St. Thomas College of Engineering & Technology
SIVAPURAM, MATTANUR, KANNUR DIST
stthomaskannur@gmail.com stthomaskannur.ac.in

RAET
RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY

RAET'26

RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY

PROCEEDINGS

TRACKS

- COMPUTER SCIENCE AND APPLICATIONS
- ELECTRONICS AND COMMUNICATION
- CIVIL ENGINEERING
- MECHANICAL ENGINEERING

23rd - 24th March, 2026

In association with
IEEE SB STM

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY

RAET'26

23rd & 24th March , 2026

PROCEEDINGS

Published By

INTERNATIONAL JOURNAL OF ENGINEERING TECHNOLOGY & SCIENCES (IJETS) www.ijets.in

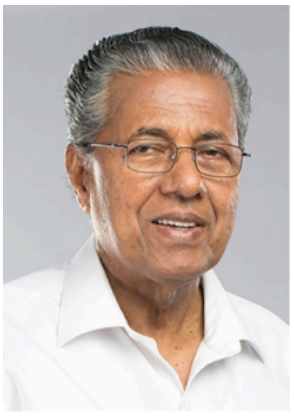
Organized by

St. Thomas College of Engineering & Technology

Vellilode, Sivapuram P. O. Mattanur, Kannur, Kerala

Approved by AICTE New Delhi, Govt. of Kerala and affiliated to APJ Abdul Kalam Technological University, Kerala

Website: www.stthomaskannur.ac.in stthomaskannur@gmail.com



GOVERNMENT OF KERALA

Pinarayi Vijayan

CHIEF MINISTER

No. 217/Press/CMO/26 20 February, 2026.

MESSAGE

I am happy to know that the St. Thomas College of Engineering and Technology, Sivapuram, Kannur, is conducting the Second National Conference on Recent Advancements in Engineering and Technology, *'RAET'26'*.

I extend my good wishes to the conference and to the Conference Proceedings which is being brought out to mark this occasion.

Pinarayi Vijayan

The Organizing Secretary
S.T.C.E & T
E-mail: raet@stthomaskannur.ac.in

141, 3rd Floor, North Block, Government Secretariat, Thiruvananthapuram Pin 695001 T 0471 2333241, 2333812, 2333610 F 0471 2333489
E chiefminister@kerala.gov.in facebook.com/cmokerala twitter.com/cmokerala
Residence Cliff House T 0471 2318406, 2314853
www.keralacm.gov.in

Dr. CIZA THOMAS
Vice Chancellor

APJ Abdul Kalam Technological University
(A State Government University)
CET Campus, Thiruvananthapuram - 695 016
Kerala, India

Date : 04/03/2026

Message from the Vice-Chancellor

I extend my warm greetings and best wishes to the organisers, participants, and contributors of the Second National Conference on Recent Advancements in Engineering and Technology (RAET'26), being hosted by St. Thomas College of Engineering & Technology on 23rd and 24th March 2026.

In a time marked by rapid technological transformation, RAET'26 will play a vital role in fostering interdisciplinary dialogue, strengthening industry–academia collaboration, and translating research into meaningful societal impact. The convergence of emerging domains including Artificial Intelligence, Data Analytics, IoT, VLSI, Sustainable Civil Engineering, and advanced mechanical innovations, reflects the forward-looking vision of the organisers. I am confident that the deliberations and research presented at RAET'26 will inspire young engineers and contribute significantly to the advancement of engineering education and professional practice.

I wish RAET'26 every success and continued excellence in the years ahead.

Prof. Ciza Thomas
Vice-Chancellor

Jose Thomas
Chairman
St. Thomas College of Engineering and Technology, Mattanur

MESSAGE

It is a matter of great satisfaction to witness the Second National Conference on Recent Advancements in Engineering and Technology (RAET 26) being hosted at St. Thomas College of Engineering and Technology, Mattanur, Kannur.

The progression of RAET into its second edition reflects the strong academic spirit and research culture nurtured within our institution. What began as a focused initiative has now evolved into a recognized platform that brings together scholars, innovators, industry professionals, and young researchers from across the nation to exchange ideas and explore emerging technological frontiers.

At a time when scientific and technological developments are redefining every sector, forums such as RAET play a crucial role in encouraging critical thinking, interdisciplinary dialogue, and solution-oriented research. The deliberations and scholarly contributions presented during this conference are expected to open new pathways, strengthen collaborative networks, and promote practical innovations that address contemporary challenges.

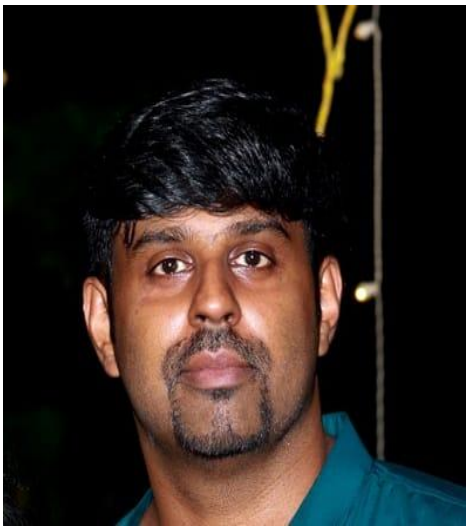
The compilation of research papers in this volume symbolizes the intellectual commitment and persistent efforts of the academic community involved. It will serve as a meaningful resource for continued study, experimentation, and advancement in diverse domains of engineering and technology.

May RAET 26 further elevate the standards set in its previous edition and continue to grow as a distinguished academic gathering in the years ahead. I extend my best wishes to all those who have

worked tirelessly to make this conference a success and to every participant contributing to its scholarly vibrancy.

Wishing the conference every success.

Best Regards,
Jose Thomas



Rijo Thomas Jose

CEO

St.Thomas College of Engineering and Technology, Mattanur

MESSAGE

The second edition of the National Conference on Recent Advancements in Engineering and Technology (RAET 26) marks an important milestone for St. Thomas College of Engineering and Technology, Mattanur, Kannur. The continuation of this initiative highlights the institution's sustained commitment to strengthening research culture and academic dialogue at a national level.

RAET 26 brings together thinkers, innovators, and practitioners who share a common purpose — to examine emerging trends, question existing paradigms, and develop practical solutions to complex technological challenges. As engineering disciplines continue to expand and intersect with diverse fields, such collaborative academic environments become increasingly valuable.

The collection of papers presented in this edition reflects both depth of inquiry and diversity of thought. Each contribution adds to a broader conversation about how technology can be harnessed responsibly and effectively to meet evolving societal needs. The efforts of the organizing team and contributors have transformed this conference into a meaningful knowledge forum that extends beyond the boundaries of the campus.

May this second chapter of RAET inspire sustained research engagement, foster interdisciplinary partnerships, and motivate young minds to pursue innovation with integrity and

purpose. Best wishes to everyone involved in making RAET 26 a noteworthy and impactful academic gathering.

Best Regards,
Rijo Thomas Jose

Dr. Shinu Mathew John
Principal
St. Thomas College of Engineering and Technology, Kannur.

MESSAGE

It is with great pleasure that I extend my warm greetings to all the researchers, academicians, industry professionals, and students participating in the second edition of RAET 2026 – Conference on Recent Advances in Engineering and Technology. I am delighted that this conference brings together innovative minds from diverse domains to share knowledge, present research findings, and explore emerging technological trends that contribute to the advancement of engineering and society.

St. Thomas College of Engineering and Technology, Mattannur, has always been committed to fostering a culture of research, innovation, and academic excellence. Platforms such as RAET provide an invaluable opportunity for scholars to engage in meaningful discussions, collaborate across disciplines, and transform theoretical ideas into practical solutions that address real-world challenges. In today's rapidly evolving technological landscape, Artificial Intelligence (AI) is transforming nearly every sector—from healthcare and education to environmental sustainability and industrial automation. While AI offers unprecedented opportunities to improve human life and accelerate scientific discovery, it is equally important that its development and deployment remain ethical, responsible, and human-centered. As researchers and technologists, we must ensure that AI is used for the betterment of humanity, while safeguarding privacy, personal rights, data security, and social equity. Responsible innovation that balances technological advancement with ethical considerations will be essential for building trust and ensuring that AI serves society in a fair and inclusive manner.

I sincerely appreciate the dedicated efforts of the organizing committee, reviewers, faculty members, and volunteers whose commitment and hard work have made this conference possible.

I am confident that RAET 2026 will serve as a dynamic platform for intellectual exchange, inspiring new ideas, research collaborations, and technological innovations that ultimately lead to impactful research outcomes.

Best Regards,

Dr. Shinu Mathew John

Dr. Anetha Mary Soman

Dean Academics

St. Thomas College of Engineering and Technology, Kannur.

MESSAGE

It gives me immense pleasure to present this message for the proceedings of the **Second National Conference on Recent Advancements in Engineering and Technology (RAET'26)**.

The successful organization of the second edition of RAET reflects the sustained commitment of our institution towards promoting research excellence and academic collaboration. Building upon the achievements of the first conference, RAET'26 continues to serve as a vibrant platform for researchers, academicians and students to exchange ideas and showcase cutting-edge developments across diverse engineering domains.

The four focused tracks—Computer Science and Applications, Electronics and Communication Engineering, Civil Engineering, and Mechanical Engineering—represent key pillars of modern technological advancement. The conference themes, ranging from Artificial Intelligence and 5G Technologies to Sustainable Infrastructure and Advanced Manufacturing, highlight the evolving landscape of engineering research and its relevance to societal progress.

I am confident that the papers presented in this volume demonstrate strong academic rigor, creative thinking, and meaningful practical application. I sincerely appreciate the dedicated efforts of the organizing committee, reviewers, faculty members, and student volunteers whose commitment has ensured the success of this second conference. I also congratulate all the authors and participants for their valuable contributions.

I wish RAET'26 great success and hope it continues to grow as a distinguished academic forum in the years to come.

Best Regards,

Dr. Anetha Mary Soman

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

ACKNOWLEDGEMENT

We take this opportunity to warmly welcome all the delegates to the Second National Conference on Recent Advancements in Engineering and Technology (RAET'26), organized by St. Thomas College of Engineering & Technology, Kannur, on 23rd and 24th March 2026.

The aim of this conference is to provide a platform for researchers, academicians, industry professionals, and students to exchange ideas, showcase innovative research, and discuss the latest trends in engineering and technology. RAET'26 focuses on fostering collaboration and exploring solutions to emerging challenges across diverse engineering disciplines. The conference features specialized tracks in Computer Science and Applications, Electronics and Communication, Civil Engineering, and Mechanical Engineering, covering a wide spectrum of contemporary topics such as Artificial Intelligence, Cybersecurity, IoT, VLSI Design, Structural Health Monitoring, Industry 4.0, and many more.

The overwhelming response to the call for papers reflects the enthusiasm of the research community. A total of 284 full papers were received from various esteemed institutions and organizations across the country. After a rigorous review process, 114 papers have been selected for presentation and inclusion in the conference proceedings, representing the latest research and development trends in engineering and technology.

We sincerely express our deep gratitude to our management, keynote speakers, advisory committee, participants, reviewers, session chairs, organizing committee members, and all those who have contributed to making RAET'26 a grand success.

Organizing Secretaries

Ms. Jithika M,HOD / CD

Mr. Chandrajith E, Assistant Professor / ME

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

ABOUT THE INSTITUTION

St. Thomas College of Engineering & Technology, Sivapuram, Mattannur, Kannur was established by St. Thomas Educational Society, Adoor in the year 2014 with a view to impart high quality engineering education through systematic studies and efficient training. The college has a team of eminent faculty members and a disciplined atmosphere which help to promote a holistic approach to learning. There is a right balance of cognitive, conceptual, ethical, humane and spiritual growth. The college has been established in the interior area of Malabar with a view to cater the needs of engineering education in the north-eastern of the Malabar area, especially to people who belong to the backward communities, tribal communities and immigrant communities, who are otherwise deprived of qualitative higher education in their area. Nevertheless, the college is open to all meritorious students from all over Kerala to benefit the best and disciplined Engineering education it imparts. The institution within its short span of existence plans to be a centre of excellence in engineering education by bringing out the young engineers devoted and socially committed. The college is approved by the All India council for Technical Education and affiliated to A P J Abdul Kalam Technological University.

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

ABOUT THE CONFERENCE

The Second National Conference on Recent Advancements in Engineering and Technology (RAET'26) is a prestigious event that provides a platform for researchers, academicians, industry professionals and students to exchange ideas, showcase innovative research and discuss the latest trends in engineering and technology. This conference focuses on fostering collaboration and exploring solutions to emerging challenges across diverse engineering disciplines. RAET'26 features four specialized tracks: Computer Science and Applications, which delves into topics like Artificial Intelligence and Machine Learning, Big Data Analytics, Cybersecurity and Blockchain, IoT and Smart Systems, Cloud Computing & Virtualization and Software Engineering Practices; Electronics and Communication, covering areas such as VLSI Design and Embedded Systems, Wireless Communication and 5G Technologies, IoT in Communication, Signal and Image Processing, Robotics and Automation and Biomedical Electronics; Civil Engineering, exploring innovations in Sustainable Construction Materials, Water and waste water treatment, Geoenvironmental Engineering, Structural Health Monitoring, Water Resource Management, Earthquake and Disaster-Resilient Structures and Advanced Transportation Systems; and Mechanical Engineering, which focuses on Advanced Manufacturing and Industry 4.0, Renewable Energy, Robotics and Mechatronics, Computational Fluid Dynamics, Thermal Engineering Innovations Automotive Engineering, Instrumentation Engineering and Machine design and modelling. RAET'26 aims to bridge the gap between academia and industry while promoting interdisciplinary research and knowledge sharing ultimately contributing to the advancement of engineering and technology.

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

CONFERENCE THEMES

COMPUTER SCIENCE & APPLICATIONS:

- Artificial Intelligence and Machine Learning
- Big Data Analytics
- Cybersecurity and Blockchain
- IoT and Smart Systems
- Cloud Computing and Virtualization
- Software Engineering Practices

ELECTRONICS & COMMUNICATION:

- VLSI Design and Embedded Systems
- Wireless Communication and 5G Technologies
- Internet of Things (IoT) in Communication
- Signal and Image Processing
- Robotics and Automation
- Biomedical Electronics

CIVIL ENGINEERING:

- Sustainable Construction Materials
- Water & Waste Water Treatments
- Geoenvironmental Engineering
- Structural Health Monitoring
- Water Resource Management
- Earthquake and Disaster Resilient Structures
- Advanced Transportation Systems

MECHANICAL ENGINEERING:

- Advanced Manufacturing and Industry 4.0
- Renewable Energy Systems
- Robotics and Mechatronics
- Computational Fluid Dynamics
- Thermal Engineering Innovations
- Automotive Engineering
- Instrumentation Engineering
- Machine Design and Modelling

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

Chief Patron	Er. Jose Thomas, Chairman, STM, Kannur
Patron	Er. Rijo Thomas Jose, CEO, STM, Kannur
General Chair	Dr. Shinu Mathew John, Principal &Professor(CSE)
General Co Chair	Dr.Bejoy Abraham,Joint Director,KTU, Kerala
Organizing Secretaries	Ms. Jithika M, HOD / CD Mr. Chandrajith E, Assistant Professor / ME
Organizing Committee	Dr. Anetha Mary Soman, Professor ECE & Dean Academics Dr. Sreekesh Namboodiri T, HOD /CSE Mr. Rahul V A, HOD / ASH Mr. Nithin C, HOD / ECE Mr. Shree Kiran, HOD / ME Ms. Vijila Balakrishnan, HOD / CE Ms. Anjana K P, Assistant Professor / CD Mr. Jithin S, Assistant Professor / CSE Ms. Roopa Balakrishnan, Assistant Professor / CE Mr. Lipin K, Assistant Professor / ME Ms. Rinija G N, Assistant Professor / ECE Ms. Sreelakshmi Prasad, Assistant Professor / ASH

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

NATIONAL ADVISORY COMMITTEE

Name	Institution/ Organization
Prof. (Dr.) Ajith Prabhu V	St. Thomas College of Engineering and Technology, Chengannur
Prof. (Dr.) Bejoy Abraham	Joint director, Abdul Kalam Technological University, Thiruvananthapuram
Prof. (Dr.) Arun C	Vels University, Chennai
Prof. (Dr.) Asha Joseph	New Horizon College of Engineering, Bengaluru
Prof. (Dr.) Deepthi P P	NIT Calicut
Prof. (Dr.) Eby David	College of Engineering, Thalassery
Prof. (Dr.) Fr. Rubin Thottupurath Jose	Amal Jyothi College of Engineering, Kottayam
Prof. (Dr.) Gilesh M P	Government College of Engineering, Thrissur
Prof. (Dr.) Jahir Hussain	Vel Tech HighTech Engineering College, Chennai
Prof. (Dr.) Hemalatha N	St. Aloysius University, Mangalore
Prof. (Dr.) Jaya Kumari J	Mar Baselios College of Engineering and Technology, Trivandrum
Prof. (Dr.) Joby P P	St. Joseph's College of Engineering and Technology, Palai
Prof. (Dr.) Leena A V	SNGCET, Kannur
Prof. (Dr.) Manimegalai R	PSG Institute of Technology and Applied Research, Coimbatore
Prof. (Dr.) Manoj B S	Chair IEEE, Kerala Section
Prof. (Dr.) Nakkeeran R	Pondicherry University, Pondicherry
Prof. (Dr.) Naveen J	Christ University, Bengaluru
Prof. (Dr.) Rajasree M S	CEO, TrEST Research Park, Thiruvananthapuram

Prof. (Dr.) Ravimaran S	Saranathan College of Engineering, Trichy
Prof. (Dr.) Sabeena Beevi K	TKM College of Engineering, Kollam
Prof. (Dr.) Sabeena M V	AWH Engineering College, Calicut
Prof. (Dr.) Samson Mathew	NIT, Trichy
Prof. (Dr.) Saraswathy R	Shrimati Indira Gandhi College, Trichy
Prof. (Dr.) Sivakumar R	Government College of Engineering, Barton Hill
Prof. (Dr.) Sojan Lal P	Jyothi Engineering College, Thrissur
Prof. (Dr.) Sooraj P	Government College of Engineering, Kannur
Prof. (Dr.) Sreekanth N S	Kannur University, Kannur
Prof. Mohammed Kasim S	Chair (2023–24), IEEE Kerala Section
Prof. (Dr.) Sreemahadevan Pillai P R	MES College of Engineering, Malappuram
Prof. (Dr.) Thangam S	Amrita Vishwa Vidyapeetham, Bengaluru

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

EDITORIAL BOARD

SECOND NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET'26)

