protection, was also evaluated. Following the initial analysis, targeted improvements such as enhanced ventilation systems, stricter PPE compliance, and regular training programs were implemented.

Post-implementation analysis showed a significant reduction in dust concentrations and an improvement in worker health indicators. The study concludes that comprehensive dust hazard management, combining technical measures with worker training and regulatory compliance, is critical to safeguarding respiratory health in the cement industry.

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ME016

FIRE PREVENTION AND SAFETY CONTROL MEASURES IN LPG GAS STORAGE AND SUPPLY AREAS AS PER INDIAN STANDARDS: IMPLEMENTATION OF AUTOMATIC FIRE EXTINGUISHING AND COMMUNICATION SYSTEM USING NOTIFIER FIRE ALARM PANEL

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Abstract

This study aims LPG Gas storage and supply areas are highly sensitive and potentially hazardous zones within industrial and commercial facilities. Effective fire prevention and safety control measures are essential to protect human life, assets, and operational continuity. This project aims to analyze, design, and implement comprehensive fire safety systems for gas storage and distribution areas in accordance with applicable Indian Standards such as IS 10987:1992, NBC Part 4 (Fire and Life Safety), and the Gas Cylinder Rules, 2016.The study focuses on integrating an automatic fire detection and extinguishing system equipped with smoke, heat, and gas leak detectors, alongside a Notifier Fire Alarm Panel (NFS-23030) for centralized monitoring, alerting, and communication. The system ensures early detection of fire or gas leak hazards, immediate activation of suppression systems, and rapid communication of alerts to designated safety and control personnel. The project covers risk assessment, hazard identification, selection of suitable fire suppression systems, and programming of the Notifier panel for seamless fire event management. It also addresses personnel training, emergency response planning, and periodic system testing to ensure operational reliability. The outcome of this project is expected to significantly improve fire safety readiness, minimize fire-related risks in gas storage and supply areas, and aligns safety practices with Indian statutory requirements and industrial best practices inside the factory premises.

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ME017

PRELIMINARY HAZARD ANALYSIS STUDY ON PHARMACEUTICAL PROCESS

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Abstract

The pharmaceutical industry is a high-risk sector, with potential hazards ranging from chemical exposure to equipment malfunction. To mitigate these risks, a proactive approach to HIRA identification is crucial. This involves identifying potential hazards, assessing their likelihood and impact, and implementing measures to control or eliminate them. Predictive measures, such as Failure Mode and Effects Analysis (FMEA) and Hazard and Operability (HAZOP) studies, can be employed to identify potential hazards and prioritize risk-reducing measures. These measures can include design modifications, procedural changes, and training programs. By integrating HIRA identification with predictive measures, pharmaceutical companies can reduce the risk of accidents, minimize downtime, and ensure compliance with regulatory requirements. This proactive approach can also help companies to identify opportunities for process improvements and optimize their operations. Regular review and update of the HIRA process is essential to ensure its effectiveness and relevance.

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ME018

SAFETY IN CONSTRUCTION WORK (LAYING OF CI/DWC PIPELINE SEWER FOR UGSS WORK IN TAMIL NADU)

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Abstract

The construction industry in India plays a vital role in the country's development, with significant investments being made in urban infrastructure projects, including the creation of "Smart Cities." A crucial component of these initiatives is the development of Underground Sewerage Systems (UGSS), which are essential for maintaining a healthy environment in urban areas. However, the execution of UGSS projects poses significant safety risks to workers and the public. Recent incidents and fatalities in these projects can be attributed to various hazards, including underground cables present risks of electrocution if accidentally contacted during excavation or other work, The construction of lifting stations, pumping facilities, and sewage treatment plants often involves working at elevated positions, creating fall hazards, sewer systems can produce dangerous gases like hydrogen sulfide, methane, and carbon monoxide, which can be lethal in high concentrations, the use of excavators, cranes, and other heavy equipment in confined urban areas increases the risk of accidents, exposing workers to traffic-related risks, soil instability can pose risks during excavation and pipe-laying activities, prolonged exposure to high noise levels from equipment and machinery can lead to hearing damage. Given the severity of these risks, it is imperative to conduct a thorough assessment of the safety protocols in place for UGSS projects to prevent accidents and ensure a safe working environment. Additionally, implementing robust safety measures not only protects the workforce but also contributes to the overall success and timely completion of these critical infrastructure projects, ultimately benefiting the community and the environment.

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ME019

AUTOMATED FIRE DETECTION AND SUPPRESSION SYSTEM FOR FACTORIES

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Abstract

Fire safety is a critical concern in factories, where the presence of flammable materials, electrical equipment, and hot processes can create a high-risk environment. To mitigate these risks, a comprehensive fire detection and suppression system is essential. This system should be designed and installed based on a thorough HIRA identification process, which involves identifying potential fire hazards, assessing the risks, and implementing measures to control or eliminate them.

The fire detection system should include smoke detectors, heat detectors, and flame detectors, strategically located throughout the factory to provide early warning of a potential fire. The suppression system should include clean agent extinguishing systems, foam systems, or water sprinkler systems, depending on the type of fire hazard present. The system should also include manual pull stations, audible and visual alarms, and a fire alarm control panel to alert personnel and initiate evacuation procedures.

Regular maintenance, inspection, and testing of the fire detection and suppression system are crucial to ensure its reliability and effectiveness. Factory personnel should also receive regular training on fire safety procedures, including evacuation drills and use of fire extinguishers. By implementing a comprehensive fire detection and suppression system based on HIRA identification, factories can minimize the risk of fire and ensure a safe working environment for personnel.

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ME020

IDENTIFICATION OF OCCUPATIONAL HEALTH & SAFETY (OHS) REQUIREMENTS IN GREEN FIELD PROJECT

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Abstract

This study aims process safety, design of equipments by design. Process Safety Management, or PSM, is an OSHA standard that requires employers to identify, evaluate, and control the hazards associated with the highly hazardous chemicals in their processes. Mechanical Integrity (MI) can be defined as the management of critical process equipment to ensure it is designed and installed correctly and that it is operated and maintained properly. The aim of the project is to identify the requirements of stainless steel reactor, design the reactor with respect to User Requirement Specifications. The main types of requirements are categorized as functional Requirements, performance requirements, System technical requirements, specifications. chemical process safety focuses on preventing incidents and accidents during large scale manufacturing of chemicals and active pharmaceutical ingredients, in particular the unintentional release of potentially dangerous materials and energy also run away reactions. If the engineering and administration controls are failed, nitrogen blanketing supports the fire and explosion of the stainless steel reactor. The reaction parameters are identified and evaluated with the cross functional event. Standard procedures for managing changes to process requirements also the construction of complex chemical compounds from simpler one. The preliminary safety requirements of agitator with stages of reaction process were evaluated and condenser specification and design safety considerations of accessories including the rupture disc and view glasses.

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ME021

SENSOR-INTEGRATED ROBOTIC PROSTHETICH AND: DESIGN AND DEVELOPMENT FOR ENHANCED FUNCTIONAL PERFORMANCE

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Abstract

The study presents the development of a sensor-integrated robotic prosthetic arm aimed at enhancing mobility and independence for upper-limb amputees. Conventional prosthetics often lack sensory feedback and are limited in functionality and affordability. This research focuses on creating a cost-effective, user-centered solution by integrating myoelectric control, pressure and motion sensors, and 3D-printed modular components. The design is inspired by the real-life needs of an amputee student, ensuring practical usability and ergonomic comfort. Structural and mechanical performance of the prosthetic arm is validated through Finite Element Analysis (FEA), confirming the system's reliability. The resulting prototype demonstrates improved grip control, intuitive motion, and scalability for future enhancements such as haptic feedback and IoT-based remote diagnostics. This work contributes to the advancement of affordable, functional prosthetic technology, improving quality of life for users and serving as a platform for further research in assistive robotics

Keywords: *Sensor-Integrated Prosthesis, Robotic Arm, 3D Printing, Amputee Rehabilitation, Electromyography(EMG), Adaptive Control Systems, Low-cost Prosthetic Solutions, Embedded Systems for Prosthetics, Assistive Technology.*

ME022

FIRERISKANALYSISANDOPTIMIZATIONOFFIRE PREVENTIONMANAGEMENTFORGREENBUILDING DESIGNANDHIGHRISEBUILDINGS: HONGKONG EXPERIENCE

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Abstract

There are many iconic high-rise buildings in Hong Kong, for example, International Commercial Centre, International Financial Centre, etc. Fire safety issue in high rise buildings has been raised by local fire professionals in terms of occupant evacuation, means of fire-fightings by fire fighters, sprinkler system to automatically put off fires in buildings, etc. Fire risk becomes an important issue in building fire safety because it relates to life safety of building occupants where they live and work in high rise buildings in Hong Kong. The aim of this research is to identify the fire risk for different types of high rise buildings in Hong Kong and to optimise the fire prevention management for those high rise buildings with higher level of fire risk and to validate the model and also to carry out the study of the conflict between the current fire safety building code and the current trend of green building design. Survey via the 7-point scale questionnaire was conducted through50 participants and their responses were received and analysed via the statistical tool SPSS software computer program. A number of statistical methods of testing for significantly difference in samples were adopted to carry out the analysis of the data received. When the statistical analysis was completed, the results of the data analysis were validated by two Fire Safety Experts in this area of specialization and also by quantitative fire risk analysis.

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ME023

CHARACTERIZATION AND MACHINING BEHAVIOUR OF MAGNESIUM BASED NANO-COMPOSITES FOR AEROSPACE APPLICATIONS

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Abstract

Composites of magnesium are used extensively in aerospace and aeronautical applications due to their high strength to weight ratio and low densities. But the limitations of magnesium-based composites are they are weaker towards resistance in wear and corrosion. In order to improve their strength, resistance to wear and corrosion without increasing the density considerably, ceramic reinforcements and fillers are added. Ceramic reinforcements are tougher and are resistance to hazardous environment and can withstand high temperature applications. In order to improve the performance, nanofillers are added to improve mechanical strength, wear resistance and lubrication properties. In this research, primary ceramic reinforcement is Zirconium carbide (ZrC) and the secondary nanofiller reinforcement is hexagonal boron nitride nanoparticles (nhBN) in the matrix of AZ31 alloy. A suitable liquid casting method is adopted for fabricating the nano magnesium composite with the aid of ultrasonic cavitation. The casted specimens are subjected to mechanical, thermal, physical, wear and corrosion characterization studies as per ASTM standards. Also, machining characterization studies is also performed and the outputs are optimized using traditional and non-traditional optimization methods. Besides, artificial intelligence approach of neuro-fuzzy (ANFIS) model is developed to predict the output responses and the results are compared with the regression model predictions.

Keywords: *Magnesium disadvantages, ceramic reinforcements (Zirconium carbide), nanofillers (boron nitride), liquid casting method, Testing, optimization methods, neuro-fuzzy (ANFIS)*

ME024

EXPERIMENTAL OBSERVATION OF MICRO VERTICAL AXIS WIND TURBINES IN INDIAN REGIONS

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Abstract

With the growing emphasis on renewable energy sources, small-scale wind energy systems have emerged as a promising solution for localized power generation. This mini project focuses on the design and fabrication of a Micro Vertical Axis Wind Turbine (VAWT) by combining the advantages of two different turbine types: Savonius and Darrieus. The initial phase of the project involved an extensive survey of existing research and journal papers related to micro VAWTs, which provided valuable insights into different turbine configurations, performance characteristics, and design methodologies. Based on this literature survey, the concept of integrating Savonius and Darrieus rotor types was proposed to leverage the high starting torque of the Savonius design with the high-speed efficiency of the Darrieus rotor. A detailed study was conducted to select a suitable airfoil profile that would enhance the aerodynamic performance of the Darrieus section. Following this, appropriate materials were chosen considering factors such as strength-to-weight ratio, durability, and cost-effectiveness to ensure a lightweight yet robust structure.

Subsequently, a complete design of the micro VAWT was developed, incorporating both turbine types in a compact and efficient configuration. Necessary calculations related to rotor dimensions, tip speed ratio, power coefficient, and expected power output were carried out to validate the design. The result is a hybrid micro VAWT model that aims to perform efficiently even in low wind speed conditions, making it ideal for decentralized energy applications. This project highlights an innovative approach to micro wind energy generation and sets the foundation for future improvements and experimental analysis.

Keywords: *Micro Vertical Axis Wind Turbine, Savonius Rotor, Darrieus Rotor, Air foil Selection, Power Coefficient*

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ME025

INTEGRATED OPTIMIZATION OF MANUFACTURING AND REINFORCEMENT PARAMETERS IN HYBRID REINFORCED ALUMINUM MATRIX COMPOSITES THROUGH MULTI-RESPONSE RESEARCH AND TAGUCHI-GREY RELATIONSHIP MODELING

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Abstract

Nano-composites with mixed metal structures represent a cutting-edge class of materials, designed to exhibit specific properties tailored for targeted applications under defined conditions. Hybrid Electric Vehicles (HEVs) have gained substantial popularity in the global transportation industry due to their cost-efficiency and enhanced energy performance compared to conventional systems. This study focused on evaluating a tetra hybrid-reinforced aluminum matrix composite, using an experimental setup based on the L25 orthogonal array and Taguchi-based Grey Relational Analysis (GRA) for multi-response optimization. The aim was to assess how various combinations of reinforcements influence the physical and mechanical properties of the composite. The composite material was developed using a pure aluminum matrix, incorporating fixed amounts of silicon carbide (5 wt%) and varying proportions of aluminum oxide (2, 5, 7, and 10 wt%) and sugarcane bagasse ash (SCBA) (2, 5, 7, and 10 wt%). The Taguchi-GRA method was applied to identify the optimal combination of processing parameters and reinforcement contents. The best results were achieved with a milling time of 5 hours, a compaction pressure of 52 MPa, a sintering temperature of 480 °C, and an SCBA content of 7 wt%. Under these optimized conditions, the composite exhibited a density of 2.49 g/cm³, porosity of 0.77%, hardness of 4435.75 MPa, compressive strength of 364.65 MPa, and a peak elastic modulus of 1648.54 MPa. Among the four examined parameters, compaction pressure was found to have the most significant influence on the composite properties. These enhanced properties suggest promising potential applications in demanding sectors such as aerospace, automotive, healthcare, marine, and transportation industries.

Keywords: *Tetra hybrid aluminum matrix composites, Taguchi-Grey Relational Analysis, Mechanical properties optimization, Hybrid reinforcement materials.*

ME026

CHARACTERISTICS STUDY OF HYBRID FIBRE METAL LAMINATED COMPOSITE

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Abstract

Natural plant based fibres are being increasingly used in sustainable fibre reinforced composite applications in order to meet the demand of using environmentally friendly materials for composites. Fibre Metal Laminates (FMLs) are used in aerospace, automobile, marine and civil engineering applications, due to their excellent mechanical behaviours compared to traditional metals and their alloys. This study describes a novel fabrication of natural and synthetic fibre reinforced aluminium metal laminates, wherein carbon fibres were used as the skins and coconut coir and aluminium in the core layers. Aluminium sheets were chemically treated to enhance the compatibility and interfacial bonding at fibre metals-matrix interfaces .FMLs were manufactured by hot pressing technique, after the application of hand lay-up process for the resin impregnation and they were further tested under tensile, flexural and impact loading conditions. While comparing results, with natural fiber showed improved tensile and flexural properties compared to without natural fiberfmls. Chemical treatments on metal sheets further exceptionally enhanced the flexural properties. Significant improvement in the adhesion between the natural fibre and aluminium sheet after chemical treatment by using the enamel thinner applied among the surface. Therefore, with these enhanced properties, carbon based FML laminates can be used as sustainable composite materials in many automotive applications.

Keywords: *Fibre Metal Laminates, Carbon fibres, Coconut coir, Aluminium sheet, Hot Pressing Technique.*

ISBN: 978-93-6163-610-3

ME027

ENHANCEMENT OF MECHANICAL AND METALLURGICAL PROPERTIES OF FRICTION STIR SPOT WELDED LAPJOINTS OF AA6061 ALUMINIUM ALLOY WITH UNDERWATER ATMOSPHERE COMPARED TO AIR MEDIUM

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Abstract

The present work involves friction stir spot welding of 2 mm thick 6063 aluminum alloy sheets using different tool rotation speeds of 800, 1000 and 1200 rpm. These experiments were conducted in two different mediums: air and water. The effect of water cooling on the features and mechanical qualities of underwater friction stir spot welding and friction stir spot welding was studied. It emerged that increasing the tool rotation speedfrom800 RPMto1200 rpm increased the load bearing capacity and caused a modest increase in hardness, regardless of welding medium. However, compared to spot welding in air, friction stir spot welding in water was found to be advantageous due to a 105 N increase in load bearing capability and a minor increase in hardness. The improvements in the observed mechanical properties of the FSSW samples in water are attributed due to the micro structural refinement in the weld nugget zone.