CONFERENCE SCHEDULE

DAY I – 23rd MARCH 2026	
TIME	**EVENT**
08.30 AM – 09.30 AM	**Registration**
09.30 AM – 10.30 AM	**Inaugural Function**
10.30 AM – 10.45 AM	**Tea Break**
11.00 AM – 01.00 PM	**Technical Session - I**
01.00 PM – 01.45 PM	**Lunch Break**
01.45 PM – 04.30 PM	**Technical Session - II**
DAY II – 24th MARCH 2026	
TIME	**EVENT**
09.30 AM – 11.00 AM	**Technical Session - III**
11.00 AM – 11.15 AM	**Tea Break**
11.15 AM – 12.45 PM	**Technical Session - IV**
12.45 PM – 01.45 PM	**Lunch Break**
01.45 PM – 02.00 PM	**Valedictory Ceremony**

INDEX

TRACK ID – CSE

COMPUTER SCIENCE AND APPLICATIONS

INDEX

INDEX

INDEX

INDEX

INDEX

INDEX

INDEX

TRACK ID – ECE

ELECTRONICS AND COMMUNICATION ENGINEERING

INDEX

TRACK ID – CE

CIVIL ENGINEERING

INDEX

INDEX

INDEX

TRACK ID – ME

MECHANICAL ENGINEERING

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE01

SECURING MEDICAL DATA USING STEGANOGRAPHY AND BLOCKCHAIN-BASED ACCESS CONTROL

Varna O V, Alka Sajeevan P, Sarang C, Shreya Sreekumar, Subhaga K
Department Of Computer Science And Engineering,
Vimal Jyothi Engineering College, Chemperi, Kannur, Kerala, India

ABSTRACT

The secure storage, transmission, and integrity verification of medical data remain critical challenges in modern healthcare systems, where unauthorized access, data leakage, and malicious tampering can lead to severe ethical and legal consequences. This work presents a comprehensive web-based framework that integrates encryption, Modified Least Significant Bit (LSB) steganography and blockchain technology to ensure confidentiality, integrity and controlled accessibility of sensitive medical reports. In the proposed system, medical test reports such as blood analysis and radiographic images are first encrypted along with essential patient identifiers to prevent unauthorized disclosure. The encrypted data is then embedded into a host image using a modified LSB steganographic model, producing a stego image that conceals sensitive information while preserving visual imperceptibility. To guarantee data integrity and tamper detection, a cryptographic hash of the stego image is generated and securely stored on a blockchain, while a corresponding hash value is maintained within a centralized database. During access or retrieval, the two hash values are compared to verify image authenticity and detect any unauthorized modifications. The system architecture involves three primary entities: a Medical Information Management authority, registered doctors and patients, enabling controlled appointment scheduling, report access and session-based confidentiality enforcement. By combining steganography-based data concealment with blockchain-driven integrity verification, the proposed approach offers a robust, secure and scalable solution for reliable medical data management.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE02

BIO-INSPIRED OPTIMIZATION FOR STOCK PRICE PREDICTION

Dr. Swapnesh S[1]. , Dr. Rekha K. S.[2], Adarsh Ramachandran[3]

1. Dept. of Mechanical Engineering, Govt. Engg College, Idukki, Kerala, India
2. Dept of Computer Science & Engineering, College of Engineering, Kidangoor, Kottayam, Kerala, India
3. Dept. of Mechanical Engineering, Rajiv Gandhi Institute of Technology, Kottayam, Kerala, India

ABSTRACT

Predicting stock prices is hard because the market is always changing and is unpredictable. This paper tests two bio-inspired methods to make short-term stock predictions: the Genetic Algorithm (GA), which mimics evolution, and Particle Swarm Optimization (PSO), which mimics group behavior. We used these methods to find the best settings for a prediction linear regression based prediction using historical data from Apple stock data set (AAPL). Both the methods performed well with reasonably good prediction accuracy. The results demonstrate that both bio-inspired approaches achieve high predictive accuracy, effectively capturing short term trends. The results indicate that these nature inspired techniques are good tools for finding short term stock trends without relying on traditional analytical methods.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE03

BLOCKCHAIN BASED INCOME TRACEABILITY SYSTEM FOR EQUITABLE WELFARE DISTRIBUTION

Prof. Jithin S, Nevin R Pradeep, Niranj C N, Muhammed Jinas T P, Devathmaj A Kaliyathan
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Ensuring an equitable welfare distribution and an accurate income assessment for daily wage workers and informal workers in India remains a persistent challenge. Existing methods such as income tax filings, government surveys like the Periodic Labour Force Survey (PLFS) and the SocioEconomic Caste Census (SECC), ration card declarations, and banking data are either infrequent, fragmented, or exclude the vast informal workforce, which constitutes over 80\% of India's labor population. This results in unreliable, easily manipulated, or self-declared income records. Consequently, many individuals falsely claim Below Poverty Line (BPL) status, inflating the BPL population and causing misallocation of welfare resources. This deprives genuinely deserving populations of adequate benefits, contributing to social and economic inequities. To address these challenges, we propose an Income Traceability System powered by blockchain and AI/ML technologies. The system immutably records every digital wage payment on a private blockchain, creating a tamper-proof, verifiable income history. AI models accurately estimate income bands, dynamically classify individuals for welfare eligibility such as BPL or Above Poverty Line (APL). Additionally the system offers a government-ready, real-time monitoring dashboard for policymakers, ensuring privacy-preserving data handling, context-aware income profiling, and automated welfare eligibility flagging. Compared to traditional methods, this system offers greater accuracy, real-time insights, and adaptability to the fluctuating nature of informal sector incomes. By integrating blockchain-verified wage records with AI-driven analytics, the framework enhances the fairness, integrity, and efficiency of welfare delivery,

ensuring benefits reach the truly deserving. Combined with strong governmental reforms promoting digital transactions, the system can help curb illegal activities like tax evasion, contributing to transparent society.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE04

ARTIFICIAL INTELLIGENCE DRIVEN AUGMENTED REALITY SYSTEM FOR DATA AUGMENTATION

Dr.Shinu Mathew John,Rhuthoshika K , Jagan K K , Jibin P V , Muhammed Fayiz V C
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

AI AR Memory Palace is designed to enhance memory and retrieve data by transforming real-world spaces into interactive Memory Palaces (object / container) using AI-based object detection and AR virtualization. It helps users anchor and recall information through spatial interaction. It serves as a cognitive enhancement tool by integrating AI and Augmented Reality to support memory recall and spatial learning. It functions by recognizing physical objects in the environment and overlaying relevant digital content like notes, images, or videos directly onto them through an AR interface. By combining AR and AI, the system not only supports human memory and spatial awareness but also opens new opportunities in education, fashion, advertisement and medical fields.

In the first stage, the system utilizes a mobile device's camera and AR capabilities to detect real-world objects using AI-based object detection. Once an object is identified, the system checks a cloud database for associated digital memories such as text, images, or videos linked to that object. These memories are then fetched for visualization. In the fourth stage, the memories are visualized in augmented reality, spatially anchored around the detected object. In the final stage, this transforms the user's environment into a personalized, interactive Memory Palace that aids in learning and memory recall.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE05

AI AGENTS FOR ENTREPRENEURS: A REVIEW

Anjana Shiji, Gopika Venu, Laya Ann Sebastian, Parvathy R Nair, Sneha S, Krishnaveni V V
Department of Computer Science and Engineering,
College of Engineering Kidangoor , Kottayam, Kerala, India

ABSTRACT

In the modern digital economy, businesses face increasing pressure to operate efficiently, adapt quickly to market changes, and deliver personalized customer experiences. Traditional manual processes often limit scalability, slow decision-making, and increase operational costs. Artificial Intelligence (AI) has emerged as a powerful solution to these challenges by enabling automation, data-driven decision-making, and intelligent support across business functions. AI-powered systems can analyze large volumes of data, optimize workflows, and assist in tasks such as customer interaction, resource management, and strategic planning.

The integration of AI into business operations enhances productivity, improves accuracy, and supports real-time decision-making. Intelligent assistants and agent-based systems further enable organizations to manage complex processes with minimal human intervention. Overall, the adoption of AI technologies helps businesses reduce costs, improve customer satisfaction, and achieve sustainable growth, making AI a critical component of modern digital transformation strategies.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE06

INSIGHTS INTO DEEP LEARNING METHODS FOR PLANT DISEASE DETECTION, DIAGNOSIS AND AGRICULTURE MANAGEMENT

Ansa Scaria, Nandana Ashok, Navya S Nair, Sebin Binoy, Ojus Thomas Lee, Shandry K K
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Plant diseases are causing serious problems for farmers worldwide, reducing crop yields and threatening our food supply. The old way of checking plants by hand is slow, expensive, and needs expert knowledge, making it nearly impossible for large farms. Fortunately, artificial intelligence, especially deep learning and computer vision, is changing how we handle plant diseases by making detection automatic, accurate, and easy to scale up.

This paper looks at the latest deep learning methods being used to identify plant diseases and help farmers make better decisions. We examine Vision Transformers, Convolutional Neural Networks, hybrid models, and nature-inspired algorithms like Ant Colony Optimization for detecting diseases in crops like tomatoes, olives, apples, and groundnuts. We also explore transfer learning (which helps when you don't have much training data), ensemble methods (which combine multiple models for better results), and data augmentation techniques that make models more reliable.

The main challenges we address include limited training data, changing weather and field conditions, catching diseases early when symptoms are barely visible, and running these models on basic farm equipment. We also look at how realtime advice systems, IoT sensors, cloud computing, and farmer friendly platforms can help increase crop yields while protecting the environment. Our analysis shows that combining Vision Transformers with CNNs, along with optimized deep neural networks, work much better than traditional methods, achieving over 98% accuracy while still being practical to use. These advances represent a major shift in precision farming, giving farmers affordable, easy-to-use tools for staying ahead of diseases and making smarter farming decisions that can really impact global food production.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE07

EMERGENCY HEALTHCARE ALERT SYSTEMS IN RURAL ENVIRONMENTS: A REVIEW OF BLOCKCHAIN, AI, AND SMS-BASED TECHNOLOGIES

Abhishek P M, Aswin M, Eldon P J, Gokul Krishnan N, Rekha K S
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Access to timely medical assistance during emergencies remains as one of the most significant issue in rural healthcare systems. Geographical inaccessibility, poor transportation infrastructure, a lack of qualified medical personnel, and unstable communication networks all considerably delay emergency response and raise deaths and injuries that could have been prevented. Even though artificial intelligence, telemedicine platforms, cloud computing, and sophisticated analytics are being widely utilised by modern healthcare systems to improve the provision of emergency services, these technologies are still challenging to implement successfully in rural areas with limited resources. The blockchain-enabled emergency healthcare alert systems that include SMS communication, mobile and web applications, automated location detection, AI-driven response prioritisation, and decentralised prescription management are carefully examined in this paper. Predictive analytics, mobile/emergency platforms, telehealth adoption, IoT-based monitoring, workforce availability, secure medical data management, and rural EMS optimization are all covered. System dependability, scalability, data security, interoperability, and operational via-bility under limited infrastructure conditions are focused. In order to create inclusive and long-lasting emergency healthcare platforms that can speed up response times, enhance patient confidence in medical records, and improve overall patient outcomes in underprivileged communities, the analysis highlights important research gaps and useful design considerations.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE08

CLOUD NOVA: A UNIFIED MULTI-CLOUD DEPLOYMENT AND OPERATIONS PLATFORM

Anjana.M, Niranjana Pradeep P.R, Swathy Jayan, Salma Thaslam,Labeeba vahid
Department of Computer Science and Engineering,
Musaliar College of Engineering, Chirayinkeezhu, Trivandrum, India

ABSTRACT

Modern cloud application deployment faces significant challenges due to fragmented management tools, manual workflows, and limited automation across heterogeneous cloud environments. The absence of a unified deployment platform often forces development teams to rely on cloud-specific interfaces and loosely integrated CI/CD pipelines, resulting in increased operational complexity, reduced deployment reliability, and limited real-time visibility. These challenges are further intensified when integrating private cloud infrastructures, such as OpenStack, with public cloud providers. This paper presents Cloud Nova, a unified cloud deployment and operations platform designed to centralise deployment management across AWS, Microsoft Azure, Google Cloud Platform, and OpenStack. The proposed system provides a consolidated dashboard for monitoring deployment status, service health, and operational logs across multiple cloud environments. While standard deployment workflows are supported for public cloud platforms, OpenStack is utilised as a private cloud with fully automated Continuous Integration and Continuous Deployment (CI/CD). An MCP server acts as the automation layer to orchestrate CI/CD pipelines, manage deployment triggers, and execute deployment actions. Experimental evaluation demonstrates that the proposed approach improves deployment efficiency, enhances reliability, and provides improved operational visibility in multi-cloud environments. This technological shift could help overcome the limitations of traditional car-sharing platforms and encourage more people to adopt shared mobility solutions, ultimately supporting sustainable urban transport goals.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE09

SEAT MATE : EXAM VENUE DETAILS SCHEDULING SYSTEM FOR EFFICIENT SEAT ALLOCATION

Abhishek K L, Anjana S, Hijas K, Swathi Krishnan P, Manoj M
Department of Computer Science and Engineering,
Jawaharlal college of Engineering and Technology, Palakkad, Kerala, India

ABSTRACT

Provides students information about the exam location, including room numbers, locations, and seat assignments.Any changes are communicated to the invigilators and students. It automatically assigns students using room management and scheduling software.It utilizes scheduling and room management software for the allocation of students to rooms based on capacity while drawing data from student information systems(SIS). Additionally, it guarantees prompt notifications, which lessens misunderstanding.Makes the exam process smooth, well-organized, and stress-free.Following allocations, the system creates unique exam information for every student, including assigned seat numbers, exam date,subject and room numbers. An integrated notification system that facilitates email, SMS, and app-based alerts is used to deliver these details. To ensure transparency and lower the possibility of misunderstandings or missed tests, students and invigilators are promptly informed of any changes, including changes to the venue or schedule.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE10

ARTIFICIAL INTELLIGENCE AND TELEHEALTH IN VETERINARY MEDICINE: COMPREHENSIVE REVIEW AND IMPLEMENTATION PERSPECTIVES

Anirudh B Nair, Aswin Krishna K K, Jyothika A S, Liya Faby, Nived C V, Alpha Mathew
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Artificial Intelligence (AI) is becoming a powerful tool in veterinary medicine, enabling improved analysis of clinical symptoms, medical image interpretation, and early disease detection. With the growth of telemedicine, pet owners increasingly seek preliminary guidance before clinic visits, creating a demand for reliable pre-diagnostic support. This survey reviews recent AI advancements in veterinary healthcare, focusing on computer vision models, natural-language processing systems, and large language models for multi-symptom reasoning. It also examines AI applications across hematology, dermatology, ophthalmology, pathology, and behavioral analysis, as well as the capabilities of telehealth platforms such as Pawp and Vetster. The review highlights key strengths and limitations of current approaches and identifies how integrated AI-supported systems can enhance accuracy, efficiency, and accessibility in companion animal diagnosis.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE11

SURVEY ON AI-DRIVEN SECURE ONLINE INTERVIEW SYSTEM

Akshai P Aji, Akshay R, Ashiek V M , Hafiya Hamzath, K A Ananthakrishna, Rakhi Ramachandran Nair
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

The employment process has undergone a remarkable digital transformation, with an emphasis on developing intelligent, automated tools that can effectively analyze applicants based on more than just conventional evaluations. This paper describes an AI-driven online interviewer system that can perform like real world interview environments and evaluate applicants based on a number of parameters, including confidence, skills, and emotion. The framework examines real-time audio and video streams using deep learning, natural language processing (NLP), and computer vision to determine the data from responses such as semantic accuracy, tone of speech, and facial clues. Convolutional neural networks (CNNs) are used to recognize emotions, and speech and natural language processing (NLP) models evaluate verbal competence and confidence. Semantic similarity and keyword matching are implemented in knowledge evaluation.The total evaluation provides candidates a detailed feedback and performance indicators through incorporating every feature into a weighted scoring methodology.The paper also includes an in depth overview of the most recent developments in AI-based interview assessment systems, detecting trends in automated feedback systems, multimodal analysis, and sentiment identification.The results of experiments show that AI-powered interviews can improve fairness, reduce bias, and help applicants with preparation and self-evaluation. The framework created here is a scalable, impartial, and real-time interview test that can be modified for usage by professional employment sites and educational institutions.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE12

A REVIEW PAPER ON EVOK SMART SAFETY VEST FRAMEWORK FOR SUBTERRANEAN WORKER PROTECTION

Kessiya Thomas, Rinitha Babu, Rizia Sara Prabin, Runa Susan Roy, Dr. Arun Madhu
Department of Computer Science and Engineering,
Saintgits College of Engineering,Kottayam, Kerala, India

ABSTRACT

Mining, restricted areas, sewerage, and tunnels pose grave safety risks including toxic gases, deficiency of oxygen, high temperatures, and communication failure. Constant observation and the quick reaction to the emergency is thus critical to safeguard the workers and the severity of the injury. EVOK Smart Safety Vest Framework is an Industrial Internet of Things (IIoT) based system that aims at making subterranean spaces safer. It incorporates environmental sensors, physiological sensors, wearable communication hardware, and cloud computing to provide real-time evaluation of the health of workers and the environment around them. The framework uses Body Area Networks, long range communication technologies, beacon-based localization, and cloud-based visualization to transmit information reliably, track locations accurately, and generate alarming data timely. EVOK allows reactive safety management to be replaced with proactive one, and its performance is contrasted with the existing LoRa-based RTEPMS systems to demonstrate its benefits to the latter.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE13

SMART MIRROR FOR REAL-TIME MENTAL MONITORING USING LIGHTWEIGHT CNN AND EDGE AI

K. Sai Sundhar Veekshith, E. Ranjith Kumar Goud, D. Saral Jeeva Jothi
Department of Computer Science and Engineering,
Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

ABSTRACT

Facial emotion recognition is an important competent part in comprehending an individual's mental state. It facilitates human-computer interaction. However, many Current Face++ systems for facial emotion recognition have cloud-based processing, which in turn leads to increased latency, privacy issues, and issues with reliability. The paper will introduce an Emotion-Aware Smart A mirror utilizing edge computing with a lightweight Con-Evolutional Neural Network is used in real time facial emotion analysis recognition. The proposed system is based on embedded systems. including Raspberry Pi and ESP32-CAM, and is trained on FER 2013 dataset with seven emotions: Happy, Sad, Angry Neutral, Surprise, Fear, and Disgust. Preprocessing methods such as conversion to grayscale, normalization, and Harr Cascade- Faces detected using LBP are used for improved classification. Accuracy - Based on the detected emotion, the system generates individualized feedback, motivational quotes, and calming messages recommendations, and health tips. Some experimental results show that this proposed system to have reliable accuracy with low inference time, making it ideal for real-time analysis of mental state Such is an example of non-invasive tracking. The technique is privacy-respecting, cost effective, and suitable for deployment in everyday environments.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE14

GIS DRIVEN TRANSFORMER HEALTH MONITORING SYSTEM

M. Madhumathi, P. J.V. Chandra Vamsi, N. Srikanth
Department of Computer Science and Engineering,
Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

ABSTRACT

Power transformers are essential to the stability of power distribution networks, and their unplanned failure can result in extensive outages, equipment stress, and expensive maintenance. Conventional monitoring methods rely on manual evaluation and periodic inspection, which frequently miss early signs of malfunction. This paper presents an improved GIS-driven Transformer Health Monitoring System that incorporates anomaly detection, IoT-based sensing, Random Forest machine learning, and a Weather Integrated Stress Index (WISI) for intelligent condition assessment. Transformer health score, anomaly score, and short-term risk prediction can be calculated using multi-parameter sensor data in conjunction with environmental stress indicators. Transformer conditions are categorised by the system into Low, Medium, and Critical groups, and an interactive GIS dashboard is used to display the results. Proactive maintenance and effective resource allocation are supported by the spatial mapping of health predictions, WISI effects, and Remaining Useful Life (RUL) estimates. The outcomes show how the suggested system can improve field decision-making processes and transformer reliability.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE15

AI-POWERED LEGAL ASSISTANCE AND AUTOMATION: A COMPREHENSIVE STUDY OF INTELLIGENT LEGAL SYSTEMS

Amal S Nair, Aswathy S Nair, Helen Shaji, Jibin Babu, Sanjai K S, Mary Priyanka
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Recent advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP) have revolutionized the legal industry by introducing intelligent automation in areas such as legal document analysis, summarization, advisory systems, and interactive query handling. The increasing complexity of legal language, coupled with limited accessibility to affordable legal counsel, has created a growing demand for digital systems capable of understanding and interpreting legal information with human-like precision. Leveraging machine learning, Optical Character Recognition (OCR), Large Language Models (LLMs), and information retrieval mechanisms, AI-based systems are now capable of parsing complex statutes, drafting documents, and responding to legal queries in real time.