Keywords: *Friction Stir Spot Welding (FSSW), Underwater welding, AA6063, Load bearing capacity, tool rotational speed, micro structural refinement.*

SCIENCE AND HUMANITIES

I - EE 01

PIN DIODE- BASED FIRE SENSOR

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Abstract

A PIN diode- based fire sensor is a compact and efficient system designed to detect fire by sensing infrared (IR) radiation emitted by flames. At it score, the PIN photo diode is highly sensitive to IR light. When exposed to this radiation, it produces a small current which is then am pilfered using an operational am pilfer (op- amp). This signal is fed into a compraetor circuit that checks whether their intensity exceeds preset threshold. If it does, the system activates an alarm such as a buzzer or LED, alerting users to potential fire hazards. This sensor is ideal for early fire detection in home, offices, and industrial setups, offering advantages like fast response time, low power consumption, and cost- effective operation.

For record studios, locker rooms, showrooms, and other locations, it is the perfect protective tool. The author sproto type is displayed. Promotion for a PIN- diode- based fire detector. The BPW34 is a two- pin photo diode that has a cathode (K) and an anode (A).The smooth surface of the photodiode in top view make sit simple to identify the anode end. The anode is a tiny solder point that is attached to a thin wire, and the cathode terminal is the other one. When exposed to 900 nm light, the BPW34, a tiny PIN photodiode in solar cell with a radiant sensitive surface, produces350 m VDC open- circuit voltage. It is sensitive to both firelight and natural sunlight. It is therefore perfect for use as a light sensor. TheBPW34 photodiode is suitable for both reverse-bias and zero- bias applications. When it receives light, its resistance drops. it is constructed with a 9Vbattery, a pies buzzer (PZ1), a PINdiodeBPW34 (D1), an op- am p CA3140 (IC1), a counter CD4060 (IC2), transistors BC547 (T1and T2), and a few more parts.

To supply photocurrent to the op-amp's input, the circuit's PIN photodiode BP W34 is connected to both the inverting and non- inverting inputs of op- amp IC1in reverse-biased m ode. TheCA3140 is a 4.5MHz BiM Osop- amp featuring bipolar output and MOSFET inputs. The input circuit's gate- protected MOSFET (PMOS) transistors offer an extremely high input impedance ,usually 1.5T ohm s. To switch the output status from high to low, the IC need survey small amount of input current— as little as10pA. As a transimpedance amplifier, IC1functions as a current- to- voltage converter in the circuit. The photocurrent produced in the PIN diode is amplified and transformed by IC1into the appropriate voltage in its output.

Keywords: *Sensing Component, Signal Conditioning Output Components, Power Supply, Processing Component, Connections*

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I – EE 02

HIGH POWER LED STROBOSCOPE

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Abstract

A High Power LED Stroboscope is a device that uses powerful LED's to emit brief, intense flash of light at rapid intervals. It's mainly used to observe or"freeze" fast-moving objects for analysis, especially in industrial, scientific, and entertainment applications. These flashes are synchronized with the motion of the object, making it appear stationary or moving slowly, allowing for visual inspection without stopping the machine. Unlike traditional xenon stroboscopes, LED-based stroboscopes are more energy- efficient, have a longer lifespan,and offer faster response times. They typically included just able frequency control, brightness settings, and a digital interface for precise tuning. Common uses include motors shaft inspection, vibration analysis, printing press monitoring, and special lighting effects in shows and concerts.

Keywords*: High- Power LED Stroboscope, Microcontroller, Sub-Microsecond Pulses, High Speed Imaging, Motion Analysis, Micro Fluidics.*

I – EC 01

ORGANIC LIGHT EMITING DIODES

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Abstract

This chapter offers an introduction to organic light-emitting diodes (OLEDs), which are solid-state light sources composed of organic semiconductor (OSC) materials. A variety of functional materials are employed to enhance the conversion of injected charges into emitted light, achieving maximum efficiency. These materials are specifically designed to produce the desired emitted color, whether for monochrome displays or broad-spectrum emissions suitable for general lighting.

Leveraging the chemical diversity of OSCs, which allows for adjustable luminescence across the visible spectrum, OLEDs have progressed from experimental curiosities to established display technologies. With ongoing technological advancements, these materials are poised to evolve into large-area, scalable, ultrathin, and flexible solid-state light sources for general illumination.

This discussion will cover the fundamental principles of OLED operation, various design and material implementations—with a particular focus on different emitter material concepts—and the optical characteristics of the thin-film structure, which significantly impact overall device efficiency. Finally, it will provide a brief overview of current research frontiers in this domain, highlighting emerging innovations and potential future developments in OLED technology.

Keywords: *High Contrast Ratio, True Blacks, Wide Viewing Angle, Fast Response Time, High Refresh Rate, Color Accuracy, High Dynamic Range.*

I – EC 02

3D HOLOGRAPHIC PROJECTION

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Abstract

3 Dholographic projection is the technology that records and reproduces objects in a real 3D image. Tremendous effect on all field so life including business education, Scienece, art and healthcare. Holographic projection is a kind of 3D technology without wearing glasses, and viewerscan see the three-dimensional virtual character. This paper made a more detailed description of 3D holographic projection, and explored the principle and technology about holographic projection based on computer three-dimensional graphics. It will have some reference value for the future development. The best candidate for a 3D display. The holographic display is an auto stereoscopic display which provides highly realistic images with unique perspective for an arbitrary number of viewers, motion parallax both vertically and horizontally, and focusing at different depths. The 3Dcontent generation for this display is carried out by means of digital holography. Digitalholography implements the classic holographic principle as a two-step process of wave front capture in the form of a 2D interference pattern and wave front reconstruction by applying numerically or optically a reference wave. Only holography makes it possible to recreate 3-D scenes that look natural, giving viewers a perfectly pleasant watching experience .But up until now, a number of obstacles have kept the technology from becoming widely used. But those challenges are now beginning to be surmounted. Recently, we combined a tracked viewing-window technology with an overlapping sub-hologram technique to create a revolutionary real-time display holography method.

Keywords: *Coherent imaging, Complex transparency, Electro-holographic, Real-time display, Sub-hologram, holographic projection, 3-D technology.*

I – EC 03

MODELING AND SIMULATION OF DOUBLE PENDULUM SYSTEM USING MATLAB AND SIMULINK

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Abstract

This paper deals with the modelling and stimulation of double pendulums with regard to MAT LAB and simulink. Computational methods were used to solve the motions non linear equations, which were formed through Lagrangiam mechanics. The stimulations demonstrate the pendulum system is more advanced features in regards to dynamics such as chaos, an unexpected side effect, and an extreme response to starting parameters. Analysis of the key features was conducted using time-domain and phase-space responses. This research will be useful in exploring issues concerned with nonlinear systems, control design, and dynamic system modeling.

Keywords: *Double Pendulum, MATLAB, Simulink, Lagrangian Mechanics, Nonlinear Dynamics*

I – EC 04

NANO ELECTRONICS

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Abstract

Nano electronics refers to the use of nanotechnology in electronic components. The term covers a diverse set of devices and materials, with the common characteristic that they are so small that inter-atomic interactions and quantum mechanical properties need to be studied extensively. Some of these candidates include: hybrid molecular/semiconductor electronics, one dimensional nanotubes / nanowires (e.g. silicon nanowires). In nano electronics, nanoscale thickness was demonstrated in the gate oxide and thin films used in transistors as early as the 1960s, but it was not until the late 1990s that MOSFETs (metal–oxide semiconductor field-effect transistors) with nanoscale gate length were demonstrated. Nanotechnology in electronics improves the capabilities of electronic devices. Moreover, it decreases their weight and power consumption. It improves the density of memory chips. It also reduces the size of transistors used in integrated circuits. While nanotechnology is transforming medicine, it also offers health hazards if not used properly. Nano particles can be harmful if inhaled or absorbed through the skin. Nanotechnology In Electronic Devices gives us the ability to improve the functionalities of electronics. Moreover, it also reduces their weight and power consumption. The following are some of the nano electronics areas under development, which you can learn more about by following the links in the next section. Nanotechnology is a branch of research and invention. It focuses on creating things on the scale of atoms and molecules. These are materials and gadgets. The National Nano science and Nanotechnology Initiative (NSTI) was launched in October, 2001 under the aegis of the Department of Science and Technology of the Ministry of Science. The motive of launching NSTI in 2001 was to create research infrastructure and promote basic research in nano science and nanotechnology. Universities and corporations across the world are rigorously studying how atoms fit together to form larger structures. Nano electronics is a fast-developing field that includes generating nano sensors in nano-sized dimensions for applications "from home to field. Nano electronic based nano devices are very important to developing the high-performance analyzes.

Keywords: *MOSFET, Nano Tube, Nano Wires*

I – EC 05

76G WIRELESS COMMUNICATION

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Abstract

The 6th generation of wireless technology is commonly referred to as 6G.The international Tele communication (ITU) has named the 6G frame work as 6G wireless technology is the next generation of cellular networks, building upon 5G and aiming for even faster speed ,lower, latency, and greater capacity the 6Gisthesuccessor to 5G cellular technology 6Gnetworks will be able to use higher frequencies than 5Gnetwork 6G technology promise as future of significantly faster and more reliable wireless communication with theoretical data rates reaching up to TPB Sand lower latency. Its expected to be deployed commercially around 2030 and will likely revolution interact with technology Several countries are actively researching and developing 6G technology, the name is Finland, China, Japan, and South korea Honourable Prime Minister has released Indias 6G vision.

Keywords: *Tele communication, 5G Cellular*

I – IT 01

EMBEDDED WITH IoT

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Abstract

The integration of Internet of Things (IoT) technology with embedded systems has revolutionized the way devices interact with the world and each other. Embedded systems, which are designed for specific control functions within larger systems, now have the ability to connect to the internet, gather data, and communicate in real-time. This convergence has enabled a wide range of smart applications across industries, including healthcare, agriculture, transportation, and home automation. By embedding IoT capabilities, devices can collect, process, and transmit data to cloud platforms or their devices, enabling advanced monitoring, automation and decision-making. This transformation not only improves emciency but also allows for predictive maintenance, real-time alerts, and data-driven insights. The use of sensors, microcontrollers, and communication modules plays a crucial role in ensuring the seamless operation of such systems. However, the fusion of embedded systems with IoT also introduces challenges related to security, power management, and data integrity. Designers must balance limited processing power and memory with the demands of constant connectivity and responsiveness. Despite these challenges, the continued advancement of low-power wireless communication and edge computing solutions is paving the way for more robust and scalable IoT-embedded systems, promising a smarter, more connected future.

I – IT 02

QUANTUM COMPUTING

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Abstract

Quantum computing is a revolutionary field that leverages the principles of quantum mechanics to process information in ways classical computers cannot. Unlike classical bits, which are either 0 or 1, quantum bits (qubits) exist in superpositions, allowing quantum computers to perform complex calculations exponentially faster in certain scenarios. With capabilities like quantum entanglement and interference, these machines promise breakthrough sin cryptography, optimization, drug discovery, artificial intelligence, and beyond Quantum computing is a new approach to computation that uses quantum mechanics principles to process information. Traditional computers rely on bits, which can be either 0 or 1, but quantum computers use qubits that can exist in multiple states at once. This property, known as superposition, allows quantum computers to perform complex calculations much faster than classical computers. Another key quantum phenomenon is entanglement, where two qubits become linked and share information instantly, regardless of distance. Entanglement enhances computational speed and accuracy, making quantum computers extremely powerful for certain tasks. Quantum computers also use quantum interference, helping refine calculations by eliminating incorrect possibilities. These advanced properties mean quantum computers can solve problems that would take classical computers millions of years. Cryptography is one of the biggest applications—quantum computers can break classical encryption methods but also create stronger security systems. Optimization problems in logistics, finance, and manufacturing benefit from quantum computing, making processes more efficient. Drug discovery is revolutionized with quantum simulations that model molecular interactions at an atomic level. Quantum AI enhances machine learning.

Keywords: *qubits, superposition, entanglement, decoherence, quantum algorithms, Shor's algorithm, Grover's algorithm, and quantum cryptography.*

I – IT 03

FULL STOCK DEVELOPMENT AND WEB DEVELOPMENT

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Abtract

Full-development is the comprehensive approach to web and application development where a developer is proficient in both front-end (client-side) and back-end (server- side) technologies. It involves designing inter active user Interfaces, implementing business logic, managing data bases, and deploying applications. Full-stack developers bridge the gap between us inexperience and system functionality, ensuring seamless integration between all layers of a software solution. This versatility allows for greater efficiency in development cycles, more cohesive architecture ,and easier debugging and maintenance. With the rising demand for scalable, responsive, and real-time applications, full-stack development has become a cornerstone of modern software engineering, especially in agile and fast-paced environments.

Keyswords: *Full-Stack Development-Front-End Development, Back-End Development, Web Development- HTML / CSS / JavaScript, React / Angular / Vue.js,Node.js / Express.js, Python / Django /Flask, SQL / NoSQL Databases,RESTful APIs / GraphQL /Git / GitHub, DevOps / CI/CD,Cloud Computing (AWS, Azure, Heroku), Responsive Design, Agile Methodology.*

I – IT 04

SECURITY INFORMATION AND EVENT MANAGEMENT

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Abstract

Security Information and Event Management (SEIM) systems play a vital role in today's cyber security landscape. They integrate data from various network devices, applications, and systems to provide a centralized view of an organization's security. SEIMs collect, normalize, and analyze log data in real time, enabling early detection of threats and suspicious behavior. They also help with regulatory compliance by maintaining logs and generating reports aligned with standards like HIPAA, PCI-DSS, and GDPR. One of the key features of SEIM is correlation, which links different events to uncover hidden attack patterns. Alerting mechanisms notify security teams about potential threats based on predefined rules or machine learning models. Despite their advantages, SEIMs face challenges such as data overload, false positives, and complex configurations. Modern SEIM solutions are evolving with cloud support, scalability, and AI integration. These innovations aim to enhance accuracy, reduce response time, and simplify threat management. SEIM provides centralized security monitoring for organizations .It collects data from multiple sources like firewalls and servers. By analyzing this data, SEIM detects unusual activity early. This helps prevent data breaches and cyber attacks in real time. SEIM improves visibility into network and user behavior. It helps security teams respond quickly to incidents. SEIM systems reduce the time to detect and contain threats. SEIM keeps audit logs that are useful during investigations. It's essential for protecting critical business assets. Without SEIM, security gaps can go unnoticed. Cloud based SEIMs offer scalability and flexibility. As cyber threats continue to evolve in complexibility and scale, SEIM solutions are adapting with advanced analytics, AI integration and cloud based capabilities .

Keywords: *Cyber security , Log analysis, Threat detection, HIPAA, Correlation, Alerting, false positives, AI integration, etc..*

I – IT 05

FULL STACK DEVELOPMENT

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Abstract

A full-stack website integrates frontend (React, HTML, CSS) for user interfaces, backend (Node.js, Express) for server logic, and a database (MongoDB) for data storage. The frontend handles dynamic rendering using React components, while the backend exposes REST APIs for CRUD o erations. User authentication (JWT/OAuth) secures routes, and Axios fetches data from Express endpoints. MongoDB stores user profiles, posts, or transactions, with Mongoose managing schemas. Responsive design ensures mobile compatibility, while state management (Redux/Context API) maintains UI consistency. Docker containerizes the app for deployment, and CI/CD pipelines automate testing. WebSockets enable real-time chat, and caching (Redis) optimizes performance. Finally, the app deploys on AWS/Heroku with HTTPS for security, completing a scalable, modern full-stack solution. This webpage features a responsive UI built with React, styled with Tailwind CSS for clean layouts. It includes a navigation bar, hero section, and dynamic content fetched via Axios from a Node.js backend. User input is captured through a form, validated with JavaScript, and submitted to an Express API endpoint. Mongo DB stores this data, while real-time updates display using React state hooks. Authentication ensures secure access, and error handling manages failed requests. The page is deployed on Vercel, connected to a cloud database, and optimized for fast loading with lazy-loaded components.

Keywords: *Essential website development keywords include *frontend (HTML, CSS, JavaScript, React), backend (Node.js, Python, APIs, databases like SQL/MongoDB), and DevOps (Git, Docker, AWS, CI/CD).*

I – IT 06

ARTIFICIAL INTELLIGENCE, MACHINE LEARNING, DATA SCIENCE

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Abstract

Artificial Intelligence (AI), Machine Learning (ML), and Data Science (DS) are rapidly evolving fields that play a critical role in transforming industries and shaping the future of technology. These tasks include reasoning, natural language understanding. AI systems rely on a combination of symbolic logic, statistical modeling. Machine Learning, a subfield of AI, involves the design and development of algorithms that enable computers to learn from and make predictions or decisions based on data. ML algorithms improve their performance over time as they are exposed to more data, utilizing techniques such as supervised learning, unsupervised learning, and reinforcement learning. Data Science is a multidisciplinary field that integrates mathematics, statistics, computer science, and domain expertise to extract meaningful insights from large and complex datasets. It encompasses the entire data processing pipeline, including data collection, cleaning, exploration, analysis, visualization, and modeling. The convergence of AI, ML, and DS has led to unprecedented progress in areas such as healthcare diagnostics, financial forecasting, intelligent automation, and natural language processing.

Keywords: *Statistical Modeling, Supervised Learning, Unsupervised Learning, Financial Forecasting.*

I – IT 06

FULL STACK DEVELOPMENT

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Abstract

The digital era has significantly transformed the way web applications are developed and deployed with the rising demand for dynamic, scalable, and interactive websites, Full Stack Web Development has become an essential skill in the industry. This paper presents a detailed study on the development of three projects using the MERN (MongoDB, Express.js, React.js, Node.js) stack: a Landing Page, a Portfolio Website, and a Weather Forecasting Application. These projects demonstrate various aspects of Full Stack Development, including front-end and back-end integration, database management, API handling, and security measures. The research focuses on the methodologies used, challenges. encountered, and future improvements. Furthermore, the study highlights how modern web development techniques can optimize user experience, performance, and security in full-stack applications.

Keywords: *Full Stack, MERN , MongoDB, Express.js , React.js , Node.js , API, Front & Backend, Database, SPA, Deployment, Portfolio.*

I – IT 07

CYBER SECURITY AND PRIVACY

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Abstract

In today's digital landscape, cyber security and privacy are paramount. As we increasingly rely on technology and online services, we expose ourselves to various risks. Cyber threats like hacking, phishing and ransomware can compromise our personal data and disrupt our lives. To safeguard our digital lives, it's essential to take basic precautions. Using strong, unique passwords and enabling two-factor authentication (2FA) can prevent unauthorized access to our accounts. For instance, apps like Google Authenticator and Authy provide an additional layer of security. Being cautious with links and downloads can help us avoid malware and viruses. Social media platforms like Facebook and Instagram often collect and share our personal data, which can be used for targeted advertising or even identity theft. To maintain our privacy, we should review our social media settings, limit data sharing, and use private browsing modes. For example, Facebook's "Privacy Checkup" feature helps users review their settings and control who sees their information. Staying Safe Online-To reduce our risk of cyber threats, we should:

- Use antivirus software like Norton or McAfee
- Keep software and apps updated
- Use a VPN (Virtual Private Network) like Express VPN or Nord VPN
- Back up our data regularly using services like Google Drive or Drop box
- Use a password manager to generate and store unique passwords
- Keep your data in encryption

In a world where technology is constantly evolving, staying informed and vigilant is key to safeguarding our digital lives. By taking these steps, we can protect our online identities and maintain our privacy

Keyword: *Two-factor authentication (2FA), Phishing, Ransomware, Data protection, VPN (Virtual Private Network, Online safety, Antivirus software)*

I – IT 08

DRONE TECHNOLOGY

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Abstract

Drone technology, also known as Unmanned Aerial Vehicle (UAV) technology, has rapidly evolved over the past decade and is transforming industries across the globe. Originally developed for military surveillance and combat, drones are now widely used in various civilian applications such as aerial photography, agriculture, logistics, environmental monitoring, and disaster management. Drones operate either autonomously through onboard systems or via remote control. They are equipped with advanced technologies like GPS, high-resolution cameras, sensors, and AI-based software, enabling them to perform complex tasks with highprecision and efficiency. The versatility and cost-effectiveness of drones make them valuable tools in sectors ranging from security to entertainment. Despite their benefits, drone usage also raises concerns related to privacy, safety, airspace regulation, and potential misuse. Addressing these challenges through smart policies and technological improvements is essential for the sustainable growth of the industry. Drone technology has evolved rapidly over the past decade, transforming from niche military tools into versatile platforms with broad civilian, commercial, and environmental applications. At its core, a drone—or unmanned aerial vehicle (UAV)—combines advances in miniaturized sensors, high‑efficiency propulsion systems, and autonomous navigation software to perform tasks that once required human pilots.

This paper explores three primary domains of drone utilization: industrial operations, scientific research, and public service. In industrial settings, drones enable precision agriculture through crop health monitoring and targeted pesticide delivery, while in construction and infrastructure inspection they deliver cost‑effective, high‑resolution aerial imaging. Scientific applications leverage drones for atmospheric sampling, wildlife tracking, and disaster‑zone data collection, overcoming traditional logistical barriers. In public service, law enforcement and emergency responders use UAVs for search‑and‑rescue, traffic management, and real‑time hazard assessment.

Keywords: *Unmanned Aerial Vehicles, Autonomous Navigation, Precision Agriculture, Airspace Regulation, Drone Swarms.*

I – IT 09

CYBER SECURITY: ISSUES AND PRIVACY

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Abstract

In an Electrical Power system, distribution substation is an important part of linking between utility to end user consumers. It has a capability to reduce as well as increase the energy supply to the end user consumers from utility generation supply as per requirement of electricity. Though, A Smart Grid is a modernized electrical power system or grid which consist analog or digital communication, information technology and an automated system. It needs to be secured with the help of cyber security. Cyber security is essential for smart grid which requires the network data and communication system to be secured. The stored data and computers need to be secured from hackers and e-threat. With the help of cyber security, Smart Grid can be made more efficient, reliable and secure. The existing power system needs to be upgraded to the next level i.e. Smart Grid. There are lots of challenges for implementing cyber security in Indian smart grid. In an increasingly interconnected world, the importance of cyber security has never been more critical. The rapid advancement of digital technologies has led to an explosion of data, making privacy protection a paramount concern for individuals, organizations, and governments. This paper explores the fundamental issues surrounding cyber security, including the growing sophistication of cyber threats such as malware, ransomware, and phishing attacks. Additionally, it examines the impact of these threats on privacy, focusing on the ways in which personal and sensitive data are vulnerable to unauthorized access, misuse, and theft. The paper also addresses the role of encryption, authentication protocols, and security frameworks in safeguarding data, as well as the challenges posed by evolving legal and ethical considerations. Furthermore, it highlights the balance between maintaining robust cyber security measures and ensuring the protection of individual privacy rights. In conclusion, the paper emphasizes the need for a collaborative approach involving government regulation, technological innovation, and public awareness to address the pressing challenges of cyber security and privacy in the digital age.

I – AG 01

SUSTAINABLEAGRICULTUREWITHSMART AUTOMATION

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Abstract

With the advanced technology, the world is getting automated. Automatic systems are being favored over manual systems, as they are energy efficient and to minimize the need for tedious manual labor. With agriculture, being the primary economic sector of India, it is essential to automate it in order to increase efficiency. A typical farm requires a lot of labor. Automation can proficiently moderate the amount of manual labor, and make farming easier and faster, leading to more agricultural growth. Numerous aspects of the farm are automated. The concept of automation is extended to agricultural farms. This paper is focused on analysis of farming, four features are included, moisture sensor which senses the soil humidity and automatically waters the field, light dependent resistor, which completes the light necessity whenever needed, obstacle detection used to enhance the security of the farm, fan system for maintaining temperature. As these featured devices will work whenever required, such system conserves energy effectively. Although, there are some issues that need this paper and efficient methods to be resolved are discussed in "Sustainable Agriculture with Smart Automation" is proposed using the analysis of the various farming problems. By optimizing resource usage, reducing labor dependency, and improving crop management, smart automation offers a path toward more resilient and eco-friendly agricultural systems. The study highlights current advancements, practical implementations, and the potential of automated solutions to support long-term food security and sustainability goals. Challenges such as technology accessibility, cost, and farmer adoption are also discussed, emphasizing the need for inclusive innovation and supportive policy frameworks.

I - AG 02

DRONE TECHNOLOGIES AND APPLICATION

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Abstract

Unmanned aerial vehicles, previously used for military purposes, have started to be used for civilian purposes since the 2000s. With the widespread use of unmanned aerial vehicles, mostly used for defence purposes, they have turned into flying vehicles called drones. Today, it is used for different purposes such as taking pictures, taking images from inaccessible places, competitions, and having a good time. However, it continues to evolve, playing an important role in social media and inter-company competition. In recent years, studies have continued on small drones that can fly autonomously, especially in closed areas, and assist people. The shrinkage and cost reduction of electronic components such as microprocessors, sensors, batteries, and wireless communication units shows that drones smaller than 1kg will soon occur in many areas of our daily life at much more affordable prices. This rapid change, development, and proliferation of drones also raise privacy and security concerns. While obtaining images of people and institutions in supposedly private environments with such technological devices emphasizes individual security, its use in urban areas and airports draws attention to social security. The rapid developments in this area necessitate the necessary regulations and controls to prevent accidents and other problems due to the growth in use and loss of control.

I – CS 01

FULL STACK DEVELOPMENT

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Abstract

Full Stack Development encompasses the creation of both front-end and back-end components of web applications. As demand grows for dynamic and responsive solutions, his approach has gained popularity for its efficiency and adaptability. This study explores the key tools—such as React, Angular, Node.js, Express, and MongoDB—and examines their role in full stack workflows. By analyzing case studies and development practices, the research highlights how full stack developers contribute to faster project delivery, improved team collaboration, and cost efficiency. Ultimately, full stack development empowers developers to manage complete applications, making them highly valuable in today's fast- paced tech environment.

Keywords: *UI/UX Design, JavaScript, Exoress.js, Web Application, Front-end development, Back-end development, MERN stack, MEAN stack*

I – CS 02

BLOCK CHAIN TECHNOLOGY

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Abstract

Block chain is a decentralized, distributed ledger technology that enables secure, transparent, and tamper-proof transactions without the need for a central authority. Initially developed for Bit coin, it has since found applications in finance, healthcare, supply chains, and more. This study explores the fundamental concepts of block chain, its advantages over traditional systems, and the challenges it faces. Key features such as smart contracts and consensus mechanisms like Proof of Work and Proof of Stake contribute to its reliability and trust. While block chain offers enhanced security, transparency, and efficiency, issues like scalability, regulatory uncertainty, and high energy consumption remain significant barriers.

Keywords: *Digital Identity, Smart Contracts, Supply Chain Tracking, Crypt Occurrences (E.G., Bit Coin, Ethere), Immutable, Crypto currencies, Distributed ledger, Cryptography, Smart contract.*

DEPARTMENT OF MANAGEMENT STUDIES

MBA 001

A STUDY ON THE ROLE OF TRANSPARENCY IN BUILDING BRAND TRUST

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Abstract

In today's competitive market landscape, brand trust has emerged as a critical factor influencing consumer loyalty and purchase decisions. Transparency, encompassing open communication, ethical business practices, and honest marketing, plays a pivotal role in shaping consumer perceptions and fostering long-term relationships with brands. This study explores the impact of transparency on brand trust by examining key dimensions such as corporate communication, supply chain visibility, data privacy, and ethical advertising. The research investigates how businesses that prioritize transparency enhance consumer confidence and mitigate scepticism. Furthermore, it examines how digital advancements, particularly in social media and online reviews, have heightened consumer expectations for honesty and accountability. The study employs a mixed-methods approach, incorporating both qualitative and quantitative data to analyze consumer attitudes towards transparent business practices. Findings from this study are expected to provide insights in to how brands can lever age transparency as a strategic tool to build trust and sustain competitive advantage. The implications of this research will be valuable for marketers, policymakers, and business leaders aiming to strengthen customer relationships in an era of increasing consumer awareness and demand for corporate accountability.

Keywords: *Transparency, Brand Trust, Consumer Perception, Ethical Marketing, Corporate Communication, Digital Transparency.*

MBA 002

A STUDY ON FINANCIAL PERFORMANCE IN AAVIN CO-OP LTD., THENI.

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Abstract

The Project study has been conducted in `` **AAVIN CO-OP LTD** `` Regarding A Study on Financial Performance financial analysis can be applied in a wide variety of situations to give business managers the information they need to make critical decisions. The ability to understand financial data is essential for any business manager. Finance is the language of business. Business goals and objectives are set in financial terms and their outcomes are measured in financial terms. Among the skills required to understand an manage a business is fluency in the language of finance the ability to read and understand financial data as well as present information in the form of financial reports. The finance function in business involves evaluating economic trends, setting financial policy, and creating long-range plans for business activities. It also involves applying a system of internal controls for the handling of cash, the recognition of sales, the disbursement of expenses, the valuation of inventory, and the approval of capital expenditures. In addition, the finance function reports on these internal control systems through the preparation of financial statements, such as income statements, balance sheets, and cash flow statements. Researching used secondary data for her research. Industry analysis done based on the information gathered from newspapers and websites and other sector related websites. The use of primary sources is limited to discussion with company guide in finance department. The reason being, it is against the company's policies and procedures to reveal the sensitive financial information, comparative balance sheet proves that the financial performance for each succeeding year very much satisfactory as compared with its previous year during the period of 2019-2024

Keywords: *Financial Function, Business goals, Business involves, Economic Trends, Setting financial policy, Creating Long Range Plans and Business Activities.*

 ISBN: 978-93-6163-610-3

MBA 003

A STUDY ON EMPLOYEES ENGAGEMENT STRATEGIES AND ITS IMPACT ON EMPLOYEE PERFORMANCE IN L.S MILLS-MADESUPS PRIVATE LIMITED, THENI.

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Abstract

Employee engagement plays a vital role in shaping an Employee Performance and overall success. This study explores the impact of employee engagement strategies on organizational performance, with a particular focus on L. S. Mills Made ups-Unit Private Limited, Theni. The research examines key engagement factors, such as workplace culture, leadership effectiveness, job satisfaction, communication, and recognition, and their influence on employee motivation and performance. A combination of primary and secondary data collection methods was employed, including employee surveys and statistical tools like Chi-square analysis and correlation techniques to evaluate engagement levels and their effect on productivity. The findings highlight that higher engagement leads to improved efficiency, reduced turnover, and better job commitment. However, challenges such as lack of leadership support, ineffective communication, and limited growth opportunities can hinder engagement efforts. The study further emphasizes the importance of strategic engagement initiatives, including regular feedback mechanisms, career development programs, and employee recognition systems, to foster a motivated workforce. By implementing these strategies, organizations can create a positive work environment that enhances productivity, innovation, and long-term business sustainability. This research contributes to existing literature by offering practical recommendations for improving employee engagement and reinforcing its role in driving organizational success.

Keywords: *Employee Engagement Committed, Motivated, and Satisfied with their work.*

MBA 004

A STUDY ON EMPLOYEE TURNOVER AND RETENTION TECHNIQUES IN BY SRI VIDYA INDUSTRIES, MADURAI.

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Abstract

This paper principally centres on managing representative retention and the instruments utilized for retention. Explicitly this paper pictures about the overall practices received like ability the executives, Organizational Development, Training, Rewards and Recognition and recruiting measure. Thoughtfully, worker retention is significant; in practically all cases, it is silly to permit great individuals to leave your association. The achievement of an association principally depends on the proficiency and steadiness of its workers. During the previous decade the automobile business has been confronting an extraordinary issue in holding the top abilities. The way to progress depends on great authority, great administration, and likely group with, information, abilities, perspectives and aptitudes. The specialized expertise of an organization to hold its worker relies upon the consistent development pace of it. In business market great alludes to significant and skilled workers. This article presents about the examination paper on representative retention in automobile industry.