This research presents a unified exploration of recent technological innovations that employ LLMs, Retrieval Augmented Generation (RAG), LangChain frameworks, FAISS indexing, and collaborative filtering techniques to enhance legal accessibility and intelligence. By examining multiple modern approaches—including OCR-driven summarization, context-aware chatbots, profile-based lawyer recommendation systems, and LLM-assisted legal advisors—this work highlights how these technologies improve accuracy, speed, and inclusivity in legal service delivery.

The study further evaluates how AI-driven models address critical challenges such as legal illiteracy, data fragmentation, and limited transparency, while also identifying the risks associated with model bias, hallucination, and data privacy. The comparative findings

demonstrate that these intelligent legal systems significantly enhance efficiency, reduce consultation costs, and democratize justice by bridging the information gap between citizens and the legal domain. Ultimately, this research underscores AI's transformative potential in redefining how individuals and institutions engage with legal information, paving the way toward a more accessible and equitable legal ecosystem.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE16

MINDMEAL GRAPH:LINKING MEALS TO MENTAL AND PHYSICAL HEALTH USING ML

Dhanya K, Hiba Sherin Cherukadu, Rinsha K, Anulakshmi,
Prof. Nayana Murali
Department of Computer Science and Engineering,
LBS College of Engineering, Kasaragod, Kerala, India

ABSTRACT

Poor nutrition and unhealthy dietary patterns are significant contributors to lifestyle diseases and mental health issues. Existing food recommendation systems often rely heavily on user history, leading to repetitive suggestions that may lack nutritional balance and diversity. This paper presents MindMeal Graph, an innovative machine learning framework that provides personalized meal recommendations by integrating both physical and mental health considerations. The system employs graph-based structures to model nutrient relationships and machine learning algorithms to generate balanced, diverse meal plans. Through comprehensive stakeholder analysis involving gym trainers, dieticians, gym members, and general users, we identified key requirements including multilingual support, real-time alerts, progress tracking, and culturally relevant food suggestions. The proposed architecture incorporates eight modular components covering user registration, data collection, preprocessing, AI-based recommendation engine, real-time alerts, dashboard visualization, and continuous learning. Our evaluation demonstrates that MindMeal Graph effectively addresses the limitations of existing systems by providing nutritionally balanced, personalized meal recommendations that consider both physical health metrics and mental wellbeing indicators. The system is designed to be accessible through multiple languages and operates without subscription fees, making healthy eating guidance available to diverse user populations.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE17

FACIAL-FEATURE-BASED CRYPTOGRAPHIC KEY PROTECTION FOR SECURE DATA STORAGE

Abhinav P V, Denita Maria, Fathimathul Hamna C P, Fathimathul Hiba C P, Muhammad Shefeek
Department of Computer Science and Engineering and Business Systems,
Vimal Jyothi Engineering College, Chemperi, Kannur, Kerala, India

ABSTRACT

A biometric-driven encryption framework is presented in which a user's facial characteristics serve as the foundation for generating the cryptographic key used in both encryption and decryption. Instead of relying on memorized passwords or stored authentication information, the system derives an AES key from facial embeddings generated by a recognition model. The key can be reconstructed only when the same individual's facial data is supplied, preventing unauthorized parties from reproducing the key or accessing the protected information. Experimental results demonstrate that the method provides robust security guarantees, eliminates weaknesses associated with password-based schemes, and facilitates a secure and user-friendly workflow for safeguarding personal and organizational data.The proposed system is implemented using classical machine learning techniques and computer vision tools, enabling real-time operation with minimal computational overhead. Furthermore, the modular architecture allows easy integration of additional security features such as liveness detection or multi-factor authentication in future extensions.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE18

CLUSTAURA: A COMPREHENSIVE SURVEY ON INTEGRATED DIGITAL ECOSYSTEMS FOR CROSS-DISCIPLINARY COLLABORATION AND INNOVATION MANAGEMENT

Rishon Sunil, Joseph Jose Thaiveettil, Elton Dannies Sabu, Donald Deeju, Neena K Pius
Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology, Palai, Kottayam, Kerala, India

ABSTRACT

Cross-disciplinary collaboration has become essential for addressing complex modern challenges, yet existing digital platforms offer fragmented support across networking, communication, and project execution. This fragmentation creates inefficiencies that limit innovation and reduce the effectiveness of distributed teams. This paper investigates how an integrated collaboration ecosystem can address these gaps by unifying the full lifecycle of problem-solving. The study systematically reviews current platforms used for community knowledge exchange, professional networking, project management, and hybrid communication, evaluating their scope, capabilities, and limitations. Results indicate that although individual tools perform well within their domains, none provide seamless connectivity between ideation, expert discovery, real-time communication, and structured workflow management. This lack of continuity disrupts cross-disciplinary collaboration and increases reliance on multiple external tools. The study concludes that platforms like ClustAura, designed as cohesive digital ecosystems, have the potential to enhance collaborative efficiency, support problem-driven teamwork, and align with emerging trends in smart, connected work environments. These findings offer valuable insights for future research and development in integrated collaboration systems.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE19

A SURVEY ON MULTIMODAL SENTIMENT ANALYSIS ON SOCIAL MEDIA DATA

Rifa Fathima K K, Shilpamol S, Sidharth P Vinod, Vaishnav M, Anjana C V
Department of Computer Science and Engineering,
College of Engineering Kidangoor,Kottayam,Kerala,India

ABSTRACT

Artificial Intelligence (AI) has significantly advanced sentiment analysis by enabling machines to interpret emotions from text, images, and videos. Traditional sentiment models focused mainly on textual data, overlooking non-verbal cues essential for accurate emotion recognition. Recent research in Multimodal Sentiment Analysis (MSA) integrates Natural Language Processing (NLP), Computer Vision (CV), and Deep Learning (DL) to enhance contextual understanding. Zhang et al. proposed a Multimodal Mixture of Low-Rank Experts model for improved feature fusion, while Li et al. introduced hierarchical representation learning for incomplete modality handling. Ren combined BERT – ResNet architectures to strengthen text–image correlation. Reviews by Al-Tameemi et al. and Kumar et al. highlighted challenges such as modality alignment, interpretability, and data imbalance. Subsequent works applied MSA in explainable visualization, large-scale social media analysis , and mental health monitoring.

However, current systems still lack real-time multimodal simulation and unified fusion strategies. This literature survey examines existing MSA frameworks, identifying limitations in cross-modal synchronization and contextual consistency. These insights form the basis for the proposed system — Sensys, a multimodal sentiment analysis platform simulating a social media environment with automated bot-generated content and unified emotion classification.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE20

NOVA A NEW ERA OF AI DRIVEN HR

Abhijith C. Santhosh, Ashwin P. S, Mark Johnson, Sreejith S, Prof. Ariyamol P G

Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology Palai, Kottayam, Kerala, India

ABSTRACT

This project proposes an Agentic AI powered HR Assistant that automates and optimizes core human resource functions. The system leverages LangChain, natural language processing, and predictive analytics to act as an autonomous agent capable of planning and executing HR tasks such as resume screening, interview scheduling, employee query handling, leave and attendance tracking, and HR dashboard reporting. Advanced features include employee onboarding, performance monitoring, attrition prediction, training recommendations, and compliance checking, while future extensions target autonomous multi step HR workflows, workforce planning, and payroll system integration.

The solution is developed as a web application using React for the frontend, Node.js or Flask for the backend, MongoDB or MySQL for the database, and AI and machine learning models for decision support. By reducing HR workload, enhancing decision making, and improving efficiency, the proposed Agentic AI HR Assistant positions human resources as a strategic partner empowered by intelligent automation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE21

SKIN-AURA : AI-POWERED SKIN TYPE ANALYSIS AND PERSONALIZED CARE

Sheethal P S, Sneha P S, Saniya K, Lena Biju, Sreehari M.T, Namitha P, Dr. S. Vadhana Kumari
Department of of Computer Science and Engineering And Business Systems,
Vimal Jyothi Engineering , Chemperi, Kannur, Kerala, India

ABSTRACT

This project aims to develop a real-time skin type analyzer using image processing and machine learning. Users can upload a photo, and the system will classify their skin as normal, dry, oily, combination. The ML model is trained to analyze skin features and provide accurate skin type detection. Based on the identified skin type, the system offers personalized skincare recommendations, including suitable skincare ingredients and a diet plan. This AI-powered solution helps users make better skincare choices for healthier skin. The project aims to develop an accurate and personalized system for identifying individual skin types and providing tailored skincare product recommendations. Frontend developed using Gradio. The methodology involves using a combination of image processing Tensorflow, OpenCV, VGG16. The system analyzes skin images to classify skin types with up to 94.57 % accuracy. Accuracy checked using accuracy curve by Matplotlib. With Early stopping the model stops training after optimal number of epochs. The project utilizes data augmentation and hyperparameter tuning to optimize model performance. The system has various applications in the cosmetics industry, dermatology, and skincare, offering benefits such as improved skin health, increased efficiency, and enhanced customer satisfaction. NumPy is a Python library used here. By personalized skincare recommendations, the system helps individuals achieve optimal skin health and addresses the challenges of manual skin type identification.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE22

CCOCOCARE: AN INTELLIGENT COCONUT DISEASE IDENTIFICATION SYSTEM USING DEEP LEARNING

Nandana K, Neha Mariya Benny, Geethika S Jyotheendran, Aira Alphonsa Roy, Prof. Rijin I K
Department of Computer Science and Engineering,
Vimal Jyothi Engineering , Chemperi, Kannur, Kerala, India

ABSTRACT

Coconut is one of the key products that is available in tropical countries and is an important source of revenue for farmers. Recently, many coconut trees have been affected by diseases and, consequently, their productivity. The main cause of the problem is the infestation of pest insects that affect the leaves and hence the coconut trees. The purpose of this project is to improve the health of coconut trees and improve farmers' livelihoods.The system to be developed will be a web-based application that detects common coconut diseases such as leaf rot, leaf spot, bud root drooping, whitefly disease, caterpillar attack, and bud rot. This application makes use of sophisticated and advanced image processing techniques such as segmentation and feature extraction to segment infected areas and analyze symptoms of diseases such as leaf discoloring, curling, and texture changes. Mask RCNN for segmentation, VGG16 for extracting features, and a CNN for accurate disease classification will be used. The system includes the detected name of the disease, as well as measures related to its management. The role of this project is to enable early diagnosis, thus reducing crop loss, increasing yield, and ensuring sustainability for coconuts as an economic crop.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE23

AN EXPLAINABLE HYBRID DEEP LEARNING FRAMEWORK FOR FACIAL IMAGE FORGERY DETECTION

Deyona Shaji , Ayswaryalakshmi R, Namita Jolly, Joby P P
Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology, Palai, Kottayam, Kerala, India

ABSTRACT

The unchecked proliferation of AI-generated synthetic media has emerged as one of the more pressing threats to digital trust in recent years, one that existing detection systems have struggled to keep pace with. In this paper, we present FortifyAI, a hybrid deepfake detection framework built on the EfficientNet-B3 backbone and augmented with a perturbation-based subtraction mechanism alongside Squeeze-and-Excitation (SE) channel attention. To train the system, we construct a domain-balanced dataset of 15,838 images drawn from FaceForensics++ (FF++), Celeb-DF, and GAN-synthesised sources through a multi-domain face-centric preprocessing pipeline that incorporates MTCNN face detection and alignment, stratified temporal frame extraction, and deterministic domain-level balancing. Images are preprocessed at 96×96 resolution to curb identity memorisation and upsampled to 128×128 at training time to satisfy backbone requirements. The core detection signal is derived by computing the feature difference between original and average-pooled backbone representations, a mechanism that reliably surfaces high-frequency synthesis irregularities that are otherwise easy to miss. We evaluate the system under two configurations: (1) a baseline at decision threshold 0.5, which achieves a mean F1 of 0.8672 and mean AUC of 0.9428, and (2) an optimized deployment configuration with threshold 0.26 and horizontal-flip Test-Time Augmentation (TTA), which improves performance to a mean F1 of 0.8713 and mean AUC of 0.9502. Under the optimized setting, Celeb-DF reaches 93.3 percentage accuracy with only 6 false negatives out of 330 fake samples—a result we consider practically significant for real-world deployment. Grad-CAM spatial visualization is integrated into a Django REST API, providing per-prediction explainability that supports human-in-the-loop verification.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE24

AI-SUPPORTED, DATA-CENTRIC EVALUATION FOR MODERNIZING HOSPITAL OPERATIONAL WORKFLOWS

Dr. George Tom Varghese, Dayona Sebastian, Anna Byju, Midhun Jomi C
Department of Computer Science and Engineering,
St.Joseph's College of Engineering and Technology,Palai, Kottayam, Kerala, India

ABSTRACT

The traditional outpatient department (OPD) management process suffers from long waiting times, inefficient patient prioritization and poor inter-departmental coordination, leading to reduced hospital efficiency and patient satisfaction. This paper presents a Smart Hospital Management System developed as an integrated digital solution to automate patient flow and optimize hospital operations while maintaining doctor centric clinical decision making.

The system includes a Pre-Consultation AI Analysis module that processes patient-reported symptoms, vital signs, demographic details, and available medical history collected during registration to identify possible diseases by analyzing symptom–vital–history relationships and known medical patterns. The AI functions solely as a clinical decision support tool, organizing and presenting relevant patient information without performing diagnosis or treatment decisions. During consultation, doctors review the AI-generated analysis alongside complete electronic medical records, conduct physical examinations, and perform follow-up interactions to accurately assess the patient's condition. AI-identified possible conditions are used only as supportive references, while all final decisions related to diagnosis, laboratory investigations, prescriptions, and treatment planning are made exclusively by doctors. The system further integrates doctor consultation management, laboratory and diagnostics handling, pharmacy management synchronized with prescriptions and inventory, reception-based registration and queue management, a patient self-service portal, and administrative coordination. Through centralized data integration and digital automation, the proposed system improves workflow efficiency, reduces manual

workload, enhances inter-departmental coordination, and provides a scalable solution for modern health care systems.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE25

HEALTHCARE INTERFACE FOR PRESCRIPTION SAFETY AND PATIENT INFORMATION MANAGEMENT

Annarose Thomas, Archana P S , Milka Joseph, Siya Joe, Maria Yesudas
Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology Palai, Kottayam, Kerala, India

ABSTRACT

Medical practitioners are many times compelled to make vital decisions in the absence of patient information, thereby compromising safety. For instance, patients who usually come into the emergency department due to an accident lack some primary medical history, such as life threatening allergies and current medications. On the contrary, pharmacists continue to encounter problems in perusing handwriting on prescriptions. Sometimes it has resulted in serious and fatal medication errors. Elderly patients and patients with disabilities too find digital systems of healthcare complicated. Prescription fraud is also one of the increasing problems worldwide as the criminals manipulate the loopholes in current prescription procedures for obtaining drugs under control. Addressing these challenges, an integrated healthcare framework that includes Whisper-based voice recognition, biometric authentication with fingerprint technology, AES encryption, and AI for medication identification and recommendation is proposed in this work. Emergency responders can scan their unconscious patient's fingerprint to retrieve vital medical information safely. Similarly, physicians are able to dictate a prescription as they naturally would, and the system converts it into error-free legible digital orders. Biometric-based digital signatures guarantee prescription authenticity, preventing counterfeit prescriptions. This strategy greatly lowers prescription errors, improves patient safety, stops prescription drug abuse, and guarantees that everyone, regardless of age or physical ability, can access healthcare.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE26

AN INTRUSION DETECTION SYSTEM

Sreebala Babu, Kavya Nandana Sanil, Minnu Mathew, Maria Maju, Dr. Kishore Sebastian
Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology Palai, Kottayam, Kerala, India

ABSTRACT

As the internet gets more and more used the number of cyberattacks and their complexity has also risen. The classic intrusion detection systems fail to detect the new and unknown cyber threats because they only rely on rules and signatures that had been predefined. Hence, there is a call for more smart and flexible security solutions. The paper intends to make a real-time detection system for malicious websites that is based on combining machine learning techniques and Open-Source Intelligence (OSINT). The system to be developed shall classify websites into two categories of either malicious or legitimate by the use of public information and automated learning methods. In this method, OSINT is responsible for the collection of data from open sources about websites that are useful for threat identification. Then, features are obtained for the Random Forest machine learning algorithm to conduct the analysis and classification. Random Forest is the chosen one because of its great accuracy and also due to the capability to work with complicated data fast. The outcome of the experiment is that using OSINT in conjunction with machine learning provides higher accuracy in detection when compared to machine learning alone. The system that was proposed is better at catching newly found and unknown malicious websites. This research proves that it is indeed the case that the combination of OSINT with machine learning gives a solution that is reliable and efficient in the area of cybersecurity and user protection against the ever-changing company online threats.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE27

A SMART DIGITAL GATE PASS FRAMEWORK FOR HOSTEL ADMINISTRATION

Asin Biju, Annu Robin, Cathy Tomson, Lulu S Thekkel, Bino Thomas
Department of Computer Science and Engineering,
St. Joseph's College of Engineering and Technology Palai, Kottayam, Kerala, India

ABSTRACT

Contemporary educational and public sector institutions are embracing the adoption of smart solutions and systems based on ICT, thus replacing manual paperwork processes prevalent in access management, visitor management, leave management, and performance management systems. This article discusses and highlights a comprehensive literature survey of 30 different smart campus and smart organization solutions, performed by synthesizing the analysis of two extensive surveys on gate pass automation, hostel management, biometric attendance solutions, blockchain-based leave solutions, AI-facilitated performance analysis, and metaverse platforms and solutions for education. The solutions are analyzed and classified under five different layers: operational access management, human resource management, biometric enablement, data analytics, and immersion. Based on the analysis of solutions under these layers, the trend is clear. While basic solutions encrypt and convert manual processes for disconnected operations such as barcodes and online forms, current solutions encompass the integration of IoT, Cloud, AI, and Blockchain technologies that support real-time analysis and intelligence on campuses and organizations. However, there is still ample scope and need for improvement in system interoperability, the effectiveness of biometric solutions on disguised faces, and privacy analytics. These solutions must therefore be scalable and deployable on large, commercial, and realistic campuses and organizations.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE28

MACHINE LEARNING-BASED PCOS PREDICTION SYSTEM

Fathima Shaziya, Thameema Sana , Shad Abdulla M,Anugraha K
Department of Computer Science and Engineering (Data Science) ,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Early disease prediction is essential for timely treatment and better healthcare management. With the growth of machine learning, intelligent systems are increasingly used to support doctors in diagnosing diseases at an early stage. Patient symptoms and medical imaging data play an important role in identifying health conditions accurately.

However, most existing disease prediction systems depend only on symptom-based data or use a single machine learning model. This limits prediction accuracy and does not fully utilize medical imaging data such as ultrasound images, which contain valuable diagnostic information.

To address this problem, the proposed system uses a multi-modal disease prediction approach by combining patient symptoms and ultrasound images. Symptom data with severity levels is analyzed using machine learning algorithms like Random Forest and Decision Tree, while ultrasound images are processed using a Convolutional Neural Network (CNN). The features from both inputs are fused to improve prediction accuracy, and model comparison is performed to select the most efficient algorithm.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE29

OPRA HEALTH: AN OBESITY PREDICTION SYSTEM WITH REAL - WORLD ADOPTION AND ADOLESCENT INTERACTION

Fathima Diya Muhammed C M, Theertha Mohandas, Uttara Prajith P K, Rashma Saleem
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Adolescent obesity remains a critical public health concern, requiring innovative solutions that are not only predictive but also engaging and accessible. So we introduce OPRA HEALTH: An obesity prediction system with real-world adoption and adolescent interaction.

The system integrates psychological and behavioral factors including mood, stress, and screen time into the prediction model, offering a more holistic understanding of individual weight trajectories. An AI-powered food recognition module further simplifies data entry by estimating caloric content from user-captured food images, reducing manual logging efforts. To improve user motivation and retention, an adaptive feedback system with an AI chatbot delivers real-time, personalized health tips and encouragement based on historical behavior patterns.

The system is also designed for low-resource settings through an offline mode, enabling data collection and temporary storage without internet connectivity, with sync-on-connect features. Data privacy is there and a “Clear My Data” function, empowering users with complete control over their personal health data. Social interaction is supported via a secure chat space and optional alert systems for reminders and support.

Together, this system is robust, privacy-conscious, and user-centric system that not only predicts obesity trends but also actively guides adolescents toward healthier lifestyles through intelligent feedback, engagement, and empowerment.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE30

AI-ENABLED REAL-TIME PPE DETECTION USING DEEP LEARNING AND COMPUTER VISION

Amaljith V R, Saritha Narayanan, Akash Biju, Fathimath Shameema T P, Yadu Krishna K V
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The proposed system introduces an AI-enabled, sensor-free Personal Protective Equipment (PPE) monitoring framework that leverages advanced deep learning and computer vision algorithms to ensure real-time worker safety in industrial environments. Unlike conventional systems that rely heavily on wearable IMU sensors, this approach eliminates the need for physical devices by processing live video streams from surveillance or workplace cameras. The system employs powerful object detection networks such as YOLOv8 and EfficientDet to accurately identify PPE items like helmets, gloves, vests, and boots in real time, even under varying lighting and environmental conditions. To go beyond mere detection, human pose estimation models such as MediaPipe and OpenPose are integrated to analyze body posture and determine whether the detected PPE is being worn correctly. This also enables the system to identify abnormal or unsafe postures, such as collapsing or lying down, to support fall detection and emergency alert generation. Furthermore, a 3D Convolutional Neural Network (3D-CNN) based activity recognition module classifies short video clips to determine whether a worker is wearing, carrying, or not using PPE, thus improving interpretability and situational awareness. By combining object detection, pose analysis, and activity recognition, the system delivers a comprehensive compliance decision in real time. This fusion ensures high accuracy, scalability, and cost-effectiveness, making it suitable for large-scale deployment in construction sites, factories, and other high-risk industrial environments. The proposed framework promotes privacy-conscious, non-invasive monitoring and lays the foundation for future extensions, including multi-camera

synchronization, synthetic data augmenta- tion. Overall, the system represents a significant advancement toward smart, AI-driven workplace safety automation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE31

REAL-TIME DRIVER DROWSINESS DETECTION USING CNN-GRU MODEL WITH FACIAL FEATURES AND BEHAVIOURAL ANALYSIS

Fathimathu Riza P V, Ahana Sumesh, Arza Fathima M, Chandana S Krishna,Anju G
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Drowsiness during driving is a significant contributor to road accidents, especially during prolonged travel or under low visibility conditions. To address this, the proposed study presents a real-time drowsiness detection system based on a deep learning hybrid model combining Convolutional Neural Networks (CNN) and Gated Recurrent Units (GRU). The model analyses behavioural features such as eye aspect ratio (EAR), mouth aspect ratio (MAR), and head pose, extracted using facial landmark detection through MediaPipe. To ensure robustness in variable lighting conditions, Retinex theory is applied for image preprocessing, enhancing contrast and correcting illumination inconsistencies. This improves the reliability of visual feature extraction. The CNN component is responsible for learning spatial features from facial images, while the GRU captures temporal patterns across video frames. This allows the system to detect signs of fatigue such as prolonged eye closure, yawning, and head nodding over time. The hybrid design leverages both spatial and temporal cues for more accurate classification. The model is trained and evaluated on a labeled dataset and demonstrates strong performance across precision, recall, and accuracy metrics. By integrating temporal modeling and illumination correction, the system adapts effectively to real- world environments. This contributes to early and accurate detection of driver fatigue. Ultimately, the approach enhances road safety by providing timely alerts and reducing accident risk.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE32

SMART UNDERWATER POLLUTION DETECTION SYSTEM

Meghna C, Dinla O K, Akshara K , Namya P V , Snigdha R K
Department of Computer Science and Engineering, St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Underwater waste is a serious problem caused by human activities like fishing, shipping, tourism and dumping of garbage and plastics into rivers and oceans. Detecting underwater waste is difficult because of low visibility and deep or hidden locations. Unmanned Underwater Vehicles (UUVs) are cost-effective solutions for undersea monitoring but face significant challenges due to visual distortions caused by light absorption and scattering as well as limited onboard power resources. To overcome these issues, an intelligent two-stage framework has been developed that first employs an efficient deep learning model (YOLOv8) for detecting underwater objects and regions of interest (ROIs) such as fish, divers and submarines. The detected ROIs are then processed through an advanced image restoration algorithm that enhances visual quality supporting more reliable navigation and monitoring for resource constrained UUVs. Building upon this foundation, the proposed system extends its capabilities by incorporating an underwater waste detection module designed to identify and classify non-biodegradable waste materials such as plastic bottles, tyres, face masks, gloves and selected categories of electronic waste (E-waste) including mobile adapters, mouse, keyboard, smartphones and TV remotes. The system supports image and video uploads as well as real-time inputs and integrates underwater image preprocessing techniques with specialized object detection algorithms to enable accurate recognition of waste objects, thereby enhancing underwater environmental monitoring and contributing to marine ecosystem protection. This integrated framework allows consistent detection performance across different input formats while maintaining reliable identification of non-biodegradable waste materials. As a result, the system provides a comprehensive solution for continuous and effective underwater waste monitoring

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE33

AI-DRIVEN HELMET DETECTION AND IGNITION CONTROL SYSTEM

Prof. Navya N C,Soumyasree C M , K Arjun Narayanan, Avinash Ravindran , Muhammed Sinan U V
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Motorcycle accidents are a major cause of fatalities worldwide, often due to riders not wearing helmets or failing to secure them properly. Manual enforcement of safety regulations is inconsistent, and the rise in two-wheeler usage in urban areas highlights the need for automated systems that ensure helmet usage and rider sobriety before engine ignition. Conventional systems use alcohol sensors, fall detection, and basic helmet-related sensors. However, these approaches have limited accuracy and are generally restricted to simple helmet presence detection. To address this limitation, a vision-based approach using a camera and real-time object detection is introduced. YOLOv8 is employed to detect helmet usage, while an infrared (IR) sensor is integrated to verify proper helmet wearing by detecting correct head and strap alignment, in addition to alcohol detection and fall sensing. All sensor readings are processed by a microcontroller that controls vehicle ignition. The system communicates with a mobile application via Bluetooth to display real-time safety status, generate alerts, and transmit location details during emergencies. By combining AI-based visual detection with IR-sensor-based helmet verification, vehicle operation is permitted only when all safety conditions are satisfied. This enhances rider safety and is applicable to real motorcycles as well as scaled prototype models.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE34

AI-INTEGRATED HOSPITAL MANAGEMENT AND DIAGNOSTIC SYSTEMS - A GLANCE

Cyril Sheron D Rozario, Elvin George Martin, Gowri Krishna A M , Sandeep Saji, Ojus Thomas Lee
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Artificial Intelligence (AI) has rapidly transformed the healthcare sector by enabling intelligent automation, predictive diagnostics, and data-driven clinical decision-making. Numerous studies have explored AI applications such as Convolutional Neural Networks (CNNs) for medical image analysis and Machine Learning (ML) models like Random Forest, XGBoost, and Multilayer Perceptron (MLP) for diagnosis. Parallel developments in hospital management systems have focused on electronic record keeping, workflow automation, and performance analytics. However, most existing systems address either the diagnostic or administrative aspect in isolation. This literature survey reviews key research in AI-driven healthcare diagnostics and smart hospital management, identifying major techniques, their strengths, and current limitations. The analysis reveals that integrating diagnostic intelligence with hierarchical management dashboards can bridge the gap between automated medical evaluation and hospital-wide operational efficiency. This insight forms the foundation for the proposed system — an integrated, AI-powered hospital management solution combining deep learning–based diagnostics with real-time analytics for doctors, heads of departments, and administrators.

This study therefore emphasizes a unified AI-driven approach that combines advanced diagnostic intelligence, explainable machine learning models, and hierarchical hospital analytics to support efficient, transparent, and data-driven healthcare management.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE35

MALAYALAM COLLEGE QUERY VOICE ASSISTANT

Abhishek T, Vijina V Nair, Abin George, Fathimath Fousiya B K,
Dr. Sulphikar A
Department of Computer Science and Engineering,
LBS College of Engineering, Kasaragod, Kerala, India

ABSTRACT

In today's digital era, accessing college-related information remains a challenge for many students, parents, and visitors, especially due to language barriers and repetitive administrative processes. Existing systems like websites and chatbots are often limited to English and fail to provide real-time, voice based interaction, creating accessibility gaps for regional users. This project, titled "Malayalam College Query Voice Assistant," aims to bridge this gap by integrating Artificial Intelligence (AI), Natural Language Processing (NLP), and Speech Recognition technologies to deliver instant, multilingual voice-based query responses.

The system allows users to interact in Malayalam and English through a conversational interface that understands spoken queries and provides accurate, real-time information about admissions, fees, courses, events, and campus facilities. It utilizes Automatic Speech Recognition (ASR) for voice-to-text conversion, NLP for intent detection, and Text-to-Speech (TTS) for natural voice replies, ensuring seamless interaction and accessibility. By automating repetitive administrative queries, the assistant significantly reduces staff workload and enhances user satisfaction.

The primary objectives of this project are to develop an inclusive and user-friendly system that supports Malayalam language interaction, integrates with the college database for live updates, and ensures 24/7 information availability. By combining automation with regional language support, the Malayalam College Query Voice Assistant promotes inclusivity, efficiency, and digital empowerment in college administration.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE36

INTELLIGENT RECIPE ASSISTANT: MULTI-INGREDIENT RECOGNITION WITH CALORIE AND ALLERGY-SAFE FILTERING

Absheera Kottikollath, Fathima Zenha Zameer, Alvita Rahim, Hafsath Noora,Neethu T Regi

Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Traditional recipe recommendation systems often depend on predefined ingredient lists or accurate user input, which can be difficult when users are unsure about the names of ingredients available in their kitchen, and sometimes may not reflect the ingredients actually available in a kitchen.

This project proposes an intelligent recipe assistant that primarily uses image-based multi-ingredient recognition through a convolutional neural network (CNN) to identify food items from user-uploaded images. In addition to image-based recognition, the system also allows users to optionally enter ingredients through text input when preferred.. Based on the identified ingredients, the system aims to recommend suitable recipes with calorie-aware and allergy-safe filtering to encourage healthier and safer food choices. Additional features will also include highlighting missing ingredients and providing step-by-step cooking instructions with optional text-to-speech guidance.

The proposed system seeks to reduce user effort and decision fatigue while demonstrating the practical application of AI in smart kitchen environments.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE37

EARLY PREDICTION OF CEREBRAL PALSY IN INFANTS USING MEDIAPIPE-BASED POSE ESTIMATION AND CNN–LSTM DEEP LEARNING MODELS

Prof. Shilpa Shiva, Sheza Fathima K, Fathima P P, Sundus Nasar, Fathima Hameed
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Early identification of Cerebral Palsy (CP) in infants is crucial for timely therapeutic intervention and improved developmental outcomes. Traditional diagnostic methods depend heavily on clinical observation, making early detection challenging due to subtle and highly variable infant movement patterns. This project introduces an enhanced, data-driven framework for early CP prediction using pose estimation and deep learning techniques. Unlike earlier approaches that rely on OpenPose, the proposed system employs MediaPipe's lightweight and high-precision pose estimation model to extract 2D skeletal keypoints from infant movement videos. The extracted keypoints undergo normalization and preprocessing before being analyzed using a hybrid CNN–LSTM deep learning architecture, which effectively captures both spatial posture information and temporal movement dynamics.

The proposed enhancement not only simplifies the preprocessing pipeline but also improves pose accuracy, joint visibility, and robustness to noise, enabling more reliable classification of fidgety movements associated with CP. Experimental evaluation demonstrates that the MediaPipe-based approach provides improved stability and performance compared to traditional OpenPose-dependent models. This system supports automated, objective, and early identification of CP-related motor abnormalities, offering potential benefits for pediatric healthcare professionals. The framework also lays a strong foundation for future extensions, including 3D pose analysis, biomechanical feature extraction, and real-world clinical deployment.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE38

HANDLING CLASS IMBALANCE IN ACCIDENT SEVERITY PREDICTION

Muhammed Fazil, Mohammed Hamdan, Mohammed Najoom, Muhammed Marvan, Prof. Jithika M
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Accident severity prediction is one of the critical tasks in developing intelligent transportation systems to safeguard public safety. Most real-world accident datasets used for machine learning suffer from severe class imbalance, where the minor accidents dominate the entire data and fatal or serious accidents are just a small fraction. This further leads to biased machine learning models that fail to detect high-risk cases precisely. This project addresses this challenge through the application of data balancing techniques like SMOTE, Random Under sampling, and Class Weighting on CICIDS2017/UK accident datasets. Several machine learning models, such as Random Forest, Logistic Regression, and XGBoost, are trained before and after balancing in order to assess the improvements in minority class prediction. The experimental results indicate a large increase in recall and F1-score in the cases of fatal and serious accidents, thus proving the efficiency of applying imbalance handling methods. It will help to realize a more objective and impartial accident severity prediction system for better decision-making and to support safety programs for reducing high-severity accident outcomes.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE39

ADVANCED VEHICLE DETECTION AND MODIFICATION IDENTIFICATION USING DEEP LEARNING AND MULTI-MODAL AI IN INTELLIGENT TRANSPORTATION SYSTEMS

Rohan K P, Athira Raj, Athul Babu P, Vaishnav M K, Navya N C
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The rapid increase in the number of vehicles on roads has placed immense pressure on intelligent transportation systems (ITS) and urban infrastructure, demanding more efficient traffic management and enhanced safety mechanisms. To address these challenges, the development of faster and more accurate vehicle detection methods has become critical, with computer vision and deep learning technologies playing a transformative role in advancing vehicle identification. While traditional detection algorithms laid the foundation, deep learning models—particularly convolutional neural networks (CNNs)—have significantly improved accuracy and efficiency. Within this domain, two-stage detectors such as Faster R-CNN are recognized for their high precision, whereas one-stage models like YOLO and SSD excel in real-time performance, making the choice between them dependent on the balance of speed and accuracy required by specific applications. Despite these advancements, real-world scenarios such as poor weather, nighttime visibility, and vehicle occlusion continue to present detection challenges. Moreover, a novel dimension in ITS development involves the detection of modified vehicles using artificial intelligence, integrating visual and audio data through computer vision and multi-microphone systems. This enables the identification of unauthorized vehicle modifications, such as loud exhausts, altered suspensions, or custom body parts, by analyzing both physical appearance and sound patterns. Incorporating such modification detection into modern ITS frameworks can significantly strengthen law enforcement, enhance road safety, and support insurance

evaluations—marking a major step forward in the evolution of intelligent traffic management.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE40

AI-BASED INTELLIGENT TRAFFIC SIGNAL CONTROL SYSTEM WITH REAL-TIME EMERGENCY VEHICLE DETECTION VIOLATION ENFORCEMENT

Akshay Pradeep, C T Adarsh, Lana Rasheed K K, Vishnu K, Dinla O K
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Urban traffic congestion, delayed emergency response, and frequent traffic rule violations remain critical challenges in modern cities, affecting both safety and efficiency. Existing traffic management systems typically rely on fixed-timing signals or basic sensor-based control, lacking the intelligence to adapt to real-time conditions, prioritize emergency vehicles, or enforce violations effectively. To address these limitations, this project presents an enhanced AI-powered Smart Traffic Control System featuring a three-module architecture: adaptive signal control, emergency vehicle detection, and traffic rule violation detection. The adaptive signal module utilizes real-time video input and deep learning to dynamically adjust signal timings based on traffic density. The emergency detection module identifies ambulances or fire trucks through AI-based object and sound recognition to provide priority clearance. Meanwhile, the violation detection module employs Automatic Number Plate Recognition (ANPR) to detect and log red light violations automatically. Together, these modules create a unified and intelligent traffic control system that significantly improves traffic flow, emergency response times, and rule enforcement in real-world scenarios

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE41

EARLY DETECTION OF MILD COGNITIVE IMPAIRMENT USING STACKED FEATURE FUSION OF PRETRAINED CONVOLUTIONAL NEURAL NETWORKS ON MRI IMAGES

Harinand P, Adith C, Navaneeth G, Sruthin Moorkoth,
Prof. Neethu T Regi
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Early identification of Mild Cognitive Impairment (MCI) in cognitively normal (CN) individuals plays a crucial role in delaying the progression of Alzheimer's disease (AD) and improving clinical outcomes. Recent studies have demonstrated the effectiveness of deep learning techniques, particularly convolutional neural networks (CNNs), in analyzing brain Magnetic Resonance Imaging (MRI) data for early-stage cognitive impairment detection. Motivated by existing dual-path attention-based models, this mini project focuses on developing a simplified yet effective deep learning framework that enhances classification performance while remaining suitable for beginner-level implementation.