Keywords: *Retention Practices, Training and development, Overall satisfaction.*

 ISBN: 978-93-6163-610-3

MBA 005

A STUDY ON HUMAN RESOURCE PLANNING IN BHARGAVE RUBBER PRIVATE LTD MADURAI

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Abstract

Human Resource Planning (HRP) is a strategic process that aligns an organization's human capital with its goals and objectives. This study examines the importance of HRP in fostering organizational effectiveness, exploring its role in forecasting staffing needs, optimizing talent acquisition, and managing workforce development. The research focuses on the methodologies employed in HRP, including the assessment of current and future skill requirements, the impact of technology on HRP processes, and the integration of HRP with broader organizational strategies. Through qualitative and quantitative analysis, the study identifies best practices, challenges, and trends in HRP, emphasizing the need for adaptability in an ever- evolving business landscape. The findings suggest that successful HRP not only enhances operational efficiency but also contributes to employee satisfaction, retention, and overall organizational success. The study highlights the critical role HRP plays in responding to dynamic market conditions, changing workforce demographics, and technological advancements.

Keywords: *workforce development, organizational strategies, qualitative and quantitative analysis and challenges*

MBA 006

A STUDY ON EMPLOYEES JOB SATISFACTION IN SRI JAYABHARATH GINNING FACTORY, THENI DISTRICT

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Abstract

Employee job satisfaction is a critical element of organizational success, influencing employee retention, performance, and overall productivity. Satisfied employees are more likely to remain loyal, committed, and aligned with organizational goals. This study, conducted at Sri Jayabharath Ginning Factory, aims to explore the various intrinsic and extrinsic factors impacting employee satisfaction.With a workforce of approximately 120 employees, the study provides insights into the workplace environment, including working conditions, leadership style, communication, recognition, salary and benefits, job security, and career development. Descriptive research methodology was used with structured questionnaires distributed among employees from different departments. The analysis, based on simple percentage and correlation methods, revealed that while employees expressed satisfaction with job security and peer relationships, there were concerns about compensation, growth opportunities, and recognition systems. It is suggested that the management must take proactive steps to improve these areas to boost satisfaction levels. In conclusion, understanding and addressing the concerns of employees is essential for building a motivated, loyal, and high-performing workforce. The findings of this study can assist the HR department in aligning employee needs with organizational objectives, thereby enhancing productivity and overall employee well-being.

Keywords: *Employee Satisfaction, Motivation, Job Security, Work Environment, Recognition.*

 ISBN: 978-93-6163-610-3

MBA 007

A STUDY ON WORK LIFE BALANCES AND ITS IMPACT ON EMPLOYEE PERFORMANCE IN HIRAMAYEE RUBBER INDUSTRY PVT LTD, MADURAI.

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Abstract

Quality of Work Life is referred to all the organizational inputs which aim at the employee's satisfaction and enhancing organization effectiveness. The purpose is to develop jobs and working condition that is excellent for employees as well as the economic health of the organization. It also refers to the satisfaction, motivation, commitment, and involvement of an individual experience concerning their line at work. The paper aims to study the concept "Quality of Work-Life" and the role it plays in enhancing the productivity and performance inthe firm. The purpose of the study is mainly to understand the quality of work life of the employees with significant factors like Working Environment, Training, and Development, Compensation & Rewards, Organizational Commitment, Job Satisfaction, etc. The research includes 150 employees who were designated as Staff Employee, Technician, Executive and Manager in a firm. The primary data can be analyzed using the statistical tool like ANOVA, Chi- Square, and Correlation

Keywords: *Quality of work life, higher productivity, working environment, Performance.*

MBA 008

A STUDY ON IMPACT OF HR PRACTICES ON HR DECISION MAKING AT L.S. SPINNING MILLS PVT. LTD., THENI

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Abstract

HR department is an essential component of any business, regardless of an organization's size. It is tasked with maximizing employee productivity and protecting the company from any issues that may arise within the workforce. HR responsibilities include compensation and benefits, recruitment, firing, and keeping up to date with any laws that may affect the company and its employees. The objective of the study is to analyse the impact of HR practices on HR decision making at L.S.Spinning Mills, Theni. The sample of the study is 120. Descriptive research design and convenience sampling method has been used. Questionnaire has been used as a primary data. Simple percentage analysis, chi-square analysis and correlation statistical tools have been applied to reach the findings of the study. It is found that there is significant relationship between gender of the respondents and employee involvement in the decision making. It is suggested that to properly inform HR decision-making, the organization must make an effort to fully comprehend its current workforce and Precise future labour forecasting ought to be given top priority in order to match HR procedures with long-term requirements. It is concluded that HR practices is a root cause for organisational growth and productivity since the top level management has to focus to frame and implement proper HR practices for the successful proceeding of the organisation.

Keywords: *Employee Productivity, Compensation and benefits recruitment, decision making, HR Procedure, Top Level Management.*

 ISBN: 978-93-6163-610-3

MBA 009

A STUDY ON HUMAN RESOURCE INFORMATION SYSTEM IN HUMAN RESOURCEB PLANNING AT NANDHU INDUSTRY

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Abstract

This study investigates the human resource information system in human resources planning, with specific focus on Nandhu Industries. HRIS is a vital tool that enhances workforce planning, decision-making, and talent management by providing accurate data and analytics. The research explores various aspects of HRLS, inducing its role in workforce forecasting, recruitment, performance management, and employee development. It also investigates how organizations integrate HRIS to improve strategic HR planning, optimize resource allocation, and enhance operational efficiency. Utilizing a combination of primary and secondary data collection methods, induding surveys and statistical analysis, this study assesses the effectiveness of HRIS in streamlining HR functions. Findings indicate that while HRIS significantly improves data accuracy, compliance, and strategic HR decisions, challenges such as system integration issues, lack of user training, and data security concerns may hinder its full potential.

Keywords: *HR decisions, challenges, Lack of user training.*

MBA 010

A STUDY ON QUALITY OF WORK LIFE AMONG THE EMPLOYEE IN IRULAPPA MILLS INDIA PVT LTD.,

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Abstract

In modern era, it has been observed that stress management has become one of the most substantial concepts in the professional environment. It is also seen that working efficiency has degraded to some extent as professionals are unable to maintain a balance between their personal and professional lives. This difference has made organizations to formulate such policies that lead to better job performance which results in job Satisfaction more over employee satisfaction. This degree of satisfaction has been referred to as QUALITY OF WORK LIFE. Quality of work life is a process in an organization which enables its members at all levels to participate actively and effectively in shaping organizational environment, methods and outcomes.

Keywords: *Quality of work life, Job Performance, Employee satisfaction. Job security.*

 ISBN: 978-93-6163-610-3

MBA 011

A STUDY ON TALENT ACQUISITION AND EMPLOYEE RETENTION TECHNIQUES AT GOODWILL TEAM PAPER PVT LTD

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Abstract

This study targets to training and development on organizational performance. It was motivated by the reality that certain firms do not appear to care about expanding the ability of their worker but instead frown upon and penalise any deficiencies shown by the employees. The researcher also stressed on the numerous training approaches devised and its execution throughout the globe during the training and development programs. The study also suggests that training and development is a must in all company notably for the unskilled or the less experience personnel. Generally, employees' job contribution was considerably enhanced owing to the training techniques and tools employed by the organisation. Thus, it led to a beneficial influence on employee' performance and an increase in their abilities and work efficiency. Findings indicated that training and development were positively correlated and claimed statistically significant relationship with employee performance and productivity. The study concluded that training and development have important impact on employee performance and productivity. Thus, in order for organizations to achieve optimum returns from their investment, there is imperative need to effectively manage training and development programs.

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MBA 012

A STUDY ON EMPLOYEE AND EMPLOYER RELATIONSHIP IN SRI GANAPATHI SILKSPRIVATELIMITED, THENI

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Abstract

The employer-employee relationship is a vital component of any organization, influencing job satisfaction, productivity, and overall workplace morale. A healthy and constructive relationship fosters trust, mutual respect, and open communication, which significantly enhance employee engagement and retention. This study focuses on examining the level of employer-employee relationships and their impact on job satisfaction at Sri Ganapathi Silks, Theni. Adopting a descriptive research design, the study utilized convenience sampling to select a sample of 100 employees from different departments. Primary data was collected through structured questionnaires, while secondary data was sourced from company records and published materials. The tools applied for analysis include percentage analysis, chi-square test, and correlation analysis. Results indicated that 45% of employees strongly agreed that effective communication is essential to organizational success, and 37% strongly believed that trust contributes positively to productivity. The correlation analysis showed a significant relationship between gender and perceptions of work-life balance, while the chi-square test revealed no significant link between age and feelings of being respected. Based on the findings, it is suggested that management should enhance employee involvement in decision-making, strengthen recognition and reward systems, and provide more welfare amenities. Encouraging training programs and offering regular feedback could also help improve job satisfaction. In conclusion, a strong and respectful employer-employee relationship not only boosts individual morale and motivation but also plays a key role in the sustainable growth of the organization. Organizations like Sri Ganapathi Silks must continue to foster trust, transparency, and employee development to maintain a productive and harmonious work environment.

Keywords: *employer-employee relationship, Job satisfaction, Communication, Trust, productivity, Employee engagement, Organizational success and work Environment.*

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MBA 013

STUDY ON EMPLOYEE WELFARE PRACTICES AT SRI LAKSHMI INDUSTIRES, USILAMPATTY

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Abstract

This study investigates the labour welfare practices implemented by Sri Lakshmi Industries, a prominent player in the murukku machine industry. Labour Welfare is crucial for maintaining a healthy and motivated workforce, which directly impacts organizational productivity and sustainability. Through a comprehensive analysis of Sri Lakshmi Industry's welfare initiatives, this research aims to assess the effectiveness of these practices in enhancing employee well-being and satisfaction. The study adopts a mixed-method approach, incorporating both quantitative and qualitative methodologies to gather data. Surveys to obtain insights into their perceptions and experiences regarding labour welfare practices. Additionally, secondary data form company reports, policies, and relevant literature and analyzed to provide context and depth to the findings. The findings reveal a range of labour welfare practices implemented by Sri Lakshmi Industries including health and safety measures, employee development programs, social security benefits, and recreational facilities. These initiatives demonstrate the company's commitment to fostering a supportive and conducive work environment for its employee. The study also identifies areas of strength and areas for improvement in the existing welfare framework. Furthermore, the research explores the impact of labour welfare practices on employee well-being, such as resource constraints to the existing literature on labour welfare practices by providing empirical insights into their case of Sri Lakshmi Industries.

Keywords: *Labour Welfare, Employee well-being, Job satisfaction, Organizational Performance.*

MBA 014

A STUDY ON EMPLOYEE MOTIVATION AT NANDHA MILLS, THENI

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Abstract

To examine the factors that influence employee motivation, to find out the ways through which employees are motivated in the organization and to examine the effectiveness of intrinsic rewards, extrinsic rewards and training program on performance. Motivation is the word derived from the word 'motive' which means needs, desires, wants or drives within the persons. It is the process of inspiring people to actions to achieve the goals. In the work goal background, the psychological factors motivating the people's behavior can be need for Money, Respect, Job- Satisfaction, Achievement, etc. In Nandhu Mills the objectives of this study was drive behavior, achieve goals, increase productivity (primary objectives) & job satisfication ,employee engagement, reduced stress, improved morale (secondary objectives). A descriptive research design was adopted for this research. The researcher used convenient sampling technique to draw a sample size of 100 respondents. The data is collected using structured questionnaire developed by the researcher, specifically for this study. A set of descriptive statistics including pie charts and frequency tables were used to present the results of the study the research design that was used for this study is descriptive research design. Descriptive study collects data in order to answer questions about current status of the subject or topic of study because this study was concerned with finding what are the factors, that influence motivation of employees and how motivation affects the employee performance in the organization. The data collected from the employee's during the survey are analyzed using various tools. Some of the statistical tools applied in the study are **Anova and chi square Test**. In this study the major conclusions are the employee motivation is highly sensitive concept which is affected by a multiplicity of factors. Some of these factors are extrinsic in that they emerge from within the organization and are an external imposition on the employee.

Keywords*: Employee Motivation, Rewords, Training Program, Highly Sensitive Concept.*

 ISBN: 978-93-6163-610-3

MBA 015

A STUDY ON EFECTIVENESS OF REWARD SYSTEM ON MOTIVATIONAL LEVEL OF EMPLOYEE AT THENI GURUKRISHNA TEXTILE PVT LTD

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Abstract

The aim of this study was to look at the importance of organization rewards system as a motivation tool for employee's performance. More and more organizations are realizing that they have to find a good balance between workers contribution to the organization and the organizations contribution to work. Therefore, the objective of this study was to investigate what types of rewards motives employees. Likewise, identifying whether there is a comprehensive total rewards system, and if there is much awareness of total rewards amongst employees. In order to investigate this research firstly looked at the literature around total rewards system and how it can relate to employee motivation and performance. After conducting various perspectives and studies carried out on reward systems and employee motivation. These were then outlined for a practical perspective as well as theoretical perspective. It is concluded that totally rewards system is vital in every industry and since employer's are looking for talented people they must produce the types of rewards that will meet employees needs in order to retain them for long term.

Keywords*: Rewards system, Employees motivation and Performance.*

MBA 016

A STUDY ON PERFORMANCE APPRAISAL SYSTEM AT SRI THIRUMALA COIRS IN MADURAI DISTRICT

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Abstract

This study focuses on the performance appraisal system of employees at Sri Thirumala Coirs. Performance appraisal refers to the regular review of an employee's job performance and overall contribution to a company. The objective is to evaluate employee performance, to provide feedback for employees improvement. The reveals that performance appraisal leads to improved employees' performance. Which results from increased productivity in the organization. The research design used is descriptive methods. The data collection instrument is primary data that is collected through questionnaires. In the research of 110 respondents were male 60 and female 50 taken. The Employees are satisfied with the current performance appraisal of the company. The majority of the employees are motivated of the organization through increased productivity. A performance appraisal is known by other terms like employee appraisal, performance review. It is a method by which the job performance of an employee is measured in terms of quality, quantity, cost, behaviour and time. It is conducted by self, peers, superior and subordinates. A performance appraisal is a part of measuring, comparing, finding, guiding, correcting and managing career development of the employees. Performance appraisal is the study of present achievements, strengths and weakness, suitability for incentives, rewards and recognition, increased promotion or further training. The study is to identify the factors that influence to provide the maximum performance towards organizational development, the awareness level of performance appraisal technique among the employees and to investigate the need and expectation of performance appraisal system in the company.

Keywords: *Performance appraisal, Employee motivation and Performance evaluation.*

 ISBN: 978-93-6163-610-3

MBA 017

A STUDY ON CHALLENGES FACED IN MATERIAL HANDLING MANAGEMENT AT SLS DHALL MILL IN UNJAMPATTI, ANNAJI, THENI

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Abstract

In today's fierce competitive global markets, customers are demanding adjustable lot sizes, shorter lead times, higher quality and flexibility; in short, they want it all. In order to stay competitive in the market, companies need to attain both customer satisfaction and cost reduction in production operations. Material Handling Systems is the place to accomplish this goal, since they have a direct impact on production. Therefore, the aim of this study was to design an in-house Material handling that could be efficient for the production it serves. The highly competitive environment, linked to the globalization phenomena, demands from companies more agility, better performance and the constant search for cost reduction. The present study focused on improvements in internal materials handling management, approaching the case of a large company in the manufacturing industry. Materials handling is intrinsically associated with production flow. Because of this, it has direct influence on transit time, resources usage, and service levels. The objective was to evaluate, in a systematic way, the challenges faced in material handling management at manufacturing industries.

Keywords: *Customer satisfaction, Cost reduction, Production operation, Cost efficiency and Work place safety.*

MBA 018

A STUDY ON WAGES AND SALARY OF ADMINISTRATION POLICIES AND PRACTICES TOWARDS CIBI KRISHNA TEXTILES PRIVATE LIMITED

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Abstract

In the present era where high employee turnover and low retention rate turn in two biggest night mare for the entrepreneurs, a sound compensation policy for the organization play sergeant role in case of providing relief to them. Concepts like performance based pay system, knowledge-based pay system, market-based pay system are introduced by the employers to pay the employees in different format. Apart from this various offers like commission, profit sharing, health insurance schemes are also provided in order to attract employees. Some organizations also prepare separate set of executive compensation policy for their top level executives, so that they canat tract and hire the min this time of cut thro at competition. Various components of compensation such as wage/salary, Incentives, benefits, perquisites are properly taken into consideration by the organization while designing the compensation policy for the employees. The sole objective behind this is to make the employees satisfied in terms of compensation, which is the major role player in influencing their professional and personal life. Because it is money, which motivates the employees more, to perform better and better in the organization and through this they get a status and recognition in the society. Owing to emphasis literacy level, today most of the employees are educated, well informed, and they are very much aware of their rights. As are salt, it is now very difficult for the organizations to exploit them in any ground. Similarly, due to the vast use of television and Internet, now it is not so difficult for them to access any job belong to any organization at any place. Therefore taking all the so into consideration a sound compensation policy is a compulsory factor for every organization under compensation management system, so that they maintain a stable and satisfied workforce.