In this work, we propose a stacked feature fusion approach using pretrained convolutional neural networks to improve CN versus MCI classification accuracy. Two complementary CNN architectures, ResNet and DenseNet, are employed as parallel feature extractors to capture both global structural patterns and fine-grained texture information from MRI slices. The extracted features are fused at the feature level using simple concatenation followed by a lightweight fully connected classifier. Transfer learning with pretrained ImageNet weights and global average pooling is utilized to reduce overfitting and improve generalization on limited medical datasets.

Compared to single-backbone CNN models, the proposed stacked feature fusion strategy provides richer feature representations and improved discriminative capability for

subtle cognitive changes. This approach demonstrates that meaningful performance improvements can be achieved using simple architectural enhancements, without relying on complex attention mechanisms or computationally expensive 3D models. The proposed method offers a practical and accessible solution for early MCI detection and serves as a strong baseline for further research in Alzheimer's disease progression analysis.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE42

STUDENT PERFORMANCE PREDICTION IN ONLINE LEARNING USING MACHINE LEARNING TECHNIQUES

Adithya Sujayan, Sanmaya K, Sayona Shamej, Theertha Nishanth K. K, Prof. Anjana K.P
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

This study explores how machine learning can be used to predict student performance in online learning environments by analyzing behavioral data collected from a MOOC platform. The work examines multiple indicators such as course logins, time spent on materials, repeated resource views, and participation in discussion forums to determine which factors best predict whether a student will achieve an excellent score. Using logistic regression enhanced with Taylor expansion, the model identifies repeated viewing behavior, utilization efficiency, and resource density as the most influential predictors. Although results show promising accuracy, the study suffers from a major limitation: the dataset is relatively small and lacks variety in student demographics, learning styles, and course types, restricting the model's ability to generalize. This drawback can be easily addressed by incorporating larger datasets from multiple platforms or institutions and adding richer features such as weekly quiz performance, engagement pace, and session-level behaviors, which can significantly improve prediction accuracy and robustness.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE43

AI DRIVEN LECTURE UNDERSTANDING THROUGH AUTOMATIC TRANSCRIPTION SEMANTIC SEGMENTATION AND ABSTRACTIVE SUMMARIZATION

Souhrudh Jeevan, Avikam Manoj, Poornendh Ashok, Prof.Jithika M
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

As more teaching moves online students face long lecture videos that are hard to navigate study from or review. Raw transcripts are useful but they do not show where topics change which parts matter most or give short readable summaries. That makes it slow and frustrating to find and revise the important ideas.

The referenced research work showed that modern speech to text models and transformer based summarizers can turn spoken lectures into readable text and coherent summaries. It did this well for transcription and abstractive summarization but it did not solve some practical needs for everyday classroom use like finding clear topic boundaries, scoring which parts are most important, producing structured metadata or offering an interactive interface for students.

To fill those gaps we built EchoNote a simple to use system that turns raw lecture recordings into study ready material. It uses faster whisper for fast accurate transcripts SBERT based semantic segmentation to find meaningful chapter boundaries and Gemini powered summarization to create chapter titles key points full summaries and normalized importance scores. Every output follows a strict JSON schema so tools and scripts can use the results reliably. We are planning to build a Vite and React interface that syncs chapter navigation with timestamps and lets users export SRT and JSON files.

EchoNote is still early work but it already makes lectures easier to navigate review and study. By combining reliable transcription smart segmentation, clear summaries and a practical UI the system moves us closer to a tool that students can actually use to learn more efficiently.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE44

DEEP LEARNING BASED ANIMAL INTRUSION DETECTION AND REPELLENT SYSTEM WITH ALERTING ANDROID APP

Abhinav C, Amalraj N, Aswanth A P, Sayanth Joshi K
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The Deep Learning Based Animal Intrusion Detection and Repellent System with Alerting Android App is a cutting-edge solution designed to safeguard farm lands from wildlife intrusion. This innovative system leverages artificial intelligence (AI) and machine learning and deep learning technology to provide effective detection and repulsion of a range of wild animals, including elephants, monkeys, deer etc. The core components of this system consist of a camera network and an image processing unit, which can be implemented using windows PC with graphics card support. The image processing unit is equipped with a trained detection model that utilizes Convolutional Neural Networks (CNNs) to recognize and classify various wild animal species. The system's detection model is preloaded with datasets of target animals,ensuring accurate identification.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE45

CYBERSHIELD: INTELLIGENT QR-BASED MALICIOUS URL DETECTION WITH RISK SCORING

Aysha Faziya, Fathima Younus, Nandhana Shaji, Ferbin Muneer P K,Anjana K P
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The existing system presented in the base paper focuses on detecting malicious URLs using machine learning techniques by analyzing URL-based features. The model is trained on a dataset of known safe and malicious URLs and classifies them accordingly. Such systems help in identifying harmful web links and improving online security. However, the existing approach mainly relies on manual URL input and does not address emerging attack vectors such as malicious URLs embedded within QR codes, which are increasingly used in real-world scenarios like digital payments, posters, and advertisements.

Despite its usefulness, the base paper has several limitations. It does not provide automatic URL detection from QR codes, forcing users to manually verify links after accessing them. Additionally, the system only provides a binary classification result without explaining the level of threat involved. The absence of a risk scoring mechanism makes it difficult for users to understand how dangerous a detected URL is. Moreover, the existing system lacks user-centric decision support and does not prevent users from opening malicious links unknowingly.

To overcome these limitations, this mini project proposes CyberShield, an intelligent desktop-based security system that integrates QR code scanning, automatic URL extraction, malicious URL detection, and risk scoring into a single framework. When a QR code is scanned, the embedded URL is automatically detected and analyzed using machine learning models before being opened. The system assigns a risk score to each URL, clearly categorizing it as safe, suspicious, or malicious, and alerts the user accordingly. By providing

early detection, risk awareness, and user-friendly decision support, CyberShield enhances protection against QR-based phishing attacks and contributes to safer digital interactions in real-world environments.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE46

CLUSTER-DRIVEN MODEL FOR PREDICTING STUDENT DROPOUT AND ACADEMIC FAILURE

Ayoshmi Santhosh Kumar, Nandana T, Sneethi Sudheendran,Hridya K K
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Early identification of students at risk of failing or dropping out is the key for improving academic performance and retention. Many prediction models exist, but their effectiveness often decreases when applied to different courses or student groups. In this project, we explore if clustering students based on their learning behaviour can enhance the accuracy of risk prediction models.

We use the Open University Learning Analytics Dataset (OULAD) to apply clustering techniques that group students with similar behavioural and demographic patterns. Instead of relying solely on K-means, we also test hierarchical clustering, which works better for mixed data and uneven student groups. After forming clusters, we train common machine learning models Logistic Regression, Random Forest, Support Vector Machine, and Neural Networks—within each cluster. To tailor the approach for Indian university settings, we introduce a new feature called the AIM Score (Attendance + Internal Marks).

Our results show that cluster-based models outperform single models trained on the entire dataset. Clustering uncovers distinct engagement profiles, such as consistently low activity, irregular activity, and high interaction. Adding the AIM Score further boosts model accuracy and clarity. Overall, the study shows that combining clustering with classification algorithms can provide a more flexible and precise way to identify at-risk students in diverse educational settings.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE47

ADVANCED CROP RECOMMENDATION SYSTEM USING ENSEMBLE LEARNING AND STREAMLIT DEPLOYMENT

Abhinav Manoj, Adithyan M C, Gagan Dev, Jyothis C R,Shilpa shiva
Department of Computer Science and Engineering (Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Selecting the right crop for specific soil and climate conditions is essential for sustainable agriculture, yet many farmers still depend on traditional methods instead of data-driven decisions. The reference study from Heliyon (2024) evaluated five machine learning models using soil nutrients (NPK), pH, temperature, humidity, and rainfall. It showed that agricultural and horticultural crops require separate models for better accuracy, with XGBoost achieving the highest performance of about 99%. It also highlighted that using a single model for all crops reduces accuracy due to overlapping soil and climate requirements.

Based on these findings, our work focuses on category-specific modeling and deeper performance analysis using multiple evaluation metrics and confusion matrices. We design an improved crop recommendation system using a stacking ensemble approach that combines XGBoost, Random Forest, and SVM with an RBF kernel. Their outputs are integrated using a Multinomial Logistic Regression meta-classifier to produce more stable and generalized predictions while reducing overfitting.

To improve transparency, SHAP-based explainability is applied to show the influence of soil and climate features on the predictions. A Streamlit interface allows users to enter real-world parameters and receive clear, data-driven crop recommendations, making the system practical and user-friendly for precision agriculture.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE48

DEPARTMENT BUDGET AND STATIONARY STOCK MANAGEMENT SYSTEM

Anjana K, Fathima Riza Ershad, Shivadha R, Vaishakhi V K
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The Department Budget and Stationary Stock Management System is designed to replace the existing manual system of maintaining departmental budget and stationary stock records. In the current system, details such as the number of stationary items available, items utilized, remaining stock, department budget allocation, and expenses for college events are maintained manually, which may lead to errors and difficulty in tracking. The proposed system aims to collect all required information and store it in a centralized database. It helps in tracking stationary items by recording total quantity, utilized quantity, and remaining stock. It also manages department budget details such as allocated budget, amount spent, and remaining balance. By storing all data in a database, the system reduces manual effort, improves accuracy, and allows easy access to information. This system provides an efficient and reliable way to manage departmental resources.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE49

SERIES EXAMINATION RESULT ANALYSIS

Fidha Fathima T, Fathima Ziya, Raya Fathima, N Liya Razack
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Series examinations are conducted in colleges to evaluate student's academic performance before university examinations. Manual analysis of these results, including expected pass percentage calculation, pass rates, and mark distributions is time-consuming and error-prone. This project, "Series Examination Result Analysis," aims to automate the process of exam absence management, performance analysis, and class pass percentage calculation. The system calculates individual percentages, class averages, and pass percentages, and provides a detailed analysis of performance trends of Series I, II, and III examinations. Additionally, based on series examination performance, the system calculates the expected class pass percentage, helping faculty identify academically weak students at an early stage and take corrective actions.

The project is implemented using Python, owing to its flexibility and wide library support, along with Tkinter for developing a user-friendly graphical interface. Data management is handled using SQLite, which is lightweight and easy to integrate with Python. Visualization of performance trends and mark distributions is achieved using Matplotlib and Pandas, making the analysis intuitive and interactive. This system reduces manual workload, minimizes errors, and provides an efficient and systematic method for academic performance monitoring.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE50

QUESTSCHOLAR: THE ALL-IN-ONE RESEARCH HUB

Sidan Muneer, Rifa Saleem, Sredha Dhanaraj, Samantha Shine,
Dr. Sreekesh Namboodiri T
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The AI-integrated academic research platform is introduced to support students, professors, and reviewers throughout the research process. It features a real-time document editor with template support and Retrieval-Augmented Generation (RAG)-based writing assistance for formatting in styles such as IEEE, ACM, and Springer. The platform enables secure review and progress report management through institutional role-based access control. Semantic-aware capabilities include automatic content tagging, intelligent tool suggestions, multilingual support, and an AI-powered assistant for literature surveys, summarization, and title generation. A scoreboard mechanism tracks user participation and contributions. The system improves workflow efficiency and fosters academic collaboration. Future developments include a research roadmap generator, visual progress dashboard, citation manager, digital certification to support structured academic workflows and all purpose document editor.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE51

SMART LEAK NET:WIRELESS LEAK MONITORING FOR IRRIGATION

Muhammed Shasin K, Muhammed Jasil V K, Najiya Np, Shaza Shamsuddeen
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Efficient and intelligent water management is vital for modern urban and rural infrastructures. This project proposes a Machine Learning-based Water Supply Monitoring Network that ensures transparency, minimizes water loss, and enhances consumer utility tracking. The system integrates flow sensors and turbidity sensors across the distribution pipeline—from the main storage tank to individual client endpoints. A Long Short-Term Memory (LSTM) based machine learning model is used to analyze sensor data, detect anomalies such as leakages, forecast future water demand, and monitor water quality. An Android app allows users to track daily water usage, receive alerts, and pay bills digitally, while an administrative dashboard enables authorities to monitor real-time data for informed decision-making. This smart water distribution system promotes sustainability, reduces wastage, and enhances the efficiency and accountability of water resource management.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE52

JOBFIT AI: INTELLIGENT RESUME MATCHING & INVIGILATED EXAMINATION

Keerthana K, Rasha Valsan, Sreya Sajeevan P, Gokul S,vaishaki V K
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Job searching and preparation continue to pose significant challenges for candidates due to time consuming applications, lack of personalized guidance, and insufficient practice tools. Most traditional platforms provide only job listings, requiring users to manually search, apply, and prepare with little feedback or direction. Our proposed system solves this gap by offering an all-in-one web platform that automates the job application process while supporting users through skill analysis and performance improvement.

Users begin by uploading their CVs, which the system analyzes using Natural Language Processing (NLP) to extract key details such as skills, experience, and qualifications. The extracted data is matched with relevant job openings, and users can apply to matched jobs directly from the platform. To help users prepare for assessments, the system offers aptitude and technical practice sessions tailored to their target roles. After each session, users receive detailed performance feedback, along with video recommendations targeting their weak areas to support ongoing learning and improvement.

Future expansions may include live AI-based mock interviews, voice-enabled interactions, and smart dashboards that track user progress over time. This project aims to provide a faster, smarter, and more effective approach to job seeking by combining automation with intelligent feedback and continuous skill enhancement.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE53

AI BASED AUDIO SURVEILLANCE SYSTEM FOR DETECTING OFFENSIVE SPEECH IN PUBLIC SPACES

Dr.Shinu Mathew John,Karthik K, Arjun K, Ashika Raveendran, Aysha P P
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The AI-Based Audio Surveillance System for Detecting Offensive Speech in Public Spaces is an application proposed to detect the offensive speech and alert it to the respected authority. This overcomes the challenges of long audio recordings which cannot be manually segmented or analyzed easily, making timely identification of abusive or threatening speech difficult. The proposed system provides an efficient and practical solution by automatically detecting harmful, offensive or panic-inducing language in real world environments. This ensures faster responses and enhances public safety through proactive audio based monitoring. The system is structured into three main modules the Admin Module, which manages authorities, reports and system settings the Authorities Module, which receives real time alerts, accesses audio evidence and locates incidents through geotagging and the AI Module, which powers the core intelligence of the system through speech recognition, natural language processing and machine learning. Together these modules coordinate seamlessly to provide an intelligent and efficient surveillance framework. The app functions through these integrated stages continuous audio capture from the environment, speech-to-text conversion using ASR, semantic and sentiment analysis through NLP, harmful speech classification via machine learning and finally automated alert generation with audio evidence and location data. By minimizing human monitoring while enhancing accuracy and response time, the system delivers a scalable, real time and AI-driven solution for modern public safety needs

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE54

AUTHENWRITE: AI-BASED HANDWRITING VERIFICATION FOR ACADEMIC INTEGRITY

Mohammad Riyad, Hima Sujesh R K, Vasudev, Muhammed Rabeeh, Dr.Sreekesh namboodiri T
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Manual evaluation of handwritten student assignments is a time-consuming and error-prone process, particularly in large academic institutions where educators must assess a high volume of submissions. In addition to grading challenges, identifying proxy-written or forged assignments remains a persistent concern, as traditional verification methods rely heavily on manual inspection and subjective judgment. To address these limitations, this paper proposes an automated system for verifying the authenticity of handwritten assignments and evaluating their content using a combination of deep learning, optical character recognition (OCR), and retrieval-augmented generation (RAG).

The proposed framework employs a Siamese Convolutional Neural Network (CNN) to analyze handwriting patterns and detect forged or proxy submissions by measuring similarities between writing samples. Handwritten assignment content is then converted into machine-readable text using OCR techniques. The extracted text is semantically evaluated against instructor-provided reference materials using Sentence-BERT embeddings stored in a vector database, enabling context-aware information retrieval. A large language model (LLM) leverages the retrieved reference context to perform detailed answer evaluation. At the same time, a weighted scoring mechanism integrates authenticity verification and content relevance to generate the final assessment. Overall, the system aims to reduce teacher workload, improve grading consistency, and strengthen academic integrity through automated, objective evaluation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE55

CROSS-SIGN LANGUAGE TRANSLATION SYSTEM

Abhinav K P, Saran Scaria, Sayanth S, Vishnu Vinodan, Jithin S
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Sign language is vital for communication among individuals with hearing and speech impairments, yet the diversity of sign languages poses a major barrier to inter-regional interaction. Existing systems mainly support sign-to-text or sign to-speech conversion within the same language, offering limited assistance in cross-lingual contexts. This paper introduces a novel CROSS-SIGN LANGUAGE TRANSLATION SYSTEM, designed to translate gestures from one sign language into another and synthesize spoken output in real time. The proposed system uses multimodal input—hand gestures, facial expressions, and body movement—processed through a spatio-temporal transformer model. Signs are converted into intermediate gloss text, translated into a target sign language, and presented via a 3D avatar with synchronized speech output. Key features include cross-lingual sign translation, real-time voice synthesis, customizable avatars, and cloud-edge deployment. Evaluation on benchmark datasets demonstrates high accuracy and low latency, enabling more inclusive communication across linguistic and geographic boundaries.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE56

MENTOR CONNECT: AN AI-POWERED CHATBOT FOR EMOTION-AWARE MENTORING AND ACADEMIC SUPPORT FOR STUDENTS

Abhinav K, Abhinsaj T, Adwaith Sujith, Harikrishnan KV,
Prof. Anu C
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

In the modern educational landscape, effective mentoring plays a vital role in ensuring the academic, emotional, and personal development of students. However, traditional mentoring methods often fall short due to time constraints of faculty, lack of structured data management, and limited mechanisms for early detection of student distress. To address these challenges, We proposes Mentor Connect, an AI-powered chatbot system designed to provide emotion-aware mentoring and academic support for students.The proposed system aims to create a smart and empathetic communication bridge between students, mentors, and counselors using Artificial Intelligence (AI), Natural Language Processing (NLP), and emotion detection technologies. Mentor Connect integrates an intelligent chatbot capable of understanding and responding to student queries in real time. Through sentiment and emotion analysis,the chatbot can identify behavioral or emotional cues indicating stress, anxiety, or disengagement. When emotional or academic concerns are identified, the system will automatically alert the assigned mentor for timely guidance. The chatbot offers 24/7 availability and provides students with immediate guidance, reminders, and motivation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE57

A SURVEY OF AUTOMATED SUBJECTIVE HANDWRITTEN ANSWER EVALUATION

Abhishek V M, Aliya Shereef, Amaya Vijayan, Anila P, Ashna Rose Antony, Jisha C Thankappan
Department of Computer Science and Engineering,
College of Engineering Kidangoor, Kottayam, Kerala, India

ABSTRACT

Automated evaluation of subjective handwritten answers is very important due to the increasing need for scalable, unbiased, and efficient assessment systems in education. Traditional evaluation is considered as time-consuming, inaccurate, and inconsistent. Recent advances in Optical Character Recognition (OCR), Natural Language Processing (NLP), and Machine Learning (ML), particularly Deep Learning (DL), have enabled the development of intelligent systems capable of evaluating handwritten subjective answers with reasonable accuracy. This survey presents a comprehensive review of existing automated subjective handwritten answer evaluation systems. It gives importance on preprocessing techniques, handwriting recognition methods, semantic analysis approaches, and scoring mechanisms. Furthermore, the paper discusses datasets, evaluation metrics, challenges, and future research directions, providing a strong base reference for researchers and practitioners in this domain.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE58

A REVIEW OF AI-BASED WASTE CLASSIFICATION SYSTEMS

Linsa V U, Alna P J, Fathimath Suhaila P S, Iver Kattukaran, Muhammed Adhil M J, Nisanth P
Department of Artificial Intelligence and Machine Learning,
Vidya Academy of Science and Technology, Thalakkottukara, Thrissur, Kerala, India

ABSTRACT

The exponential rise in municipal solid waste generation poses a severe threat to global environmental sustainability. Traditional waste segregation methods, primarily reliant on manual labor, are inefficient, hazardous, and prone to high error rates. This paper presents a comprehensive literature survey of Artificial Intelligence (AI) solutions designed to automate this process. We critically analyze the evolution of deep learning architectures in waste management, ranging from standard Convolutional Neural Networks (CNNs) to modern Vision Transformers (ViT) and real-time Object Detection models like YOLO (You Only Look Once). We specifically review pivotal studies that highlight the trade-offs between classification accuracy, inference speed, and system complexity. Our analysis identifies a critical research gap: while current models achieve high accuracy on static datasets, they often fail in real-world, multi-object scenarios and lack user-centric features. We conclude that future systems must integrate lightweight object detection algorithms with interactive disposal guidance to effectively modify consumer behavior and reduce contamination at the source.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE59

FINDY: AN AI-POWERED LOST AND FOUND PLATFORM

Aaliya R S, Arya. S, Manjima Manikandan, Meharunissa A N,Remya R S
Department of Computer Science and Engineering,
Musaliar College Of Engineering Chirayinkeezh ,Trivandrum, Kerala, India

ABSTRACT

The problem of losing personal items is both stressful and time-consuming, and current recovery methods such as social media posts or notice boards are scattered, manual, and lack security.Findy addresses this challenge by introducing a centralized, AI-powered platform built on the MERN stack. The system integrates multiple roles—Admin, User, Organization, and Moderator—to ensure proper management and verification of items. Its AI engine leverages both image recognition and text analysis to automatically match lost and found items, reducing the effort required by users.

To further enhance the recovery process, Findy provides real-time notifications to alert the community, as well as a secure in-app chat that protects personal details while enabling safe

communication between finders and owners. By offering an organized, structured, and intelligent ecosystem, Findy creates a reliable and community-driven solution for handling lost and found cases, making item recovery faster, safer, and more efficient.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE60

FOOTBALL PLAYER RECRUITMENT AND TRANSFER MARKET VALUE DETERMINATION

Prof. Hridya K K, Sankeerth C K , Sayanth K, Abhijith Suresh, Kiran Rajesh
Department of Computer Science and Engineering(Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Player recruitment and transfer market valuation play a critical role in modern football club management. Conventional scouting approaches rely heavily on subjective evaluations and often overlook behavioural consistency, tactical suitability, and user-specific requirements. This project proposes an interactive machine learning–based framework that integrates player performance statistics, behavioural attributes, and user-defined recruitment preferences to deliver accurate market value predictions and intelligent player recruitment recommendations.The system allows users to provide inputs such as player position, preferred playing style, tactical role, age range, and budget constraints. Ridge Regression is employed to address multicollinearity and generate a stable baseline estimation of player market value. Random Forest Regression is used to model complex non-linear relationships among technical, physical, mental, and behavioural features for precise value prediction. Additionally, clustering techniques are applied to group players based on performance profiles, playing style, and behavioural traits, enabling the identification of players who closely match user-defined recruitment criteria.

Model performance is evaluated using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R-squared (R^2). Experimental results show that Random Forest Regression achieves high predictive accuracy, while clustering enhances recruitment effectiveness by identifying tactically similar and potentially undervalued players.

The proposed system serves as a comprehensive decision-support tool that bridges market value estimation and customized player recruitment, offering football clubs and analysts a transparent, data-driven approach to transfer decision-making.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE61

AUTOMATED PADDY DISEASE DETECTION USING THERMAL IMAGING AND MACHINE LEARNING

Prof. Shilpa Shiva, Muhammed Rashdan , Adithyan K, Adil Abdu Rahman T
Department Of Computer Science And Engineering(Data Science),
St Thomas College Of Engineering And Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Plant diseases significantly reduce paddy yield, creating a need for reliable and early detection methods. Conventional approaches based on manual inspection and visible-spectrum imaging are often time-consuming, error-prone, and sensitive to environmental conditions. To address these limitations, this work proposes an automated multiclass paddy disease detection framework using thermal imaging and machine learning techniques.Thermal images are analysed to capture temperature variations between healthy paddy leaves and those affected by five common diseases: rice blast, brown leaf spot, leaf folder, hispa, and bacterial leaf blight. Fourteen statistical features and their Box Cox transformed versions are extracted, and a Modified Lemurs Optimization Algorithm (MLOA)-based filter feature transformation method is applied to enhance class separability. The optimized features are evaluated using K-Nearest Neighbour, Random Forest, Linear Discriminant Analysis, and Histogram Gradient Boosting classifiers, achieving improved performance, with K-Nearest Neighbour reaching a balanced accuracy of 90%.To further improve detection capability, advanced classifiers such as Support Vector Machine(SVM) and XGBoost are proposed to handle non-linear decision boundaries and complex feature interactions. Dataset expansion and the inclusion of texture-based features are also suggested to enhance robustness and generalization. The proposed framework offers an accurate, efficient, and scalable solution for early paddy disease detection, supporting sustainable agricultural productivity.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE62

AN IMPROVED HYBRID DEEP LEARNING APPROACH FOR COTTON LEAF DISEASE DETECTION

Prof. Anugraha K, Akshaj P , Nived K P, Nived V, Jibin Pushkar
Department of Computer Science and Engineering(Data Science),
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Cotton is one of the most important cash crops in India, and its productivity is severely affected by various fungal, bacterial, and viral diseases. Early and accurate identification of cotton leaf diseases is crucial for maintaining crop health, improving yield, and supporting farmers' livelihoods. Existing studies have primarily focused on traditional machine learning techniques such as Support Vector Machines, Random Forests, and ensemble classifiers using handcrafted features, which often require extensive preprocessing and may struggle with complex visual patterns in leaf images.Building upon the concepts presented in the base paper "Hybrid Approach of Cotton Disease Detection for Enhanced Crop Health and Yield", this mini project proposes an improved deep learning–based hybrid approach for cotton disease detection using transfer learning. Instead of relying solely on classical machine learning models, the proposed system utilizes pretrained convolutional neural networks, namely ResNet50 and DenseNet121, as feature extractors. The deep features obtained from both networks are combined using a hybrid architecture to enhance feature representation and classification performance. This approach reduces manual feature engineering and improves robustness in multi-class disease classification.The model is trained and evaluated on a cotton leaf image dataset containing multiple disease categories such as bacterial blight, curl virus, fusarium wilt, and healthy leaves. Data augmentation techniques are applied to improve generalization, and performance is assessed using accuracy, confusion matrix, and classification metrics. The experimental results demonstrate that the hybrid deep learning model achieves improved classification performance compared to traditional machine learning-based approaches discussed in the base paper. To make the system practically usable, a lightweight deployment prototype is developed using Streamlit,

enabling users to upload cotton leaf images and receive real-time disease predictions. This mini project highlights the effectiveness of hybrid deep learning models in agricultural disease detection and demonstrates how modern computer vision techniques can enhance crop health monitoring and decision support for farmers.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE63

LEAVE MANAGEMENT SYSTEM-STUDENT

Muhammed Zaid O V , Muhammed Mazin K P, Mishal Majeed,Muhammed Finas Noufal A P

Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Many educational institutions still rely on manual, paper-based methods for managing student leave, which are time-consuming and prone to errors and data loss. To overcome these issues, the Student Leave Management System was developed as a web-based application that automates the leave application and approval process.The system allows students to submit leave requests securely, while faculty or administrators can quickly review and approve them. It also maintains accurate leave records, tracks leave history, and generates reports for efficient monitoring. By reducing paperwork and manual effort, the system improves efficiency, accuracy, and overall leave management in educational institutions.The system also enhances transparency and communication between students and staff by providing real-time updates on leave status. Its user-friendly interface ensures ease of use for all users, making it a practical and effective solution for modern educational institutions seeking to digitalize administrative processes.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE64

WAYEM - CONTEXT-AWARE EMOTION-BASED MUSIC RECOMMENDATION SYSTEM USING NLP AND APP USAGE ANALYTICS

Prof. Jithin S, Muhammad Nihal, Sayand A N, Athul K Sandeep, Anandu M
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

This work proposes a context-sensitive emotion-aligned music recommendation system that integrates behavioral analytics with lightweight natural language processing to generate more reliable emotional assessments than traditional chatbot-based approaches. Existing research primarily infers mood from conversational text alone, which limits accuracy and fails to capture non-verbal emotional cues.

In contrast, the proposed system fuses multimodal indicators including daily app-usage patterns, screen-time duration, usage frequency trends, and signs of digital fatigue together with short user-entry reflections or emotional tags.

These signals are translated into a unified emotional vector that is mapped to four actionable music categories: calming, energizing, focusing, and uplifting. The system architecture comprises a mobile interface for mood input, a backend emotional processing engine combining behavioral metrics with NLP- based sentiment correction, an emotion-to-music mapping layer retrieving category-specific tracks from external libraries such as Spotify, and a dynamic recommendation interface that adapts to real-time behavioral changes.

The novelty of this work lies in integrating behavioral indicators such as app usage metrics, screen-time irregularities, and digital fatigue patterns with textual cues. This

approach constructs a broader emotional profile and provides a grounded, context-sensitive emotional model for personalized music recommendation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE65

EXAMSPERE: EXAM CELL AUTOMATION SYSTEM

Prof. Saritha Narayanan, Fathimathu Suhadha K V, Hredya M, Sankeerthana P, Anusree Prakashan
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Efficient examination management is a critical requirement in academic institutions, particularly for large-scale examinations involving numerous students and faculty members. Traditional manual methods of preparing seating arrangements and assigning invigilation duties are time-consuming, error-prone, and often lead to issues such as seat duplication, hall mismanagement, and uneven distribution of invigilator workload. These challenges highlight the need for an automated and reliable examination management system.

This project proposes a web-based Exam Cell Automation System designed to stream line student seating allocation and invigilator duty assignment using systematic and algorithm-driven approaches. The system automatically assigns students to examination halls and seat numbers while ensuring optimal space utilization and minimizing manual errors. Simultaneously, invigilator duties are allocated based on faculty availability and workload balancing principles, ensuring fair distribution of responsibilities among teachers. The system also incorporates a dynamic reallocation mechanism to handle last-minute invigilator absences, thereby maintaining continuity in examination operations.

By integrating automation, data management, and optimization techniques, the proposed system enhances transparency, accuracy, and efficiency in examination processes.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE66

COLLEGE TIMETABLE MANAGEMENT SYSTEM

Prof. Dinla O K, Roshni K , Sayanand M P, Yasin V M, Soummyakeerthi K S
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Manually creating college timetables is time-consuming and leads to scheduling conflicts. Existing systems lack intelligent conflict handling, leading to imbalanced schedules and overhead. To solve this problem this automated timetable management system that ensures fair workload distribution and avoids scheduling conflicts can be used. The main aim of this system is to reduce the work load of the faculties in creating an efficient timetable by consuming a lot of time. This is a web-based system that makes use of constraint-based scheduling algorithms for automated allocation of subjects without any conflicts. The system also makes use of React.js for frontend and Node.js for backend with a MySQL database. The scheduling engine will employ constraint satisfaction algorithms to allocate slots while respecting rules like subject limits, hour gaps, and balanced morning/evening sessions. Role-based dashboards will allow HODs to assign subjects, while teachers and students can view their timetables in real time.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE67

CERTITRACK: KTU ACTIVITY POINT CALCULATION SYSTEM USING AI

Prof. Anu C , Anjitha V , Hridush Prakash, Asritha S Nath, Jerome Jimmy
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Manual evaluation of student KTU activity points is a time-consuming and error-prone process in educational institutions. Students often submit multiple certificates, making it difficult for teachers to verify and calculate cumulative points accurately. The objective of this project is to develop an AI-based system that automatically classifies uploaded certificates and assigns activity points without human intervention.

In the proposed system, students upload certificate images through a web application. The system extracts text from the image using OCR and identifies the certificate type and date using AI-based classification. Based on predefined academic rules, points are assigned and stored in a database. Teachers can then view the cumulative points of each student through a dedicated dashboard. The expected outcome of this project is to reduce manual effort, improve accuracy, and provide a fast and reliable method for certificate evaluation and cumulative point calculation.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE68

CANTEX-A SMART CANTEEN SYSTEM WITH LIVE QUEUE DISPLAY

Prof. Anu Ć, Amegha S , Anjana Raj R, Gopika T K, Riya P P
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The Smart Canteen System is a software-based solution designed to overcome common problems in traditional canteen operations such as long waiting queues, insufficient food ordering and payment processes, limited control over food availability, and reduced customer satisfaction. The proposed system integrates online ordering, digital menus, secure digital payment, live queue management, and real-time analytics to streamline canteen services.

In this system, canteen staff update food availability in advance, ensuring only available items are displayed to customers. Customers are allowed to place food orders and can modify or cancel their orders before they are finalized for preparation. After this stage, orders are locked and sent for preparation.

A live queue system assigns queue numbers and displays real-time order status and estimated waiting time, reducing congestion at the canteen counter. The system is divided into multiple stages including customer registration, menu browsing, order placement, live queue management, order preparation, payment processing, and order pickup. By automating these processes and introducing controlled order handling, the Smart Canteen System improves operational efficiency, minimizes food wastage, and reduces waiting.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE69

COLLEGE BUS TRACKING SYSTEM

Prof. Sreekesh Namboodiri T, Akash P S , Shyamjith M , Yadhusagar S, Zaid Ibnu Abdul Gafoor
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

College transportation systems often suffer from lack of real-time visibility, uncertainty in bus arrival timings, and limited accessibility of tracking information for students, parents, and staff. Although GPS devices are installed in most college buses, their live data is frequently inaccessible or restricted due to technical and administrative constraints. This leads to inefficiencies in transportation management and increased waiting time for commuters.

This paper presents the design and implementation of a fully web-based College Bus Tracking System that provides real-time location tracking and route visualization of college buses. The proposed system collects live GPS coordinates either through integration with existing bus GPS modules (where permitted) or via a driver-assisted mobile GPS interface. The collected data is transmitted to a centralized web server and displayed through a responsive web application that can be seamlessly integrated into the official college website.

The system enables users to view bus routes, live bus movement, and estimated arrival times through a secure browser-based interface without the need for a dedicated mobile application. By utilizing web technologies for real-time data processing and visualization, the proposed solution enhances transportation efficiency, improves campus safety, and offers a scalable, maintenance-friendly platform suitable for institutional deployment.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE70

LEAVE MANAGEMENT SYSTEM FOR STAFF

Prof. Navya N C, Riza Mehak, Fathima Saba M, Sabah Shameer
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

In lots of organizations, staff leave management is still done using manual or semi-manual methods like paper forms, registers, or spreadsheets. These old ways take a lot of time, often lead to mistakes, aren't very clear, and make it tough to keep track of leave balances and approval records accurately. This often causes miscommunication, data inconsistency, slow and messy office work. This project's main goal is to design and build an automated Staff Leave Management System that makes things easier. The process of requesting, approving, and keeping track of employee leave. The system is designed to offer a simple and dependable way to keep track of staff, keeping track of records, checking leave status and making sure everyone follows the company's leave rules. The system is built to work as a web-based platform. An application built with web development tools like HTML, CSS, and JavaScript is used for the frontend, paired with a server-side programming language on the backend and a database to handle the backend operations. The system has modules for user authentication that lets people log in securely. Leave application is the process employees use to ask for time off. Approval workflow is how managers review and approve those leave requests. Leave balance shows how many days off someone has left management that keeps data safe and easy to handle. This project aims to create a leave management system that is easy to use, reliable, and safe. A system that cuts down on manual work and lessens the administrative burden. This will help make leave records more accurate and make things clearer between staff and management, helping decisions get made faster, which in the end boosts organizational productivity.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE71

MENTOR-MENTEE MONITORING SYSTEM

Prof. Vaishakhi V K, Shijas Shabeer, Marjana K P, Kenzah Raffy
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The Mentor–Mentee Management System is designed to support and strengthen the traditional face-to-face academic mentoring process in educational institutions by providing a structured and digital approach to record keeping and monitoring. In many colleges, mentoring activities such as meetings, academic progress tracking, guidance, and feedback are maintained manually using paper-based records, which can be time- consuming, error-prone, and difficult to retrieve. This system aims to overcome these limitations by offering a centralized platform to manage and store mentoring related information efficiently. The proposed system allows administrators to store mentor and stu- dent details and manage mentor-student assignments in a systematic manner. Mentors can record details of face-to-face meetings, monitor students' academic progress, provide guidance, document actions taken for improve- ment, and submit feedback. Students are provided with view-only access to their mentoring records, enabling them to stay informed about their aca- demic performance and guidance received. All records are securely stored in a database, ensuring easy access, consistency, and long-term availability of data. This system improves transparency, accountability, and continuity in the mentoring process while reducing paperwork and administrative effort. By maintaining complete and organized mentoring records, the Men- tor–Mentee Management System helps institutions enhance the effectiveness of academic mentoring and supports students in achieving better academic and personal development outcomes..