Keywords: *Compensation, Compensation management system, Compensation approach, Employee, job satisfaction, Awareness, Skills and Knowledge.*

 ISBN: 978-93-6163-610-3

MBA 0119

A STUDY ON IMPACT OF TEAMWORK IN ORGANIZATION PRODUCTIVITY AT MENAKA MILLS PRIVATE LIMITED THENI

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Abstract

The study investigates the impact of teamwork on organizational productivity, with a specific focus on Menaka Mills Private Limited in Theni Distinct. The teamwork is a crucial factor in enhancing efficiency, motivation, and innovation in the work place. The research explores various aspects of teamwork, including leadership style, team coordination, conflict management, and the relationship between team objectives and overall organizational goals. The research employee's a combination of primary and secondary data collected including employee a questionnaire and statistical tools such as ANOVA, Percentage and correlation analysis to sample size the number of observation included in sample is called sample size. The research fixed the sample size a 110 for this study Male 53 Female 57 assess the effectiveness of teamwork initiative. Finding indicate that while teamwork significantly contributes to improved productivity and employee's satisfaction, challenges such as ineffective leadership, unequal task distribution, and lack of proper teamwork assessment can hinder its full potential. 31.8% are of the respondent are 34-44 years. 25.55% revealed that it is satisfied. The Teamwork record must be maintained, preserved properly and updated timely. Proper care should be taken while selecting the trainers. Analysis of all the facts & figures, the observation and the experience during the Teamwork period gives a very positive conclusion/impression regarding the Teamwork imparted by lzon Technology is performing its role up to the mark and the trainees enjoy the Teamwork imparted especially the practical session and simulation

Keywords: *Teamwork, Communication, Collaboration, Leadership and Employee Satisfaction.*

MBA 020

A STUDY ON TRAINING AND DEVELOPMENT TOWARDS ON JPR AQUA FARM PRIVATE LIMITED, THENI.

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Abstract

This study targets to training and development on organizational performance. It was motivated by the reality that certain firms do not appear to care about expanding the ability of their worker but instead frown upon and penalise any deficiencies shown by the employees. The researcher also stressed on the numerous training approaches devised and its execution throughout the globe during the training and development programs. The study also suggests that training and development is a must in all company notably for the unskilled or the less experience personnel. Generally, employees' job contribution was considerably enhanced owing to the training techniques and tools employed by the organisation. Thus, it led to a beneficial influence on employee' performance and an increase in their abilities and work efficiency. Findings indicated that training and development were positively correlated and claimed statistically significant relationship with employee performance and productivity. The study concluded that training and development have important impact on employee performance and productivity. Thus, in order for organizations to achieve optimum returns from their investment, there is imperative need to effectively manage training and development programs.

Keywords: *Employee Training, Employee Development, employee Productivity.*

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MBA 021

A STUDY ON WORK CULTURE EMPLOYEE IN SREE VAISHNAVI INDUSTERIES

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Abstract

Work culture is a critical determinant of organizational success, influencing employee engagement, productivity, and overall well-being. This study explores the dynamics of workplace culture, emphasizing its role in shaping employee behaviour, job satisfaction, and retention. Key elements such as leadership styles, communication practices, diversity and inclusion initiatives, and psychological safety are examined as drivers of a positive work environment. The research highlights how toxic cultures, marked by poor management or lack of work-life balance, contribute to burnout, attrition, and diminished performance. Additionally, the study investigates the impact of evolving trends, such as remote/hybrid work models and digital collaboration tools, on redefining cultural norms. Findings suggest that organizations prioritizing transparent communication, recognition programs, and employee empowerment foster higher levels of trust and innovation. Recommendations include cultivating inclusive leadership, aligning cultural values with employee needs, and leveraging feedback mechanisms to sustain adaptive and resilient workplaces.

Keywords: *Work Culture, Employee Engagement, Organizational Culture, Leadership Styles, Employee Well-being.*

MBA 022

A STUDY ON WASTE CONTROL AND MANAGEMENT BY USING LEAN AT ANNA COOPERATIVE SPINNING MILLS LTD

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Abstract

Organizations today have started incorporating methodologies for reduction or elimination of wastages in various forms thereby focusing on waste management and controlling the min the effective way. one of the powerful methodologies through the implementation of Lean management within the production process. Through the various types of lean tools like 5s, kaizen, Root cause analysis, organization can eliminate the various forms of waste. Generally there is a different form of waste in the company. They are in different forms like over production, waiting, transport, movement, process, stocks, defects, non-utilized talent, by eliminating the waste by implementing the lean manufacturing process. The main objective of the study is to control and manage the waste in the Anna cooperative spinning mills ltd. waste management is the impact full and essential process, which leads to promoting the productively and reduces the environmental impacts. by using the waste management principles along with lean management to control waste and management in an effective way to increase the company revenue and improve the overall company development through continuous improvement. To analyze the overall production process by using the lean tool to identify the waste and root cause of the waste generation. waste which is generated in the company, it may be the raw material for the other production the same market by analyzing the waste to reuse in a way, to promote productivity, reduce the manufacturing cost. Through the lean tool implementation, company can improve the working environment, reduce waste, increase productivity, improve employee safety, and finally the company can be continuously improved.

Keywords: *Waste control and management, Lean management and Continuous improvement.*

ISBN: 978-93-6163-610-3

MBA 023

A STUDY ON GENDER EQUALITY IN WORKPLACEAT NEVEDHA KNITTS, TIRUPUR.

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Abstract

This study explores the current state of gender equality in the workplace, examining the challenges faced by women and men in achieving equal opportunities, treatment, and outcomes. Through a mixed-methods approach, combining surveys, interviews, and case studies, this research investigates the impact of organizational culture, policies, and practices on gender equality. The purpose is to increase gender equality at work for all employees in organisation, with a focus on leave policy inequalities, challenges, equality in gender, equal opportunity in between men and women on working environment. The findings highlight persistent disparities in career advancement, pay equity, and work-life balance, as well as opportunities for improvement through inclusive leadership, diversity training, and flexible work arrangements. The study provides recommendations for organizations to promote gender equality, enhance employee well-being, and drive business success.

Keywords: *Gender equality, Workplace diversity, Inclusion, Career advancement, Pay equity, Work-life balance.*

MBA024

A STUDY ON HR POLICIES AND LEGAL COMPLIANCE IN SHAKTHI KNITTING PRIVATE LIMITED.THENI

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Abstract

HR policies in India play a crucial role in ensuring structured employee management while maintaining compliance with a complex framework of labour laws. These policies must align with statutory regulations to create a fair, safe, and productive work environment. Recruitment and selection policies must adhere to anti-discrimination laws like the Equal Remuneration Act, 1976 and constitutional provisions, while employment contracts are governed by the Industrial Employment (Standing Orders) Act, 1946 and state-specificShops and Establishments Acts. Wage policies must comply with the Minimum Wages Act, 1948, the Payment of Wages Act, 1936, and the Bonus Act, 1965, ensuring timely salaries and proper statutory deductions such as PF, ESI, and TDS. Workplace health and safety are labour mandated under the Factories Act, 1948 and the OSH Code, 2020, requiring safety measures and training. Additionally, the POSH Act, 2013 makes it compulsory for organizations to implement anti-harassment policies with Internal Complaints Committees (ICCs). Leave policies must follow the Maternity Benefit Act, 1961 and state labour laws, while grievance redressal mechanisms must comply with the Industrial Disputes Act, 1947. With the introduction of the Digital Personal Data Protection Act, 2023, HR policies must also ensure employee data privacy. Navigating India's evolving labour laws, including the new labour codes (2020), presents challenges such as compliance risks, legal penalties, and the need for regular policy updates. To mitigate these risks, organizations must conduct periodic audits, provide compliance training, and revise HR policies to align with legal requirements. By integrating statutory mandates into HR frameworks, companies can foster ethical workplace practices, avoid legal repercussions, and maintain a harmonious work environment.

Keywords*: HR Policies, Legal Compliance, Employment, Environment, Complaints and Workplace health and safety.*

 ISBN: 978-93-6163-610-3

MBA 025

A STUDY ON INNOVATIVE HR PRACTICES FOR IMPROVING LABOUR PRODUCTIVITY IN COW BRAND AGRO FOODS, TINDIVANAM

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Abstract

This study explores the impact of innovative HR practices on labour productivity at Cow Brand Agro Foods. It investigates how strategic HR initiatives such as employee engagement programs, skill development training, performance-based incentives, and workplace wellness initiatives can enhance productivity. The research identifies best practices and areas for improvement, providing insights for HR professionals and management to optimize labour productivity and drive business growth. It highlights key strategies such as employee training, performance incentives, and engagement initiatives. The research finds that modern HR approaches contribute significantly to boosting worker efficiency and overall organizational performance. The study concludes that adopting innovative HR methods is essential for enhancing productivity in the agro-food sector

Keywords: *Innovative HR Practices, Labour Productivity, Employee Engagement, Skill Development, Performance-Based Incentives, Workplace Wellness.*

MBA 026

A STUDY ON ANALYSIS OF CONSUMER SATISFACTION AND ADHERENCE WITH FRESH FRUIT CRUSH, READY-TO-DRINK BEVERAGES, AND SOFT DRINKS FROM KAMAYAM SIVASAKTHI FOOD PRODUCTS, CUMBUM

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Abstract

This study investigates consumer satisfaction and adherence levels toward three popular beverage categories fresh fruit crushes, ready-to-drink (RTD) beverages, and soft drinks produced by Kamayam Sivasakthi Food Products, based in Cumbum, Tamil Nadu. With a growing demand for convenient and flavourful beverages, understanding consumer preferences is essential for strategic product development and market positioning. Using a structured questionnaire distributed among a diverse consumer base in the region, data were collected on taste, quality, packaging, price perception, brand loyalty, and repurchase intentions. Statistical tools, including descriptive analysis and correlation metrics, were employed to evaluate consumer satisfaction and behavioural adherence. The findings reveal that fresh fruit crushes scored highest in perceived naturalness and taste satisfaction, while RTD beverages were favored for convenience. Soft drinks maintained strong adherence among younger demographics due to brand familiarity and affordability. The study concludes with actionable insights for Kamayam Sivasakthi Food Products to enhance product offerings and align marketing strategies with consumer expectations.

Keywords: *Consumer Satisfaction, Marketing Strategies, Affordability.*

 ISBN: 978-93-6163-610-3

MBA 027

A STUDY ON CONTROLLING EMPLOYEE ABSENTEEISM AND ITS IMPACT ON ORGANISATIONAL PERFORMANCE IN AKRUTHI APPEARAL S.S PURAM, AUNDIPATTI

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Abstract

Absenteeism is an issue that has grown in importance over the past few years; however, little has been done to explore the impact of presenters on individual and organizational performance and wellbeing. Utilizing both quantitative and qualitative methodologies, the research delves into the factors influencing absenteeism rates, including organizational policies. The objective of the study is to analyse the study on controlling employee absenteeism and its impact on organizational performance in Akruthi Appearal S.S Puram, Andipatti. The study based only on the opinion and expectation of employees. Total number of Sample Universe is 500 and taken Sample size is 120 respondents. Descriptive research design and random sampling techniques were used for the study. Primary data and secondary data have been used in the study. Simple percentage analysis, Chi square analysis and correlation analysis have been applied in this study to reach the finding of the study. It is found that there is positive relationship between the gender of the respondents and impact of employee absenteeism on organisational performance. It is suggested that the company must Control the Employee stress and Satisfied their needs and wants. It is concluded that the study highlights the importance of employee satisfaction is the need for organizations

Keywords: *Absenteeism, Employee attendance, Workforce absenteeism, Absence management, Attendance tracking, Employee satisfaction.*

MBA 028

AWARENESS ON BIOMEDICAL (BM) WASTE AND ITS IMPACT ON PERSONNEL HEALTH: A STUDY WITH REFERENCE TO SELECTED HOSPITALS IN TRICHY

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Abstract

Health care waste refers to all the waste generated by a health care establishment. It is estimated that 10%-25% of health care waste is hazardous with the potential for creating a variety of health problems". "Biomedical waste (BMW) collection and proper disposal has become a significant concern for both the medical and general community". The problem associated with medical waste disposal is due to rapid and uncontrolled growth of medical care facilities. This situation can cause a potential health hazard (epidemic) to public at large, especially health care workers of disposing waste. This study is primary concerned with awareness and Bio medical waste and its impact on health of employees in selected hospital in Trichy. The result indicates that, 70 %of the respondents are male and 30% of them are female. The highest 39% of the employees are in the age range between 31 Years to 35 Years. 42 % of the respondents are having experience between 3 years to 5 years. The respondents who are in the age range between 6 years to 8 Years will have more awareness about the legislation based on the mean score 1.85.The respondents who are having experience range of 9 years and above has given high amount of important for Bio medical waste disposal based on mean score of 4 and its variance of opinion based on standard deviation is ±.00. Whereas the respondents who has ,up to 2 years of experience has given less important for bio medical waste disposal systems. There should be strategically attention need on Bio medical waste awareness and its impact on Health.

Keywords: *Awareness, Biomedical waste, Health Hazard, Personnel, Legislation.*

 ISBN: 978-93-6163-610-3

MBA 029

A STUDY ON TEACHERS' PERCEPTION TOWARDS THE PERFORMANCE APPRAISAL SYSTEMS IN COLLEGES, TRICHY

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Abstract

Self-assessment is fundamental to reflective practice that informs on-going professional growth. The Teacher Performance Appraisal includes performance rubrics designed to guide self-assessment and reflection based on professional practice. There are three parameters has been taken into account for this study. The primary method of data college was deploy and out of the 400 total sample there were 369 fill and complete questionnaire were used for analysis. The results of the present study emphasis that female respondents highly satisfied towards the learning and development dimension and co curricular dimension and male respondents were satisfied only with research dimension of the performance appraisal systems used in the higher education. Senior teachers have high level of satisfaction towards the all dimensions of performance appraisal where as the beginners teachers show less satisfaction towards al the dimensions. The strategic attention need to give all the dimensions and revised the system which meets all the age group in the systems.

Keywords: *Co-curricular, Performance appraisal, Research and Teaching and Learning*

MBA 030

STRESS ADOPTION FACTORS AND ITS IMPACT ON HEALTH AMONG THE MEDIA PROFESSIONALS IN KERELA

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Abstract

A profession that leads to well-being is rewarding and fulfilling, as it is a vital factor in ascertaining the happiness and purpose of one's life. Information and communications technology has become an integral part of everyone's life in contemporary times. Media professionals are engaged in using various types of digital and online media for their work-related needs. At many times, due to extensive work requirements, they carry their professional commitments outside the office hours. Due to their obsessive media consumption attitude, they lose out on spending time with their families and themselves. Job is an important part for many people's life and professional stress related to job is inevitable. "There is a firm relation between profession-related stress and performance and there is evidence to support that the stress affects organizational and individual productivity (Bradley & Sutherland, 1994)."Absenteeism, shirking work responsibilities, arriving late, leaving early, etc., loss of productivity, increase in employee turnover ,more of error prone work, memory loss, etc., cribbing, various psychological and psychometric problems, over-reacting, arguing, getting irritated, frustration, suicides, deteriorating health, more of accidents, etc., eating disorders, excessive smoking and drinking, insomnias , depression, improper work, delay in completion of job etc. are the outcomes of stress. Therefore it is matter of series consent the proposed to study the Stress adoption factors and its impact on health among the Media Professionals in Kerala.

Keywords: *Absenteeism, Employee Turnover.*

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MBA 031

ROLE OF BUSINESS INTELLIGENCE IN STRATEGIC DECISION-MAKING IN SMEs

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Abstract

In today's dynamic and data-driven business environment, Small and Medium Enterprises (SMEs) face increasing pressure to make informed, timely, and strategic decisions to remain competitive. This study explores the pivotal role of Business Intelligence (BI) tools and technologies in enhancing strategic decision-making processes within SMEs. It examines how the integration of BI systems enables SMEs to collect, analyze, and interpret large volumes of data, transforming it into actionable insights. The research investigates the benefits, challenges, and adoption barriers faced by SMEs in implementing BI solutions. Through a combination of literature review and case studies, the paper highlights the positive impact of BI on improving operational efficiency, forecasting, market analysis, and customer relationship management. The findings suggest that while BI offers significant strategic value, factors such as cost, digital skills, and data quality influence its effective implementation in small business environments.