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE72

ATTENDANCE MANAGEMENT SYSTEM USING RFID

Prof. Anju G, Athul Raj , Abhiram Anil P A, Adwaith K
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Attendance management plays a vital role in educational institutions for monitoring student participation. Conventional attendance methods such as manual roll calls and paper registers are time-consuming, error-prone, and allow issues like proxy attendance. These methods also make it difficult to store, analyze, and generate attendance reports efficiently. Hence, there is a need for an automated system that ensures accuracy, reliability, and effective data management.

This project proposes an RFID-based Attendance Management System to automate the attendance process using smart cards. Each student is provided with an RFID card containing a unique identification number, which is scanned by an RFID reader during entry and exit from the classroom. Attendance is recorded along with date and time, and the data is stored in a centralized system. The proposed system reduces manual effort, prevents proxy attendance, saves class time, and improves accuracy. It also provides scope for future enhancements such as biometric integration, mobile application support, and cloud-based data storage.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE73

A COMPUTERIZED LIBRARY MANAGEMENT SYSTEM FOR ACADEMIC INSTITUTIONS

PROF. NAVYA N.C, RISNA RAFEEQ B. M , FATHIMATH SAHDIYA C, ANANYA MOHAN N, KRISHNA SAJEEVAN

Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

A good library management system makes life easier for people at a college. We used to keep track of books and users by hand. That does not work very well anymore. The old way is causing a lot of problems like mistakes happening all the time, library management system items getting lost and it's hard to know what library management system books are really on the shelves. This project is going to fix this problem by setting up a library management system on the computer. Administrators can now manage book inventories in a way. They can update records. Monitor what books are available. They can also track who is borrowing books and who is returning them. All of this can be done in one place. The library system is very helpful. Students and teachers can log in from anywhere to use the library. They do not need to be on campus to access the library. Users can search for books. See what books are available. They can also check their borrowing history from anywhere they want. The system is also good at reminding people about things. It sends reminders about book returns or when a book is due soon. This way people will not forget to return their books on time. The library system is making it easy for administrators to manage book inventories and for users to borrow books. Book inventories are managed well with this system. No more running around or endless paperwork. Routine tasks are handled automatically, leading to fewer mistakes and less hassle for everyone. In the end, the library runs smoother, resources are managed better, and the whole campus—students, teachers, and researchers gets more out of it.

TRACK ID : CSE COMPUTER SCIENCE AND APPLICATIONS

CSE74

AUTOMATED UNIVERSITY RESULT ANALYSIS SYSTEM

PROF. JITHIN S, MOHAMMED AZEEM SAMBRATH, MUHAMMED THAHA K T, SWETHA V, YADUDEV M
Department of Computer Science and Engineering,
St Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

This paper presents AURAS (Automated University Result Analysis System), a centralized web platform that transforms university issued consolidated course wise PDF reports each containing the results of an entire class into a structured, queryable academic database with no manual data entry. Rather than applying Optical Character Recognition (OCR) which introduces a noise floor that no post-processing step fully eliminates AURAS exploits the native text layer embedded within digitally-generated PDFs through the pdfplumber library, achieving 100% accuracy on grade fields and 98.3% on SGPA values in testing. The parser iterates every page of each consolidated PDF, extracting register numbers, student names, per-subject letter grades, and the university-computed SGPA for each student. These records are persisted in a normalized SQLite schema after passing through a cumulative backlog detection engine. A Flask web dashboard with role-based access control (Admin vs Faculty) allows upload of consolidated class reports and one-click generation of formatted Excel workbooks containing SGPA pivot tables and per-subject grade-distribution pie charts.

TRACK ID: ECE ELECTRONICS AND COMMUNICATION ENGINEERING

EC01

ARCHITECTURAL SCALABILITY ANALYSIS OF STREAMING CONVOLUTION PROCESSING ELEMENTS FOR FPGA EDGE VISION ACCELERATORS

Prof. Anoop Thomas, Jobin K. Antony, Avanthika S
Electronics and Communication Engineering,
Rajagiri School of Engineering and Technology, Kakkanad, Kochi, India

ABSTRACT

Embedded vision accelerators typically implement complete convolutional neural networks, making it difficult to isolate how convolution micro-architecture alone affects hard-ware scalability. This work presents a reusable FPGA streaming convolution processing element and evaluates how architectural choice influences timing closure, resource replication capability,and energy efficiency. Standard and depthwise separable convo-lution engines were designed in Verilog HDL and analyzed usingpost-implementation reports in Xilinx Vivado.Unlike full CNN accelerator studies, the proposed approach evaluates convolution as a modular building block intended for integration into larger edge-vision pipelines. The depthwise separable architecture achieved 10.1% lower critical path delay and 30.7% lower dynamic power while maintaining identical memory bandwidth. The results demonstrate that lightweight convolution primarily improves parallel replication capability rather than single-instance utilization, providing architectural insight for scalable FPGA vision accelerators.Index Terms—FPGA, Streaming Architecture, ConvolutionProcessing Element, Depthwise Separable Convolution, Hard-ware Acceleration, Edge Vision, Timing Closure, Scalability

TRACK ID: ECE **ELECTRONICS AND COMMUNICATION ENGINEERING**

EC02

WIRE TRAIL CROP

Prof. Manu Thomas, Anujith K, Gopika Latheesh, K Gautham Krishna, Sreethul Rajeev P
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The Wire Trail Crop Monitor is a smart automated farming system, agricultural automation solution designed for active crop health management and efficient resource utilization. The system operates on two coordinated ESP32 microcontrollers and a dual monitoring principle. First, an ESP32-CAM module is mounted on a mobile platform controlled by DC motors and boundary-defining IR sensors. This unit continuously captures real-time video and image data as it moves along a fixed wire, allowing remote crop inspection. This visual data is wirelessly transmitted to a central unit for image processing and deep learning analysis to identify the type and location of plant diseases. Second, a secondary ESP32 module monitors ambient conditions via a DHT11 sensor (temperature and humidity) conditions. The system then correlates the detected disease with a database to determine the correct single pesticide required for treatment. Functioning as the Pesticide Dispenser and Control Unit, this secondary ESP32 precisely controls the preparation: it activates only one of the three valves/pumps to release the specific pesticide (or solution) and controls a water pump to add water to the mixture. For delivery, a servo motor precisely aligns the mixture output pipe with the mobile unit's container intake port for refilling. The loaded mobile unit then traverses back to the zone and dispenses the solution to the affected area. Telegram integration provides farmers with real-time alerts regarding disease detection, recommendations and data. This integrated, dual-controller approach ensures efficient monitoring, automated disease management, reduced water and chemical wastage, and minimal manual labour, improving overall productivity and sustainability in smart agriculture

TRACK ID: ECE **ELECTRONICS AND COMMUNICATION ENGINEERING**

EC03

DEEP FISH NET

Prof. Athira V ,Jyothika V, Krishnendhu S Nair, Vighnesh T, Hanan M V
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Ensuring the freshness and safety of fish is vital to maintaining high quality seafood standards and consumer trust. Traditional methods of fish freshness evaluation such as manual inspection and chemical testing are often subjective, time consuming, and unsuitable for large scale operations. To overcome these limitations this paper presents Deep Fish Net, an intelligent and non-invasive fish quality monitoring system that integrates sensor data acquisition with deep learning based image analysis.

The system employs an ESP32 microcontroller as the central control unit, interfacing with multiple sensors including a temperature sensor, ammonia sensor and ultrasonic sensor to monitor environmental conditions affecting fish freshness. A camera module captures real time images of fish samples on a conveyor belt mechanism driven by DC motors controlled through an L293D motor driver IC. Captured images and sensor data are transmitted to a server, where a Convolutional Neural Network (CNN) fine tuned using MobileNetV2 classifies fish into distinct freshness categories.

Experimental results demonstrate an impressive classification accuracy of 97.50%, outperforming conventional inspection techniques in both speed and reliability. Real time monitoring and alert generation through LED indicators and buzzer notifications are made possible. The proposed Deep Fish Net framework provides an efficient, accurate and scalable solution for automated fish freshness assessment significantly enhancing food safety, reducing spoilage and improving quality control in seafood processing industries.

TRACK ID: ECE ELECTRONICS AND COMMUNICATION ENGINEERING

EC04

KNEEIOT–AUTOMATED KNEE MOVEMENT MONITORING USING IOT FOR TELEREHABILITATION

Prof. Arsha C Dinesh, Abhinand R, Marjana T, Ramees Muhammed Kandoth, Safna O V
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

Rehabilitation following knee injuries is an essential but often lengthy process requiring frequent physiotherapy sessions and professional monitoring. Traditional rehabilitation methods involve physical visits to healthcare centers, which can be inconvenient, time-consuming, and costly, especially for patients living in remote areas or with limited mobility.This project aims to design and develop an IoT-based telerehabilitation system that enables remote monitoring, guidance, and progress tracking of knee injury recovery exercises. The proposed system uses an ESP32 microcontroller integrated with various sensors — including the MPU6050 for motion detection, the MAX30100 for heart rate and oxygen saturation monitoring, and a temperature sensor for local temperature detection. Data from these sensors are displayed on an OLED screen and transmitted via Wi-Fi to a cloud server, which can be accessed through a mobile application by physiotherapists or caregivers. Additional components such as a stepper motor, buzzer, and LED indicators enhance feedback and interactivity during the rehabilitation session. This system allows continuous observation,performance evaluation, and early detection of abnormalities, providing a safer, more efficient,and accessible method of rehabilitation.

TRACK ID: ECE ELECTRONICS AND COMMUNICATION ENGINEERING

EC05

IOT BASED WATER WASTE CLEANUP AND MONITORING SYSTEM WITH WATER QUALITY AND OBJECT DETECTION

Adithyan P P, Alphin V J Anjana V, Aparna K, Pavi Lal
Electronics And Communication Engineering,
College Of Engineering And Technology Payyanur, Mathamangalam, Kannur, Kerala, India

ABSTRACT

Water pollution has become a major environmental concern due to its harmful impact on aquatic ecosystems and human health. Conventional methods used for monitoring and cleaning water bodies rely heavily on manual labour, which is time-consuming, inefficient, and often unsafe. To address these challenges, an IoT-Based Water Waste Clean-up and Monitoring System with Water Quality and Object Detection has been designed to provide an automated and intelligent solution for maintaining water quality. The proposed system integrates Internet of Things (IoT) technology with an autonomous cleaning mechanism to perform real-time water monitoring , underwater object detection and waste removal simultaneously. The system utilises various sensors including Total Dissolved Solids (TDS), pH level and turbidity for continuously measuring important water quality parameters and JSN-SR04T Ultrasonic sensor for object detection. The collected data is transmitted to a mobile or web-based platform, allowing users to remotely monitor the condition of the water body and receive timely alerts if pollution levels exceed safe limits. In addition to monitoring, the system is equipped with a robotic cleaning unit capable of navigating semi-autonomously across the water surface. It detects floating waste materials such as plastic and other debris, collects them using a mechanical or conveyor-based mechanism, and stores the waste in an onboard collection bin. It ensures continuous cleaning without disrupting aquatic life. Overall, the system offers an efficient, safe, and eco-friendly approach to water body management. By combining automated waste removal with real-time environmental monitoring, the system supports sustainable water resource conservation and contributes significantly to pollution control and environmental protection.

TRACK ID: ECE **ELECTRONICS AND COMMUNICATION ENGINEERING**

EC06

MINIATURIZED DUAL-BAND ANTENNA WITH RECONFIGURABILITY FOR NEXT-GEN WIRELESS MULTI BAND FRACTAL PATCH ANTENNA FOR IMPLANTABLE CARDIAC MONITORING

Prof. Manu Thomas, Muhammed Fazil K V, Navaneeth Narayanan, Sourav K K, Viswajith V V
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Mattannur, Kannur, Kerala, India

ABSTRACT

The rapid advancement of wireless technologies such as WiFi 6, WiFi 7, and 5G demands compact, efficient, and reconfigurable antennas for mobile, IoT, and biomedical applications. This work presents a Miniaturized Dual Band Reconfigurable Fractal Patch Antenna designed for next generation wireless systems and implantable cardiac monitoring.The antenna supports the 2.4 GHz and 5 GHz bands, enabling high speed, low latency communication across heterogeneous networks. Its fractal geometry and half mode patch design with meandering lines achieve miniaturization, multi band operation, and high efficiency, making it well suited for space constrained biomedical implants. Circular polarization improves reliability by mitigating multipath effects in mobile, indoor, and in body environments.Reconfigurability is implemented using PIN diodes for dynamic frequency tuning and polarization switching. A dual port structure with optimized ground design ensures isolation and low mutual coupling, supporting MIMO and phased array systems with enhanced gain and capacity.The proposed antenna offers a compact, versatile, and future ready solution, advancing wireless connectivity and reliable biomedical monitoring in next generation systems.

TRACK ID: ECE **ELECTRONICS AND COMMUNICATION ENGINEERING**

EC07

IOT ENABLED DENSITY BASED TRAFFIC CONTROL SYSTEM

Prof. Manu Thomas, Rejin Ram C, Anugrah E K, Sourav K K, Viswajithv V
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

This paper presents an AI-Based Intelligent Traffic Light Control System that integrates ESP32 microcontrollers with AI-powered cameras utilizing the YOLO (You Only Look Once) object detection algorithm. The system is designed to dynamically manage and optimize traffic signal timings based on real-time vehicle density at a four-way junction. Each junction is equipped with red, yellow, and green LED traffic signals on the north, south, east, and west sides—totaling twelve LEDs. The ESP32 microcontroller serves as the central processing unit, connected to the Google Cloud via the Internet for real-time data processing and synchronization.

The system continuously analyzes live video feeds using the YOLO algorithm to determine traffic density on each lane. Based on this data, the traffic control server intelligently adjusts signal durations: extending green light intervals during high-density conditions and reducing them when traffic is minimal, thereby improving flow efficiency and reducing waiting times. An additional emergency vehicle prioritization mechanism instantly activates the green signal on the path of an approaching ambulance or fire truck, while setting red lights on all other sides, ensuring a clear route for emergency response.

To enhance connectivity monitoring, a dedicated Wi-Fi connection LED blinks during active communication and remains steadily lit when disconnected. Furthermore, the system uploads real-time traffic density data to the cloud, enabling the public to access live traffic information for better route planning and congestion avoidance.In an era of escalating urban traffic challenges, this AI-driven intelligent traffic control system offers a scalable, responsive, and efficient solution to reduce congestion, enhance emergency vehicle response times, and empower the public with actionable traffic insights

TRACK ID: ECE ELECTRONICS AND COMMUNICATION ENGINEERING

EC08

AUTONOMOUS CAMPUS NAVIGATION ROBOT USING RASPBERRY PI

Prof.. Arya C, Hridik N, Amshiga Ranjith, Abhinrag Krishna Ratheesh M
Electronics and Communication Engineering,
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

Navigating within large and complex college campuses can be a daunting task for newcomers and visitors. To overcome this challenge, the proposed Campus Navigation Robot is designed as an autonomous guidance system that assists users in reaching their desired locations efficiently and safely. The system is powered by a Raspberry Pi, which acts as the central processing unit, coordinating inputs from various sensors and controlling the actuators. An ultrasonic sensor continuously monitors the surroundings to detect and avoid obstacles, while navigation and mapping are achieved using Simultaneous Localization andMapping (SLAM) technology, enabling the robot to build a map of the environment and determine its position in real time without relying on predefined paths. The L293D motor driver IC controls two DC motors,ensuring precise locomotion and directional control.For user interaction, a touchscreen display provides a simple interface for destination selection and navigation status, while a speaker delivers real-time audio instructions, enhancing accessibility for all users, including those with visual impairments. LED indicators offer visual cues about the system's operation, and a stable power supply ensures uninterrupted performance.By integrating SLAM-based navigation, intelligent sensing, motor control, and multimodal feedback mechanisms, the Campus Navigation Robot provides an innovative, user-friendly, and inclusive solution for on-campus navigation. Its design promotes accessibility, reduces confusion,and contributes to a more efficient and connected campus environment.

TRACK ID: CE CIVIL ENGINEERING

CE01

PREPARATION OF CANAL NETWORK MAP FOR PAZHASSI IRRIGATION PROJECT USING GIS AND GPS

Dr. S. Arun Kumar, Chand Kiran A, Gouri Nandana, Ayyub Khan
Department of Civil Engineering
St. Thomas College of Engineering and Technology, Mattanur, Kannur, Kerala, India

ABSTRACT

Google Earth is a freely available geospatial visualization platform that provides satellite imagery, aerial photography, and terrain data. It helps engineers trace canal paths, cross-check surveyed points, and measure distances. The software's "path and polygon" tools were used to outline the main canal and Mahe branch canal. Another key advantage is the ability to importGPS data for field verification, ensuring that the surveyed points align correctly with actual locations. Google Earth also allows exporting data to formats compatible with GIS platforms for further analysis. Preparation of a map for a network plan of a canal system is fundamental before the planning and construction work can be carried through, as it has a very important influence on water distribution efficiency,agricultural productivity, and long term irrigation sustainability. An efficient canal network has been designed to convey water from the headworks to the command area with minimal losses, effective regulation and adequate distribution. The aim of this project is to produce a canal network map for an irrigation project by using EarthPro software which is a dedicated digital tool designed for the purpose of terrain modelling, earthwork analysis, and infrastructure planning. Detailed topographic information including contour maps, elevation points and slope characteristics are studied using EarthProsoftware. These factors are important to establish an efficient canal alignment prevailed gravity flow and reduce problems such as seepage, erosion, and stagnation of water in their domain.The model helps in selecting optimal routes for main canal, branch canals, Distributaries and Minors while also satisfying the necessary bed slopes of the canal system. Hydrological variables such as the source discharge, irrigation requirement, command area size and seasonal water availability are

taken into consideration in planning. The canal alignment, drain flow direction, junction and command boundaries are explicitly depicted in the software-generated network map. EarthPro assists in measuring earthwork volumes for cost estimation and project planning. In general, the proposed approach is an efficient and sustainable way for planning an irrigation project, in particular large-scale irrigation systems.