Keywords: *Business Intelligence, Strategic Decision-Making, SMEs, Data Analytics, Operational Efficiency, Forecasting.*

MBA 032

THE SYNERGISTIC ROLE OF UPI AND FINTECH STARTUPS IN PROMOTING FINANCIAL INCLUSION AND CASHLESS TRANSACTIONS IN INDIA

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Abstract

In recent years, India has witnessed a remarkable transformation in its financial landscape, primarily driven by the growth of digital payment systems and the emergence of innovative fintech startups. This study examines the synergistic role played by the Unified Payments Interface (UPI) and fintech startups in fostering financial inclusion and advancing the country's journey toward a cashless economy. UPI, developed by the National Payments Corporation of India (NPCI), has revolutionized real-time interbank transactions, while fintech startups have introduced accessible, user-friendly platforms that cater to diverse population segments, including those previously excluded from formal financial systems. Through a mixed-method approach involving secondary data analysis and primary stakeholder interviews, this research explores the extent to which UPI and fintech innovations have enhanced digital payment penetration, improved financial literacy, and bridged socioeconomic gaps. The study also highlights key challenges such as cybersecurity concerns, digital illiteracy, and infrastructure barriers, while recommending policy interventions and strategic partnerships to strengthen the digital payment ecosystem. The findings provide valuable insights for policymakers, financial institutions, and technology entrepreneurs aiming to build an inclusive and cashless economy in India.

Keywords: *Unified Payments Interface (UPI), Fintech Startups, Financial Inclusion, Cashless Economy, Digital Payments, Financial Technology, India, Digital Financial Services, Mobile Wallets, Payment Innovation.*

 ISBN: 978-93-6163-610-3

MBA 033

A STUDY ON TRANSPORTATION MODE SELECTION: A DECISION-MAKING FRAMEWORK

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Abstract

The selection of an appropriate transportation mode is a critical decision in logistics and supply chain management, as it significantly impacts the efficiency, cost, and sustainability of goods movement. This study aims to develop a comprehensive decision-making framework for transportation mode selection, considering factors such as cost, time, reliability, and environmental impact. A mixed-methods approach was employed, combining qualitative and quantitative data collection and analysis methods. The study identifies key criteria influencing transportation mode selection and evaluates the trade-offs between different modes, including road, rail, air, and sea transportation. The findings provide insights into the complexities of transportation mode selection and offer a practical framework for logistics managers to make informed decisions. The study's results can help organizations optimize their transportation operations, reduce costs, and improve their environmental sustainability.

Keywords: *Transportation mode selection, Decision-making framework, Logistics management, Supply Chain management, Sustainability.*

DEPARTMENT OF MASTER OF COMPUTER APPLICATION

MCA 001

DIGITALIZED STUDENT ATTENDANCE TRACKING AND ENROLLMENT SYSTEM FOR COMPUTER TEACHING INSTITUTES USING FLUTTER AND WEB SERVER

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Abstract

The Digitalized Student Attendance Tracking and Enrollment System is a smart and modern solution built using Flutter and integrated with a web server to streamline and enhance the daily operations of computer teaching institutes. This system enables real-time management of student data, batch scheduling, and attendance tracking through user-friendly interfaces for both administrators and staff.

One of the system's key features is its real-time SMS notification service, which sends an automatic message to parents when a student is marked present. This fosters active parent engagement and ensures transparency in student attendance monitoring.

By replacing manual processes with a fully digital approach, the system reduces human error, improves efficiency, and provides instant access to academic records. The platform is scalable, secure, and designed to support the growing needs of educational institutions.

Overall, this project represents a significant step toward the digital transformation of institute management, delivering a reliable, interactive, and tech-driven experience for staff, students, and parents alike.

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MCA 002

AI-ENABLED SURVEILLANCE SYSTEM FOR ABNORMAL ACTIVITY DETECTION AND ALERTING

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Abstract

Surveillance system is a network of interconnected devices and technologies designed to monitor, record, and analysis activities in a particular area or environment. The primary purpose of surveillance systems is to enhance security, gather data for analysis, and provide insights into various aspects of the monitored space. These systems are commonly used in a wide range of settings, including public spaces, commercial establishments, residential properties, and governmental facilities. Many surveillance systems rely on motion detection algorithms to trigger alerts. As a result, false alarms are common, leading to alert fatigue and reduced effectiveness. Traditional surveillance systems, however, often face challenges such as limited coverage, manual monitoring, and false alarms, which can hinder their effectiveness in detecting and responding to security threats. In recent years, advancements in artificial intelligence (AI) and computer vision technologies have revolutionized surveillance systems by enabling more intelligent and automated approaches to monitoring and analysis. This project presents an AI-driven surveillance system designed to enhance security by detecting and responding to abnormal activities in real-time. The proposed system utilizes Convolutional Neural Networks (CNN) for behaviour classification and YOLOv8 (You Only Look Once version 8) for abnormal activities detection, the system identifies abnormal behaviours and specific objects associated with security threats. Upon detection, an integrated alert system triggers alarms and sends SMS and email notifications to designated personnel, enabling swift response and intervention.

Keywords: *AI-Enabled Surveillance, Abnormal Activity Detection, Alerting, Security System, Real Time Monitoring, YOLOv8, Convolutional Neural Network*

MCA 003

AI DRIVEN HEALTHCARE SYSTEM FOR DOCTOR RECOMMENDATION AND VIDEO CONSULTATION BASED ON FACIAL EXPRESSION AND SPEECH ANALYSIS

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Abstract

Telehealth refers to the use of digital technologies to provide healthcare services remotely, enabling patients to consult with healthcare providers without needing to visit physical healthcare facilities. While telehealth offers the convenience of remote access, it faces significant challenges in delivering holistic care, as it often lacks the ability to gauge a patient's emotional well-being or mental state during consultations. Current telehealth systems also fail to offer personalized doctor recommendations tailored to the specific needs of each patient, relying instead on more generalized care approaches. This project introduces an AI-powered healthcare system designed to overcome these limitations by integrating advanced machine learning techniques. It utilizes Temporal Convolutional Neural Networks (TCNN) for facial expression recognition to assess emotional states and Convolutional Neural Networks (CNN) for speech recognition to capture vocal patterns. Furthermore, Natural Language Processing (NLP) is employed to understand the semantic content of patient speech, enabling a comprehensive analysis of both emotional and physical well-being. A key feature of the system is the use of content-based filtering to recommend healthcare professionals best suited to the patient's condition, ensuring a more tailored approach to treatment. The system also includes a feedback mechanism to continuously improve doctor recommendations and overall patient care. By providing personalized recommendations and real-time emotional insights, this AI-driven solution addresses the shortcomings of traditional telehealth services. This innovative system marks a significant step forward in telehealth, combining machine learning with human-centered care to deliver a better remote healthcare experience.

Keywords*: Telehealth, Artificial Inteligence (AI), Temporaral Convolutional Neural Networks (CNN), Natural Language Processing (NLP), Personalized Heathcare.*

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MCA 004

GRADE FORGE: DYNAMIC RESULTS MANAGER

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Abstract

The College Student Results Maintenance System is a comprehensive digital platform designed to efficiently manage and track academic results within educational institutions. It replaces outdated, paper-based result processing with a secure, user-friendly, and automated solution. The system enables administrators and faculty members to input, update, and manage student grades, while students can easily log in to view their academic performance. Core features include result entry, automatic grade calculation, report generation, and secure data storage. Role-based access control ensures that only authorized users can view or edit specific sections of the data, maintaining data integrity and privacy. All academic records are centrally stored, making it easy to retrieve, back up, and manage information over time. Automation reduces human error, speeds up processing, and promotes transparency in academic evaluations. The system also allows filtering and searching of student results by roll number, department, semester, or subject. Faculty can export reports for printing or archive them digitally, and students receive timely notifications when new results are published. The platform is scalable to handle thousands of students and is built with a focus on long-term reliability. Security features such as form validation and database encryption help protect sensitive academic data. Designed with both performance and usability in mind, this system supports institutional goals of accuracy, efficiency, and accessibility. It is developed using Python, Django, MySQL, HTML/CSS, and JavaScript, providing a modern, maintainable, and expandable infrastructure for future needs.

MCA 005

A NOVEL APPROACH TO DIGITAL EVIDENCE INTEGRITY AND CHAIN OF CUSTODY USING BLOCKCHAIN AND DEEP LEARNING

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Abstract

Digital evidence, which encompasses data stored, transmitted, or received via electronic devices, is crucial in criminal investigations, civil cases, and regulatory compliance. This includes electronic documents, recordings, and transaction logs that underpin critical decision making processes. However, challenges such as data tampering, unauthorized access, and vulnerabilities in centralized storage systems threaten the integrity and security of this evidence. To address these issues, a novel architecture has been developed to enhance the investigation lifecycle by securing storage, detecting tampering, and preserving the integrity of digital evidence. The proposed solution employs blockchain technology to establish a robust Chain of Custody (CoC) and integrates advanced deep learning models for tamper detection across various file types. These models include CNN for image forensics, BERT for document embedding's, TCN for video frame analysis, HMM for audio spectrogram processing, and structural analysis for PDF files. By incorporating fuzzy hash functions, the system effectively addresses permissible alterations in digital evidence while standardizing forensic processes. The blockchain-based ledger ensures encrypted, immutable storage, facilitating complete data provenance and traceability throughout the investigation. This innovative architecture provides a reliable mechanism for maintaining the authenticity and integrity of digital evidence. It fosters transparency and trust among stakeholders by delivering a tamper-proof record of events associated with evidence collection, storage, and analysis. The integration of advanced AI algorithms with blockchain technology ensures a comprehensive framework for secure digital evidence management, addressing the growing need for an automated, standardized, and reliable solution in modern forensic investigations.

Keywords*: Digital Evidence, Blockchain, Chain of Custody (CoC), Deep Learning, Tamper Detection, Digital Forensics.*

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MCA 006

AI POWERED MEDIA GENERATION AND FAQ SYSTEM

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Abstract

This project integrates multiple AI-powered modules—an FAQ system, a text-to-image generator, a voice assistant, and intelligent chatbots—into a unified smart assistant platform. The FAQ system uses Natural Language Processing (NLP) to interpret user queries and deliver accurate, context-aware responses from a structured knowledge base. The text-to-image generation feature leverages deep learning models to transform user prompts into visually creative outputs, making the system interactive and visually engaging. A voice assistant allows users to interact with the system hands-free, enhancing accessibility and convenience. Chatbots further extend the conversational capabilities, simulating human-like interactions for both casual and functional dialogues. Together, these components create a powerful, user-friendly solution that bridges communication, creativity, and automation, suitable for use in customer support, education, and content generation environments.

Keywords: *Artificial Intelligence (AI), Natural Language Processing (NLP), FAQ System, Text-to-Image Generation, Deep Learning, Voice Assistant, Chatbots*

MCA 007

AI-POWERED CHATBOT FOR STUDENT QUERIES

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Abstract

In today's fast-paced academic environment, students require instant support for a wide range of queries related to admissions, courses, fees, examinations, and administrative processes, etc... Traditional systems, often reliant on manual handling via phone calls or emails, are inefficient and prone to delays and errors, especially during peak periods. This paper presents the design and development of an AI-Powered Chatbot for Student Queries, which leverages Natural Language Processing (NLP) and Machine Learning (ML) to provide real-time, accurate, and contextually relevant responses to student inquiries. The system incorporates Dialog flow for understanding and interpreting natural language inputs and provides interaction via both text and voice interfaces, enhancing accessibility.

Developed using a modern technology MERN stack which includes React.js and Tailwind CSS for the frontend, Node.js with Express.js for the backend, and MongoDB for data storage and the chatbot ensures scalability and maintainability. The system includes a voice recognition module using the Web Speech API, allowing users to interact with the chatbot through voice commands. An admin panel enables dynamic updates of FAQs and allows administrators to manage the knowledge base, keeping the system relevant and up-to-date. Optional modules such as notification and reporting systems provide analytical insights into chatbot performance and user behavior. Deployed using Vercel for the frontend and AWS/Render for the backend, this intelligent chatbot system reduces academic staff workload while offering 24/7 support. Its modular design ensures future scalability, making it a reliable digital assistant for educational institutions.

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MCA 008

PARKING SLOT DETECTION USING IMAGE PROCESSING

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Abstract

Urbanization has led to increased vehicle ownership, resulting in ineffective and chaotic parking systems, especially in densely populated areas. This paper presents a smart parking slot detection system using image processing techniques to overcome these issues. The system utilizes real-time image acquisition from CCTV or dedicated cameras to monitor parking lots. Through advanced image preprocessing techniques like grayscale conversion, noise reduction, and contrast enhancement, the input images are optimized for accurate analysis. Perspective correction and edge detection are employed to segment and identify individual parking slots, ensuring the camera's angle does not affect the slot recognition.

The core of the system integrates modern vehicle detection algorithms such as YOLOv8 and Open CV-based object detectors to classify each slot as occupied or available. Detected slot statuses are overlaid on the image in real time, allowing users to quickly identify free parking spaces. This automated approach reduces the need for manual monitoring, helps drivers save time and fuel, and contributes to better traffic management. The proposed system is particularly suitable for use in public buildings, shopping malls, and office complexes, offering a scalable solution for smart city infrastructure.

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MCA 009

ROBUST SCALABLE CAMPUS-WIDE DATA COLLECTION AND DISTRIBUTION FRAMEWORK

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Abstract

The Robust Scalable Campus-Wide Data Collection and Distribution Framework integrates event management and student record tracking using a centralized, scalable MySQL database. It supports scheduling, registration, and real-time attendance via QR codes or RFID, storing event data in normalized tables linked to student profiles. Student records include academics, attendance, disciplinary actions, and participation, with triggers and procedures automating GPA calculations and eligibility. Scalability is achieved through sharding, indexing, and connection pooling to support 10,000+ users during peak times.

Python middleware layer manages API interactions between the frontend and backend, syncing event updates with student calendars. Read replicas and scheduled my sql dump backups ensure reliability during high traffic and data protection. Dashboards provide real-time analytics using SQL JOINs, revealing trends like performance linked to participation. MySQL JSON fields handle flexible metadata like disability accommodations. Encryption and role-based access control ensure FERPA/GDPR compliance, while cloud-hosted MySQL clusters enable auto-scaling. Query caching, triggers for notifications, and MySQL views for insight reporting make the system a secure, intelligent foundation for unified campus data.

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MCA 010

ENSURING TRUSTWORTHY NAVIGATION IN AUTONOMOUS VEHICLES USING BLOCKCHAIN AND MACHINE LEARNING

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Abstract

Connected and Autonomous Vehicles (CAVs) are a category of vehicles that combine connectivity, automation, and advanced technologies to enhance transportation efficiency, safety, and convenience. A CAV GPS spoofing attack refers to a type of cybersecurity threat aimed at Connected and Autonomous Vehicles (CAVs) by manipulating their Global Positioning System (GPS) navigation data. GPS spoofing involves transmitting fake GPS signals to mislead CAVs' onboard GPS receivers, causing them to make incorrect location and navigation decisions. This form of attack can have serious consequences, including altering the vehicle's route, causing it to deviate from its intended path, or even leading to accidents or safety issues. One of the primary challenges is the continual evolution of spoofing methods, with attackers employing increasingly sophisticated techniques. The project aims to tackle these challenges by integrating block chain technology for data integrity, LSTM algorithms for analysing GPS time series data, and quantum cryptography for secure communication. Through this integration, the goal is to detect and prevent location spoofing attacks and establish a secure and trustworthy framework for CAVs in a world where reliable GPS data is essential for their operation. This project introduces a multifaceted solution that combines cutting-edge technologies to safeguard CAVs from location spoofing attacks. The integration of blockchain technology ensures the integrity of GPS data by creating a tamper-resistant ledger of information. Long Short-Term Memory (LSTM) algorithms are employed to Quantum cryptography utilizes the principles of quantum mechanics to encrypt and transmit data in a way that is practically immune to eavesdropping and hacking. This not only ensures the safety of passengers and the proper functioning of autonomous vehicles but also paves the way for a more secure and trustworthy environment for CAVs in the future.

Keywords*: Connected and Autonomous Vehicles, GPS spoofing attack, Blockchain technology, LSTM algorithms, Quantum cryptography.*

MCA 011

DETECTION OF MANUFACTURING DEFECTS USING SIAMESE NETWORK

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Abstract

In modern manufacturing environments, ensuring product quality through precise and reliable defect detection is essential to maintain operational efficiency and customer satisfaction. Traditional defect identification methods—often manual or rule-based—are limited by subjectivity, high labour costs, and poor scalability. This project introduces a deep learning-based approach utilizing a Siamese Neural Network (SNN) for the detection of manufacturing defects. The SNN is particularly adept at learning similarity measures, making it well-suited for identifying subtle anomalies across component surfaces. The model comprises twin convolutional neural networks with shared weights that extract and compare features from image pairs. By calculating the Euclidean distance between the feature embeddings of two images and optimizing with a contrastive loss function, the system learns to differentiate defective components from non-defective ones, even with a limited dataset.

To train and evaluate the model, a curated dataset of component images with labelled defect and non-defect instances was used, along with data augmentation techniques to enhance variation and robustness. Experimental results demonstrated that the Siamese Network exhibited high accuracy, low false positive rates, and strong generalization to unseen defect types. The proposed solution significantly outperforms conventional CNN classifiers in detecting minor surface defects and can be seamlessly integrated into automated inspection pipelines. This approach lays the groundwork for real-time, intelligent quality control in manufacturing, offering a scalable, cost-effective, and consistent alternative to traditional inspection systeUltimately, this research bridges the gap between deep learning innovation and industrial automation, showcasing the transformative potential of AI in smart manufacturing

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MCA 012

AI-POWERED SCHEME NAVIGATOR FOR TAMIL NADU GOVERNMENT SCHEMES

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Abstract

Government schemes encompass diverse areas such as education, healthcare, agriculture, social welfare, and infrastructure. However, a lack of awareness and difficulty in accessing accurate information often prevents individuals from availing of these benefits. To address these challenges, this project proposes the development of a Natural Language Processing (NLP)-based chatbot designed to provide seamless access to information about Tamil Nadu government schemes. The chatbot leverages advanced NLP frameworks, such as spaCy and Hugging Face Transformers, to process and interpret user queries, delivering precise and relevant responses.

Comprehensive data on government schemes is collected, preprocessed, and used to train the model. Integrated into a user-friendly interface, the chatbot ensures effortless interaction, allowing users to inquire about various initiatives and obtain real-time information. The system incorporates testing and monitoring mechanisms to ensure accuracy and adaptability to a wide array of user inputs. Regular updates are planned to reflect policy changes and maintain the chatbot's relevance. Additional features include user authentication for personalized assistance and provisions for human support to handle complex queries. By offering an intelligent conversational interface, this project aims to enhance accessibility and engagement, empowering citizens to make informed decisions and utilize available government resources effectively.

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MCA 013

AUTONOMOUS DEFENSE FRAMEWORK FOR CRYPTOGRAPHIC RANSOMWARE USING BILSTM AND PROACTIVE DATA PROTECTION

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Abstract

Ransomware attacks have become a pervasive cyber threat, targeting organizations of all sizes and causing significant financial and operational disruptions. Ransomware encrypts critical files or locks systems, rendering them inaccessible until a ransom is paid, often with no guarantee of recovery. Despite the availability of numerous ransomware detection tools, emerging ransomware variants continue to outpace traditional defenses, leaving users, businesses, and governments vulnerable. This project addresses the growing threat of cryptographic ransomware by developing an innovative runtime solution that autonomously defends against such attacks. Leveraging a BiLSTM (Bidirectional Long Short-Term Memory) network model, the system identifies and blocks ransomware during its execution by analyzing intricate temporal patterns in its behavior. The BiLSTM model is designed to adapt to evolving attack techniques, ensuring robust and reliable detection. In addition to detection, the project introduces a proactive defense mechanism employing Format Preserving Encryption (FPE) to safeguard data. By camouflaging files as untouchable through excluded extensions and hiding them in obscure directories, the system minimizes the risk of encryption by ransomware. The proposed solution combines advanced detection with proactive data protection.

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MCA 014

HARVEST HUB: E-COMMERCE AND KNOWLEDGE SHARING FOR FARMERS

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Abstract

The agricultural sector, particularly in countries like India, faces pressing challenges such as low productivity, limited market access, and poor price realization for farmers. Small and marginal farmers, who represent a significant portion of the agricultural community, often face difficulties securing fair returns due to a reliance on intermediaries in a fragmented, unorganized market. These intermediaries commonly pay below-market prices to farmers while imposing high commissions on buyers, diminishing farmers' earnings and limiting growth. This project, HarvestHub, aims to address these challenges by offering an integrated e-commerce platform that connects farmers directly with consumers. Through HarvestHub, farmers can set up profiles, showcase their produce with detailed descriptions, images, and pricing, and reach a wider range of potential buyers. Consumers can browse available products, make selections, and securely complete transactions through an embedded payment system. By eliminating middlemen, HarvestHub empowers farmers to achieve fairer prices, creating a more transparent and equitable marketplace. Alongside the marketplace, HarvestHub features a Farmers Forum—an interactive community space for registered users to seek advice, share experiences, and discuss best practices in agriculture. This forum fosters a collaborative environment where farmers can learn, gain insights, and refine their techniques for improved productivity. By bridging the gap between farmers and consumers, HarvestHub not only facilitates direct sales but also builds a support network that promotes sustainable farming and boosts farmers' livelihoods.

MCA 015

TRASH AI: CAMERA VISION BASED TRASH CLASSIFICATION AND DETECTION SYSTEM USING DEEP LEARNING

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Abstract

Trash, commonly referred to as discarded materials or waste, includes items and substances no longer deemed useful or valuable. Improper waste management contributes to environmental issues such as pollution, ecosystem disruption, and health hazards due to the release of harmful substances. Existing waste management systems face significant challenges in sorting, disposal, and efficiency, particularly in rapidly urbanizing areas where the volume and complexity of waste streams are increasing. To address these challenges, an innovative solution leverages advanced technologies like Convolutional Neural Networks (CNNs) and Temporal Convolutional Networks (TCNs). CNNs are leveraged for their exceptional ability to analyze images, enabling precise classification of various waste types, such as biodegradable, recyclable, and hazardous materials. This ensures accurate segregation at the source, minimizing contamination between waste streaComplementing this, TCNs are employed to process time-series data, allowing the system to detect and adapt to dynamic changes in waste patterns and volumes. These capabilities enable real-time detection of waste and intelligent segregation, significantly reducing manual intervention and human error. These cutting-edge methods enable precise trash classification, real-time waste detection, and intelligent segregation, forming the core of a next-generation waste management system. A Municipality Web App serves as the central hub for monitoring and decision-making, streamlining waste management operations and promoting sustainable practices. By automating and optimizing waste-handling processes, this solution enhances efficiency, minimizes human error, and fosters environmental consciousness. This transformative initiative is designed to revolutionize urban waste management, paving the way for smarter, cleaner cities and contributing to a more sustainable future.

Keywords: *Trash AI, Image analysis, Smart city solutions, Time series analysis, Temporal Convolutional Networks, Deep Learning, Waste Detection,*

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MCA 016

ADVANCED AI FRAMEWORK FOR URBAN SAFETY THROUGH MANHOLE INSPECTION AND MAINTENANCE

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Abstract

Manholes, essential components of urban utility infrastructure, provide access to underground systems like sewers, electrical conduits, and storm drains. However, deteriorated, open, or missing manhole covers pose significant hazard stopped strains, cyclists, and vehicles, often leading to severe accidents. Traditional inspection methods rely on manual observation, which is labour-intensive, error-prone, and inefficient, particularly in large urban areas. Moreover the increasing frequency of manhole-related incidents highlights the urgent need for an automated and reliable solution to ensure public safety and efficient maintenance of urban infrastructure. This project addresses these challenges by proposing an advanced deep learning based automated inspection system. The system utilizes Convolutional Neural Networks (CNN) for image classification and You Only Look Once version 8 (YOLOv8) for accurate detection and localization. It is trained on adiverse dataset to classify manhole covers into distinct categories, including 'Closed, "Open, "Broken, "Overflow, 'and' No Manhole.' The By automating the inspection process, it reduces reliance on manual labour, minimizes errors, and ensures timely intervention to address potential risks. This project not only enhances public safety but also optimizes resource allocation for infrastructure maintenance, offering a scalable and efficient solution to modern urban challenges.

MCA 017

LIBRARY MANAGEMENT SYSTEM

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Abstract

The Library Management System is a web-based application designed to manage and streamline day-to-day library operations such as book issuance, returns, fine calculations, and user management. Built using HTML, CSS, and JavaScript for the frontend and MySQL for the backend, it replaces manual processes with a faster, automated solution. The system provides a responsive and user-friendly interface for librarians and users alike. Users can register, log in, browse the catalog, check book availability, and request books online, while librarians manage book records and handle overdue fines. Administrators have access to dashboards with real-time statistics on library usage, borrowed books, and popular titles. Features like real-time availability, advanced search filters, and overdue alerts improve user experience and efficiency. MySQL triggers and stored procedures ensure data integrity, while role-based access controls protect sensitive actions and data. Performance is enhanced through optimized SQL queries, indexing, and connection pooling, allowing the system to scale for large user bases. Regular data backups and user activity logs maintain reliability and security, while the system's mobile-responsive design enables access from smartphones and tablets. Future enhancements may include barcode scanning, integration of e-books, and AI-powered recommendation systems, offering a smarter, more accessible, and modernized library experience

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MCA 018

ALGORIEN-MCQ-SYSTEM – A SMART MCQ PLATFORM FOR SECURE AND PERSONALIZED ASSESSMENTS

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Abstract

The Algorien-MCQ-System is an intelligent web-based platform designed to enhance the process of conducting objective assessments in academic institutions. This system leverages automation to generate a unique set of multiple-choice questions (MCQs) for each student, ensuring personalized and fair testing environments.

Key features include automatic result filtering based on candidate scores and integrated mechanisms to detect and minimize malpractice. By dynamically assigning randomized questions, the system reduces the chances of cheating and enhances the integrity of examinations. Additionally, administrators can easily track performance, manage exams, and access filtered results without manual intervention.

This solution not only streamlines the assessment workflow but also upholds transparency and fairness in the examination process. It is built with scalability and security in mind, making it suitable for educational institutes looking to adopt a modern, digital-first approach to evaluations.

MCA 019

ADAPTIVE WILDLIFE MANAGEMENT SYSTEM FOR CROP PROTECTION LEVERAGING EDGE COMPUTING AND DEEP LEARNING

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Abstract

Human-wildlife conflicts, resulting from habitat encroachment and deforestation, have led to a rise in crop raiding, causing severe agricultural losses and posing risks to human safety. Traditional deterrent methods, ranging from lethal approaches to non-lethal measures, have proven ineffective, often leading to environmental pollution, high costs, and unreliable results. As a response, there is an urgent need for more effective, sustainable solutions to mitigate these conflicts and protect crops from wildlife damage. This project proposes an innovative Integrated Wildlife Management System that combines Computer Vision and Temporal Convolutional Networks (TCN) for accurate animal species detection and recognition. The system is enhanced by a targeted ultrasound emission technique that repels the identified species. The solution, powered by edge computing, ensures real-time detection and immediate response. The camera activates the edge device to deploy an advanced Animal Intrusion Detection Model, which accurately identifies the invading species. Upon detection, the system triggers the emission of species-specific ultrasound from the Animal Repelling Module, effectively deterring wildlife intrusions. The proposed system offers significant advantages over traditional methods by minimizing environmental pollution, reducing operational costs, and improving reliability. With the ability to address diverse wildlife threats such as elephants, wild boars, and deer, this system provides a robust and adaptable solution for crop protection. By leveraging advanced technologies, the project aims to foster a balance between safeguarding crops and minimizing the ecological impact, contributing to the ongoing efforts for peaceful coexistence between agricultural practices and biodiversity.

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MCA 020

BLOCKCHAIN-POWERED CROP INDEX INSURANCE FOR IMPROVED TRANSPARENCY AND TRUST FOR INDIAN FARMERS

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Abstract

Agriculture plays a vital role in India's economy, but farmers frequently face challenges such as unpredictable weather, pest attacks, and irregular rainfall that impact crop yields. Crop insurance serves as a safeguard, helping mitigate financial losses due to these natural calamities. However, traditional crop insurance models are often plagued by complex procedures, high costs, and a lack of trust, discouraging many farmers from adopting such protective measures. To address these issues, this project introduces an innovative blockchain based crop insurance solution that leverages the advantages of blockchain technology to ensure transparency and security. By utilizing blockchain, every transaction and data exchange within the system is recorded on an immutable ledger, creating a transparent and trustworthy environment for all stakeholders. Smart contracts, embedded within a private blockchain, allow only authorized participants—including farmers, insurers, and weather data providers—to interact with the system. This reduces the risk of fraud and automates claim processing, ensuring faster settlements and increasing overall trust in the system. The core objective of this project is to develop an affordable, low-cost crop insurance model that guarantees timely insurance payouts for farmers who experience valid losses. The decentralized, distributed architecture of the system eliminates intermediaries, reducing costs and protecting smallholder farmers from exploitation. Through the integration of blockchain technology, the proposed solution aims to transform the crop insurance landscape by improving efficiency, accessibility, and trust for farmers.

MCA 021

WATERBORNE DISEASE PREDICTION USING MACHINE LEARNING

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Abstract

Waterborne diseases continue to be a major concern worldwide, particularly in areas with limited access to clean drinking water and sanitation facilities. Contaminated water, often laced with harmful chemical and microbial pollutants, is a leading cause of illnesses such as cholera, dysentery, typhoid, and diarrhea. Traditional water testing methods, while accurate, are often expensive, time-consuming, and require specialized equipment and expertise. To address these limitations, this project titled "Waterborne Disease Prediction Using Machine Learning" proposes a novel, data-driven approach to detect water contamination and predict related diseases. Using physicochemical parameters like pH, turbidity, hardness, sulfate, chloramines, and conductivity, machine learning models are trained to classify water quality and assess associated health risks. A Random Forest Classifier is used to determine the potability of water, while an XGBoost Classifier is employed to predict possible waterborne diseases if contamination is detected. This dual-layered prediction system enhances accuracy, reduces diagnosis time, and helps in early intervention. The model is built using a labeled dataset, preprocessed and normalized to improve training efficiency and prediction reliability. The system is integrated with a web-based front end, making it accessible to the general public, especially in remote areas. Ultimately, this project aims to reduce the burden of waterborne diseases, promote sustainable water management, and support global efforts toward universal access to safe drinking.

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MCA022

SPY USB: SECURING USB DRIVES AGAINST MALWARE INJECTION AND DATA EXFILTRATION

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Abstract

Portable storage devices, such as USB drives, external hard drives, and memory cards, are widely used for transferring and storing data due to their portability and ease of use. However, they are highly susceptible to covert data theft, a serious cybersecurity threat. Covert data theft often occurs through malware injection attacks, where malicious code is injected into a system to secretly exfiltrate sensitive data. These attacks are particularly dangerous as they are stealthy and can evade traditional security measures, leading to unauthorized access to valuable information. Existing systems primarily address either malware detection or data backup separately, failing to offer a holistic approach to protect sensitive data from such covert attacks. To address these limitations, this project proposes an integrated security solution that combines Deep Neural Networks (DNNs) for detecting malware injection attacks, Cloud Conceal as a secure backup and recovery system, and Data Masking using Tokenization to protect sensitive information stored on USB drives. The DNN model detects suspicious system activities such as file access and process creation by analyzing features like API calls, byte sequences, and system log metadata. Once a malware attack is identified, sensitive data is swiftly transferred to Cloud Conceal, a secure backup system that creates encrypted copies of the data and allows for recovery in case of data loss or breach. In addition, Data Masking using Tokenization obfuscates sensitive information on USB drives, replacing original data with tokens, ensuring that unauthorized users cannot access the actual content. This integrated proposed system provides a framework for preventing covert data theft, enhancing the security of sensitive data, and ensuring its availability and integrity

MCA 023

IMAGE STEGANOGRAPHY USING PYTHON

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Abstract

Steganography is the art and science of hiding information within non-secret media to avoid detection. This project presents an image steganography application developed in Python, utilizing the Tkinter library for the graphical user interface and the Python Imaging Library (PIL) for image processing. The system enables users to embed and extract secret messages within digital images using the Least Significant Bit (LSB) technique. This method ensures minimal distortion to the carrier image, preserving its visual integrity while maintaining confidentiality. The intuitive interface allows easy image selection, message input, and real-time encoding and decoding of data.

The proposed system is designed to provide a secure and user-friendly solution for covert communication. It includes modular components for user interaction, image handling, data embedding, and extraction. The software runs efficiently on standard hardware and is compatible across multiple operating systeBy combining cryptographic techniques with a simple UI, the system serves as a practical tool for data security and digital privacy. The implementation demonstrates that image steganography can be an effective approach for safeguarding sensitive information without raising suspicion

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MCA 024

NATIONWIDE UNIFIED VOTING SYSTEM USING BLOCKCHAIN AND AI-DRIVEN FACE RECOGNITION

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Abstract

This project introduces a Nationwide Unified Voting System that integrates blockchain technology with AI-driven facial recognition to revolutionize the electoral process. Addressing the limitations of traditional and electronic voting methods, the system ensures secure voter authentication using multi-factor verification, including QR codes and CNN-based facial recognition linked with Aadhaar. Once authenticated, votes are encrypted using 256-bit SHA hash codes and stored on a tamper-proof blockchain, ensuring complete vote immutability and protection against tampering. The system also supports real-time vote tallying, eliminating manual errors and delays, and includes a "Vote Integrity Verifier" to let voters confirm that their vote was accurately recorded.

In addition to enhanced security, the system promotes transparency and voter trust by providing SMS alerts in case of tampering and generating detailed audit reports. It enables centralized control through a multi-role administrative dashboard while allowing decentralized access for citizens, making it both secure and scalable. With the ability to vote from any authorized booth across India, the system increases accessibility and participation. This innovative approach not only improves efficiency and integrity but also sets the foundation for future smart elections by ensuring fairness, speed, and accountability through cutting-edge technologies.

MCA 025

VEHICLE DETECTION AND COUNTING

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Abstract

Traffic congestion and management have become increasingly challenging due to the rapid growth in vehicle usage. Traditional vehicle counting methods, which often involve manual observation or costly sensor-based systems, lack the efficiency and real-time capabilities required for modern traffic systeThis paper proposes an automated, video-based vehicle detection and counting system utilizing OpenCV and various image processing techniques. The system incorporates background subtraction, thresholding, morphological operations, and hole-filling strategies to enhance detection accuracy. Vehicles are tracked through predefined virtual zones within video frames to ensure precise and consistent counting.

The proposed system is designed for real-time traffic monitoring, offering a cost-effective and scalable solution for smart transportation infrastructure. By eliminating the limitations of manual and sensor-dependent methods, this approach provides valuable insights for traffic flow analysis, congestion control, and infrastructure planning. Developed using Python and Django for the backend and HTML, CSS, and JavaScript for the frontend, the system demonstrates how integrated technologies can lead to intelligent traffic solutions. This project ultimately contributes to safer and more efficient urban mobility through intelligent automation.

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MCA 026

PERSONALIZED MENTAL HEALTH AND WELLNESS SUPPORT CHATBOT

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Abstract

This Python-based chatbot combines machine learning with rule-based responses for intelligent conversations. Using a Decision Tree classifier, it analyzes user inputs against predefined intents stored in JSON format. The system transforms text via CountVectorizer, enabling accurate intent classification. A Tkinter GUI provides an interactive interface with real-time chat display. The modular design separates training data from core logic, allowing easy updates through JSON modifications. During operation, user messages are processed, classified, and matched with appropriate responses. The implementation demonstrates effective integration of basic ML techniques with software engineering principles. Future enhancements can incorporate advanced NLP or neural networks while maintaining the lightweight architecture. Designed for both functionality and education, it serves as a practical chatbot and demonstration of conversational AI fundamentals. The project offers immediate usability while supporting domain-specific customizations and scalability. Its JSON-based knowledge structure enables effortless expansion of conversation capabilities without code changes. This versatile foundation balances current performance with potential for sophisticated upgrades, making it suitable for various applications requiring intelligent dialog systems.

MCA 027

WOMEN SAFETY APP & SECURITY WITH SMS ALERT BASED ANDROID APP

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Abstract

In the modern's world, it will be unsafe to travel alone for a person at night especially for women. To provide safety for women a good way to reduce the chances of becoming a victim of violent crime is to identify and call on resources to help you out unsafe situations. Having a safety app on your phone can reduce the reason for the risk situation and add assistance when we need to use it. Unlike the other applications available, which work only at the time of Emergency or Danger, this app can be used as a safety or precaution measure. So that, "Protection is better than cure". The main purpose of this app is to provide a safe platform through Android phone as today all person is taking Smart Phones to travel here and there. The user also gets to know the current user address using GPS location tracker. The fetched information is sent to the emergency contact of the user. This paper presents women security an Android Application for the Safety of Women and this app can be activated this app by a shaking the mobile, whenever need arises. This app identifies the location of place through GPS and sends a message comprising this location URL to the registered contacts and also send messages to near by mobile which are having this app.

Keywords: *Women Safety, Android Application, Emergency Contact, GPS Location Tracker, Shake Activation, Precautionary Measure, Real-time Location Sharing, Mobile Safety App*

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MCA 028

DDOS ATTACK DETECTION AND MITIGATION IN INTERNET OF VEHICLES

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Abstract

The project, developed using NetBeans with Java and JSP, focuses on implementing a robust system for analyzing and detecting security threats in the Internet of Vehicles (IoV) environment. The flow of the system begins with the integration of the CICIoV2024 Decimal Datasets, which provide numerical representations of normal and malicious network traffic. The benign traffic data serves as the baseline for normal IoV operations, while the Denial of Service (DoS) attack data simulates malicious activities aimed at overwhelming the system. The application processes these datasets, allowing intrusion detection systems (IDS) to be trained and tested on different network behaviors. Through Java and JSP, the system efficiently handles dataset integration, traffic analysis, and visualization, enabling real-time detection and response to potential threats. This project ultimately enhances the security of IoV systems by ensuring they can identify and mitigate various cyber attack scenarios.

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MCA 029

FAKE JOB RECRUITMENT DETECTION USING ML APPROACH

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Abstract

The "Fake Job Recruitment Detection using ML Approach" project aims to develop a machine learning-based system to identify fraudulent or fake job postings in online recruitment platforUsing a CSV dataset containing various features such as job title, company name, description, required qualifications, and other recruitment details, the system analyzes patterns to detect anomalies or suspicious job listings. The machine learning model is trained to differentiate between legitimate and fake job postings by learning from historical data. By automating the detection process, the system helps protect job seekers from scams and fraudulent recruiters, ensuring a safer and more trustworthy online job market. This solution provides valuable support for both job seekers and recruitment platforms to identify and avoid deceptive practices.

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MCA 030

FRAUD DETECTION IN FINANCIAL TRANSACTION

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Abstract

The "Fraud Detection in Financial Transactions" project aims to develop an intelligent system that detects fraudulent activities in financial transactions using machine learning techniques and a dataset in CSV format. By analyzing transaction data, such as transaction amount, frequency, location, and user behavior, the system identifies patterns indicative of potential fraud. The machine learning model is trained on historical transaction data to classify transactions as legitimate or suspicious, allowing for real-time detection and prevention of fraud. This automated fraud detection system enhances security, reduces financial losses, and improves the efficiency of monitoring financial transactions, providing a valuable tool for financial institutions to safeguard their systems and customers from fraudulent activities.

MCA 031

JOB VACANCY APPLICATION WITH QR CODE CERTIFICATION

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Abstract

The "Job Vacancy Application with QR Code Certification" system is a web-based platform developed using Django, designed to streamline the job application process for both admins (companies) and users (job seekers). Admins can post job vacancies with detailed descriptions, and these vacancies will be visible to registered users. Users are required to create a QR code linked to their certification, which is uploaded as part of their job application. The QR code serves as a secure, verifiable link to the user's certification, ensuring authenticity. When users apply for a job, they simply upload the QR code associated with their certificate. On the admin side, the system displays the QR code as a visual certificate, enabling the admin to easily verify the user's qualifications. This process ensures both ease of application for users and efficient verification for admins, enhancing the recruitment workflow and providing a secure, transparent way to handle certifications.

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MCA 032

MOVIE REVIEW APPLICATION

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Abstract

The "Movie Review Application" is a web-based platform developed using Flask that allows both admins and users to interact with movie data in a dynamic way. The admin has the ability to add movies to the platform, including uploading posters, adding movie details, and categorizing movies by genre. Users can browse the list of movies, view their posters and descriptions, and post reviews or comments about their movie experience. The application also includes a special feature called "Collections," where users can search for a specific movie by name. Upon searching, the system displays the requested movie along with related movies from the same genre, helping users discover similar filThis system provides an engaging experience by combining movie exploration, user feedback, and personalized recommendations based on genres, all within a user-friendly interface built with Flask.

MCA 033

AI-POWERED CLASS TIMETABLE GENERATOR

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Abstract

The "AI-powered Class Timetable Generator with Chatbot" project aims to develop an intelligent system for automatically generating class timetables using Python, Flask, and an integrated chatbot. The system is designed to create optimized timetables that include the time, subject, and teacher name for each class. In cases where a teacher is unavailable, the system will automatically assign an alternative staff member to ensure continuity. The chatbot interface allows users—such as administrators or students—to interact with the system, request timetable information, or even make adjustments in real-time. Leveraging machine learning algorithms, the system learns from historical data to optimize timetables based on teacher availability, subject requirements, and student preferences. Flask is used to create a seamless web interface, allowing users to view, update, or modify the timetable effortlessly. This AI-powered solution aims to streamline the scheduling process, reduce administrative workload, and ensure an efficient educational experience for both students and staff.

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MCA 034

EMOTION-AWARE CLASSROOM ASSISTANT FOR PERSONALIZED LEARNING

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Abstract

The "Emotion-Aware Classroom Assistant for Personalized Learning" project aims to develop an intelligent system that analyzes the emotions of both students and teachers in real-time, using a dataset to enhance personalized learning experiences. The system leverages advanced machine learning and natural language processing techniques to interpret emotional cues, such as tone, sentiment, and engagement levels, from written or spoken content within the classroom environment. By monitoring the emotional states of students and teachers, the system can adapt its responses, recommend learning materials, and adjust teaching methods to improve engagement, understanding, and overall learning outcomes. The dataset, which may include text from student feedback, online discussions, or teacher-student interactions, provides a foundation for the emotion analysis. This tool aims to support a more dynamic, responsive, and personalized learning experience, creating a better understanding of how emotional states affect learning and teaching processes. Ultimately, the system strives to foster a more supportive and adaptive educational environment.

MCA 035

AI-POWERED RADIOLOGY ASSISTANT

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Abstract

The "AI-powered Radiology Assistant" project aims to develop an intelligent system that utilizes artificial intelligence to assist radiologists in interpreting MRI scans for medical diagnoses. By leveraging a dataset of MRI images, the system uses advanced deep learning algorithms to analyze and detect anomalies such as tumors, lesions, or other pathologies in the images. The AI model is trained to accurately identify patterns, providing radiologists with automated insights that can support faster and more accurate diagnoses. This technology can help reduce human error, streamline workflow, and improve patient outcomes by providing a reliable, AI-driven tool for radiological analysis. Ultimately, the AI-powered assistant aims to enhance the decision-making process in healthcare by assisting radiologists with accurate, efficient image interpretation.

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MCA 036

JOB APPLICATION ASSISTANT

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Abstract

The "Job Application Assistant" project is a web-based application developed using Flask that assists job seekers in managing and streamlining their job application process. The system automates key tasks such as tracking job applications, generating customized resumes and cover letters, and sending applications to multiple employers through integrated platforBy leveraging user input, such as job preferences, qualifications, and experience, the assistant generates tailored application documents and provides recommendations for suitable job openings from various sources. The Flask application acts as a lightweight backend for handling user data, sending notifications, and managing application statuses. Additionally, the system can offer insights and tips on improving job applications based on the user's profile, increasing the chances of success. This assistant simplifies the job search process, helping users stay organized and focused on their career goals.

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MCA 037

PEARSON CORRELATION COEFFICIENT-BASED PERFORMANCE ENHANCEMENT OF BOARD LEARNING SYSTEM FOR STOCK PRICE PREDICTION

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Abstract

The "Pearson Correlation Coefficient-Based Performance Enhancement of Board Learning System for Stock Price Prediction" project aims to enhance stock price prediction accuracy by utilizing the Pearson correlation coefficient to improve a board learning system. By analyzing historical stock price data from a CSV dataset, the system identifies correlations between various market factors and stock price movements, applying this knowledge to create more accurate predictive models. The project leverages Flask to build a web-based application where users can input stock-related data and receive real-time predictions of stock prices based on the learned model. The Pearson correlation coefficient is used to assess the relationships between different financial indicators, boosting the model's performance and providing insights into which factors most significantly impact stock prices. This system not only enhances prediction accuracy but also allows users to visualize trends and make informed decisions in their stock trading strategies.

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MCA 038

WATER QUALITY PREDICTION AND SMART AQUACULTURE USING HYBRID DEEP LEARNING MODEL

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Abstract

The "Water Quality Prediction and Smart Aquaculture Using Hybrid Deep Learning Model" project aims to develop an intelligent system for predicting water quality in aquaculture environments and optimizing aquaculture practices. By utilizing a CSV dataset containing various environmental parameters such as pH levels, temperature, dissolved oxygen, turbidity, and other relevant water quality metrics, the system applies a hybrid deep learning model to predict the health of the water and its suitability for aquatic life. This predictive system helps in monitoring and controlling water quality in real-time, ensuring optimal conditions for fish farming. By combining multiple deep learning techniques, the model provides more accurate and reliable predictions, enabling smarter decision-making in aquaculture management. The integration of this system into smart aquaculture practices can lead to increased productivity, better resource management, and sustainable practices in the aquaculture industry.

MCA 039

AN OPTIMIZED TECHNIQUE FOR SHARING AIR QUALITY INDEX USING CLOUD TECHNOLOGY

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Abstract

This paper studies the sharing the messages of Air Quality Index (AQI) in Metropolitan areas. AQI specifies the percentage of pollutants mixed in air which creates problem in health. The pollutants level in the AQI values is between 0 to 500. Air pollution sensors are used to monitor the air pollution for outdoor environments and the cloud technology is used to display to public via private cloud. Prototype was developed with the aim to create awareness and public engagement in restoring the environment back to its healthy state. Using the prototype, the users can interact with the environment sensors in the field of view to access and visualize latest and historic environment measurements to prevent the people from air pollution.

Keywords: *AQI, Air Quality index, mobile Communication, cloud with AQI, air pollution sensors.*

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ABOUT THE INSTITUTION

Bharath Niketan Engineering College (BNEC) is run by Nehru Rural Development (NRD) Educational Trust established by (Late) Shri. S.V. Ramani Iyer in 1998 with an objective to impart technical education to the rural youth and to promote welfare of the rural community. The college is managed by Shri. S. Mohan, Managing Chairman, a leading Industrialist and a philanthropist with a passion for developing the youth.

The college is located in a picturesque and scenic environment flanked by the Western Ghats. It is situated near Aundipatti, (Madurai- Cochin national highway) in Theni district, Tamil Nadu, India.

The college offers Eight UG courses (Agri, AI &DS, Civil, CSE, ECE, EEE, IT, MECH) and five PG courses (M.E- Industrial Safety Engg, M.E - Software Engg, M.E - Communication Systems, MBA and MCA). All the courses are approved by AICTE, New Delhi and affiliated with Anna University, Chennai.

BNEC has a highly qualified faculty team with many professors holding doctorate degrees. The college also has well-equipped labs and a library with a vast collection of resource materials.

In terms of research, the department of Mechanical Engineering has a recognized and collaborative research centre approved by Anna University, Chennai. BNEC has several ongoing projects in various fields, including renewable energy and communication networks. The college has also collaborated with many industries and research organizations to provide students with hands-on experience and exposure to real-world problems.

NRD Educational Trust also runs a polytechnic college in the name of Bharath Niketan Polytechnic College (BNPC) located near BNEC. BNPC offers six Diploma courses (Diploma in Agricultural Engg., Civil Engg, CSE, ECE, EEE & MECH)

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