TRACK ID: CE **CIVIL ENGINEERING**

CE02

ASSESSING THE LIVABILITY OF THE RESIDENTIAL ZONE NEAR THE MAJOR METROTRANSIT HUB IN KERALA

Prof. Jency P A, Darsana C
Department of Civil Engineering
Government Engineering College Thrissur, Kerala, India

ABSTRACT

Urbanization has gained speed in Kerala during the last decade, largely due to rising infrastructure and the state's increasing focus on Transit-Oriented Development as a means of achieving sustainable growth. The Kochi Metro, being Kerala's first rapid transit system, has become the structural spine for the urban transformation of this city. While TOD aims at compact, walkable, and accessible neighborhoods, livability of residential zones around metrocorridors remains inadequately addressed. Livability encompasses more than transport accessibility and includes housing quality, safety, inclusivity, environmental comfort, and access to basic amenities.

The title of the study is "Assessing Livability of Residential Zones near MajorMetro TransitHubs in Kerala." It assesses the extent to which the principles of TOD have augmented livability in chosen metro-influenced neighborhoods like Changampuzha Park, Palarivattom, and JLNStadium. The parameters falling under three major dimensions, namely Transportation andMobility, Housing and Safety and Security.

While the research shows improvements in access at the Metro level, lack of pedestrian-friendly infrastructure, absence of quality open spaces, time spent in traffic, and variable access to type,quality, and availability of social services in the area negatively impact Access at the Microlevel. In other words, because of these identified problems, the comprehensive, inclusive,human-scale vision of the Concept of TOD does not come close to being realized in Kerala.Itis recommend that to improve livability for persons living around Metro Hubs, integrated planning that encompasses

Mobility Infrastructure as well as Social and EnvironmentalConsiderations is necessary.It recommends embedding livability indicators into future TODpolicy frameworks to ensure resilient, equitable, and people-cantered urban development across Kerala's metropolitan regions.

CE03

NEW URBANISM PRINCIPLES INTO TRANSIT ORIENTED DEVELOPMENT : A CASE OF INDIAN METRO INFLUENCE AREA

Prof. Saranya A S, Henna Nourin
Department of Civil Engineering
Government Engineering College, Thrissur, Kerala,India

ABSTRACT

Transit-oriented development (TOD) has emerged as a key planning approach in rapidly urbanizing Indian metropolitan regions, aiming to promote compact, mixed-use, and transit- supportive development. However, TOD implementation in India has often resulted in fragmented, infrastructure-heavy, and real estate driven outcomes that fail in creating walkable,inclusive, and human-scaled neighbourhoods. Current station areas commonly work as transit-adjacent developments, where very poor street integration, limited public realm quality,inadequate pedestrian infrastructure, and monoculture land-use patterns affects the intended benefits of tod such as vibrancy, accessibility, and social inclusivity and equity.

In this context, new urbanism principles that emphasize walkability, connectivity, mixed-use diversity, quality urban design, sustainability, and quality of life offer a spatial and human-centred framework capable of transforming transit nodes into lively, socially connected, and pedestrian-oriented urban places. The study aims to develop a scoring matrix and an evaluative framework that prioritizes and applies new urbanism parameters to assess the spatial effectiveness of tod within Indian metro influence zones (0-400 m).

The methodology combines a multi-layered approach that includes a detailed literature review,analysis of global new urbanist case studies, identification of measurable spatial indicators, and expert validation using a multi-criteria evaluation process. The study develops a structured scoring matrix that assigns weights to each parameter based on expert surveys, leading to a prioritized hierarchy of new urbanism principles for the Indian context. This outcome contributes to a context-specific framework enabling planners, policymakers, and urban designers to quantitatively evaluate and enhance the spatial performance of

metro-based road projects. By bridging the gap between tod policy intent and on-ground liveability outcomes, the framework advances a more people-centric, place-making approach to transit-integrated urban development in India.

TRACK ID: CE **CIVIL ENGINEERING**

CE04

ASSESSMENT OF GROUNDWATER POTENTIAL ZONES AND WELL YIELD ESTIMATION USING GIS-BASED WELL HYDRAULICS

Ms. Deepthi K, Nafeesathul Misiriya K V, Nafeesathul Misiriya P V, Rajyeshwar R , S Sruthi

Department of Civil Engineering,

St. Thomas College of Engineering and Technology, Mattanur, Kannur, Kerala, India

ABSTRACT

The assessment of groundwater potential zones and well yield estimation plays a crucial role in sustainable groundwater management and planning. This project aims to delineate groundwater potential zones and estimate well yield using GIS-based well hydraulics analysis.The study integrates various thematic layers such as geology, geomorphology, slope, soil, landuse/land cover (LULC) and drainage density usingGeographic Information System (GIS).Each parameter is assigned suitable weights and ranks through the Analytical HierarchyProcess (AHP) to generate a comprehensive groundwater potential map.This spatial analysis helps in identifying areas with high, moderate, and low groundwater potential, providing valuable insights for effective water resource utilization.Further, wellyield estimation is performed using well hydraulics principles considering aquifer characteristics such as transmissivity, permeability, and specific capacity derived from field data and bore well information. The integration of GIS with hydrogeological and hydraulic data ensures accurate assessment and visualization of groundwater availability. The results of this study serve as a scientific basis for sustainable groundwater extraction, agricultural planning, and water conservation strategies, particularly in water-stressed regions.

TRACK ID: CE CIVIL ENGINEERING

CE05

SPATIAL ANALYSIS FRAMEWORK FOR ASSESSING RENTAL HOUSING AFFORDABILITY IN KERALA'S URBAN CONTEXT

Prof. Reshmi K C, Akhila M S
Department of Civil Engineering
Government Engineering College Thrissur, Kerala, India

ABSTRACT

Rapid urbanisation, increased migration, and sectoral employment growth have intensified the demand for rental housing in Indian cities, leading to rising rents and growing affordability concerns. While recent national policies acknowledge the importance of rental housing, Kerala's urban housing discourse remains largely ownership-oriented, with limited spatial assessment of rental affordability. This study develops a Spatial Analysis Framework to systematically assess rental housing affordability in Kerala's urban context. The study adopts a three-stage methodological approach. First, a comprehensive review of global, national, and Kerala-specific literature is conducted to examine existing affordability concepts,indicators, and spatial assessment methods, highlighting limitations of conventional income–rent ratio approaches. Based on this review, rental housing affordability is conceptualised as a multidimensional phenomenon encompassing economic, spatial,social, and demographic dimensions. In the second stage, relevant parameters and indicators are identified and refined through criteria-based screening and expert validation. Indicator weights are derived using the Weighted Linear Combination (WLC)method. The final stage integrates the validated indicators within a GIS environment through normalization, spatial mapping, and overlay analysis to construct a composite rental affordability index. The proposed framework enables the identification of spatial disparities, affordability stress zones, and neighbourhood-level drivers of rental housing stress. The study offers a context-specific, evidence-based tool to support urban planning, housing policy formulation, and targeted rental housing interventions in Kerala's cities.

TRACK ID: CE CIVIL ENGINEERING

CE06

SOIL STABILIZATION USING RECYCLED PET PLASTIC AND FLYASH

Prof. Sneha K T V, Adithya P P , Anunanda A, Angith Krishna V, Jishnu C V
Department of Civil Engineering
St Thomas College of Engineering and Technology, Mattanur, Kannur, Kerala, India

ABSTRACT

Soil stabilisation is essential for improving the performance of weak subgrade soils in pavement and foundation applications. Conventional stabilisers such as cement and lime are energy-intensive and environmentally unfriendly. This study investigates the use of recycled polyethylene terephthalate (PET) plastic strips combined with fly ash as a sustainable soil stabilisation technique. Laboratory tests were conducted on natural soil and soil mixed with a constant 5% fly ash and varying PET strip contents (0.5%, 1.0% and 1.5%). Standard Proctor compaction and Unconfined Compressive Strength (UCS) tests were performed. The untreated soil showed a maximum dry density (MDD) of 1.84 g/cc at an optimum moisture content (OMC) of 13.46%. The addition of fly ash and PET caused slight variations in compaction characteristics, with the highest MDD of about 1.83 g/cc observed at 0.5% PET, while higher PET contents resulted in marginal density reduction.

UCS results indicated a significant improvement in strength due to PET and fly ash inclusion. The UCS value increased from 123.57 KN/m² for untreated soil to a maximum of 532.49 KN/m² at 1.5% PET content, demonstrating enhanced load-bearing capacity and ductility. The study concludes that recycled PET strips and fly ash can be effectively used as eco-friendly stabilising agents for sustainable soil improvement.

TRACK ID: CE CIVIL ENGINEERING

CE07

SOIL STABILISATION OF DREDGED MATERIAL USING CEMENT FOR PAVEMENT

Prof. Vijila Balakrishnan, Adwaitha S R , Anjali P V , C K Aneesa, Sherin P V
Department of Civil Engineering
St Thomas College of Engineering and Technology , Mattanur,Kerala, India

ABSTRACT

Dredged soil is often characterized by high water content and low shear strength, making it unsuitable for direct use in construction works. Soil stabilization using Cement is an effective method to improve the engineering properties of dredged soil. This study investigates the stabilization of dredged soil using 5%, 10%, and 15% cement by weight of dry soil. Laboratory tests were carried out to evaluate the changes in index properties, compaction characteristics,of the stabilized dredged soil. The addition of 5% cement to dredged material resulted in marginal improvement, achieving a CBR of 13%, suitable for low-load applications. With 10%cement, considerable enhancement in strength was observed, giving a CBR of 24.75%, making It is ideal for pavement subgrades and embankment fills. At 15% cement, the material exhibited cementation, with a CBR of 15.3%, causing it to behave like a stabilized structural material.The study concludes CBR increases with cement up to 10%, then decreases at 15%, thus 10%cement is optimum for dredged material.

TRACK ID: CE **CIVIL ENGINEERING**

CE08

ANALYSIS AND DESIGN OF EARTHQUAKE RESISTANT BUILDING USING BASE ISOLATION

Prof. Roopa Balakrishnan, Aalvi C , Sana Fathima K, Shahana K K
Department of Civil Engineering
St Thomas College of Engineering and Technology , Mattanur, Kerala, India

ABSTRACT

This project deals with the analysis and design of an earthquake resistant building using baseisolation techniques. The main objective of the project is to reduce the seismic forces acting on the structure and to improve the safety and performance of the building during earthquake conditions by adopting base isolation systems.Base isolation is an effective earthquake-resistant technique in which isolators are provided between the superstructure and the foundation. These isolators reduce the transfer of earthquake forces from the ground to the building by increasing the natural time period and providing energy dissipation. This helps in minimizing structural damage and protecting both life and property.In this project, a reinforced concrete building is modeled and analyzed for seismic loads with and without base isolation.The analysis is carried out as per the provisions of IS 1893 (Part 1):2016. Structural components such as slabs, beams, columns and foundations are designed in accordance withIS 456:2000 using the limit state method. Suitable base isolators are selected based on designrequirements.Comparative analysis is performed to study parameters such as base shear, storey drift, storey displacement and time period. The results show that buildings with base isolation experience significantly lower seismic forces and improved performance when compared to conventional fixed-base buildings.The study concludes that base isolation is an efficient reliable technique for earthquake resistant design, especially for important and critical structures. The project highlights the importance of adopting advanced seismic protection systems in modern building design to enhance structural safety and resilience.

TRACK ID: CE CIVIL ENGINEERING

CE09

STRATEGIES FOR PLANNING SPORTS-FRIENDLY CITIES IN INDIA

Prof. Geetha A,Vignesh Karthik M P

Department of Civil Engineering
Government Engineering College Thrissur, Kerala, India

ABSTRACT

The concept of a Sports-Friendly City envisions urban environments that integrate sports and recreation into everyday life, fostering inclusivity, public health,and community well-being.This dissertation explores planning strategies for developing such cities in the Indian context, where rapid urbanization and a predominantly young population highlight the need to embed active lifestyles within city design. The research emphasizes how sports canserve asa catalyst for social cohesion, youth engagement, economic growth, and urbanliveability.A mixed-method approach based on secondary data, policy analysis, and international benchmarking is adopted. Global case studies-including Barcelona, London,Singapore, Qatarand Indianexamples such as Bhubaneswar, Ahmedabad, and Delhi are analysed using a ten-parameter framework covering land use, accessibility, governance, environmental sustainability, inclusion, and legacy. The composite scoring analysis based on the ten-parameter benchmarking framework shows a clear performance hierarchy:international predominantly fall within the ‗Excellent' category across parameters such as accessibility,governance, sustainability, and community integration, whereas Indian cities mostly fallwithin the ‗Moderate' category, with strengths in infrastructure and event hosting but weaker scores in decentralised accessibility, policy integration, and institutional coordination., Indian cities are progressing through initiatives like Khelo India, and Fit India Movement, but still face challenges in governance coordination and public access.The study proposes strategic interventions for India: integrating sports zoning in master plans,enhancing multi-use neighbourhood-level facilities, promoting active mobility networks, adopting data-driven management systems. It concludes that developing sports-friendly cities can

significantly contribute to India‘s sustainable urban future by merging physical activity,health, inclusivity, and economic vitality within urban planning frameworks.

TRACK ID: CE **CIVIL ENGINEERING**

CE10

FEASIBILITY ASSESSMENT OF URBAN SPACE OPTIMIZATION THROUGH UNDERGROUND INFRASTRUCTURE IN THE KERALA CONTEXT

Prof. Rekha V Kumar, Archana N
Department of Civil Engineering
Government Engineering College, Thrissur ,Kerala, India

ABSTRACT

Kerala's urban areas are turning more and more crowded due to the fast urbanization that has been combined with the problems of land scarcity, delicate ecosystems, and environmentally friendly limitations. While some world cities like Singapore and Hong Kong make good use of below-ground facilities to control density and enhance land efficiency, Kerala's underground development is still at a very nascent stage, disjointed and only a few projects have been able to leverage it. This research tries to find out if underground infrastructure can be of help in space optimization in cities of Kerala, mainly focusing on Kochi, Thiruvananthapuram andKozhikode.The research through a vast literature review, case studies, spatial indicators, and feasibility assessments, takes into account the geological, hydrological, environmental, socio-economic,and governance factors that influence the decision-making process of the underground development. The results indicate that although the cities are encountering problems such as elevated groundwater levels, flood hazards, and lack of institutions, the cores of these cities,particularly the high-density areas, transit hubs, and congested commercial localities, also have visible potential.The expert survey results point out strong feasibility of implementing underground transport systems and common utility corridors, whereas commercial and mixed-use underground spaces seem to be less viable. Based on this study, the research offers the thematic strategies and a phased implementation roadmap that includes policy integration, 3D subsurface mapping,priority zone identification, pilot projects, institutional reforms, risk management, financing mechanisms.This investigation is an emphatic statement that although underground

development in Kerala mandates a meticulous examination and governance reform, a well-thought-out plan of intervention can, to a great extent, increase land efficiency, make the surface less crowded, and be of help in the realization of the sustainable urban growth.

TRACK ID: CE **CIVIL ENGINEERING**

CE11

DEVELOPMENT OF SUSTAINABLE TERNARY BLENDED MORTAR USING GGBS AND SUGARCANE BAGASSE ASH.

Adithya T S, Soorya P, Anupriya Raj, Krishna G N, Siva N Satheesh
Department Of Civil Engineering
College Of Engineering Trikaripur, Kasaragod Kerala,India

ABSTRACT

Rapid industrialisation and continuous population growth have led to a substantial increase in construction activities worldwide. The construction industry relies predominantly on OrdinaryPortland Cement (OPC), the production of which is highly energy-intensive and a major contributor to carbon dioxide emissions. To address these challenges, the use of SupplementaryCementitious Materials (SCMs) has emerged as an effective approach for promoting sustainable construction practices.This experimental study focuses on the development and evaluation of a sustainable ternary blended mortar by partially replacing Ordinary Portland Cement (OPC) with GroundGranulated Blast Furnace Slag (GGBS), an industrial by-product, and Sugarcane Bagasse Ash(SCBA), an agricultural waste material. The combined use of these materials not only provides a viable solution to global environmental concerns but also encourages the utilization of alternative resources in cement-based construction materials.In this study, cement was partially replaced at three levels—10%, 20%, and 50%—using a combination of GGBS and SCBA. Conventional OPC mortar was used as the control mix for comparison. The primary objective of the study was to evaluate the fresh, mechanical, and durability properties of GGBS–SCBA blended ternary mortars. The constituent materials were characterized, and test specimens were cast and cured for periods of 28, 56, and 90 days. This study aims to highlight the potential of ternary blended mortars incorporating industrial and agricultural waste materials as a sustainable alternative to conventional cement mortar, with scope for reducing cement consumption, lowering carbon emissions, and improving long-term durability in construction applications.

TRACK ID: CE CIVIL ENGINEERING

CE12

A SPATIAL AND SOCIOECONOMIC DISPARITY ANALYSIS IN WASTE MANAGEMENT FACILITY SITING IN KERALA

Aswani M, Sneha N
Department Of Civil Engineering
Government Engineering College, Thrissur ,Kerala, India

ABSTRACT

Waste management facility siting is a major challenge for urban planning in Kerala, where high population density, fragmented land ownership, ecological sensitivity, and decentralised governance constrain spatial decisions. Landfill siting is not only a technical task but a spatial governance issue that shapes how environmental burdens are distributed across social groups. Despite policies promoting scientific siting and decentralised waste processing, recurring conflicts indicate persistent spatial and socioeconomic inequities.This study analyses landfill siting in Kerala through a spatial planning and environmental justice perspective. While the broader context is statewide, detailed assessment focuses on four sites representing regional structure: Thiruvananthapuram, Kochi, Kozhikode, and Kannur. The scope is limited to locational patterns rather than operational performance. The methodology combines GIS-based spatial analysis, buffer-based zonal delineation, and Census-derived indicators such as caste composition, literacy, employment structure, housing quality, and land values. Comparative analysis between landfill influence zones and surrounding areas is used to identify spatial disparities.Findings show consistent patterns across regions: areas near landfills have higher concentrations of socially and economically vulnerable populations, lower land values, and limited adaptive capacity. These patterns suggest siting decisions prioritise land availability and political feasibility over spatial equity. The study calls for a shift toward proactive, equity-oriented planning through vulnerability mapping, cumulative impact assessment, and participatory approaches within statutory and local planning processes. Integrating environmental justice principles into landfill siting can support more equitable and resilient waste management systems in Kerala.

TRACK ID: CE CIVIL ENGINEERING

CE13

FINANCING LOCAL AREA PLANS IN INDIA - A SUSTAINABLE FINANCING FRAMEWORK

Dr. Ambily .P, Ashifa U P
Department Of Civil Engineering
Government Engineering College Thrissur, Kerala ,India

ABSTRACT

The local area plan plays an important role in shaping Urban Development at the neighbourhood levels in the Indian cities. Even though their implementation faces many issues due to limited financial resources in Municipal revenue systems and the absence of organised funding models. This research examines the existing challenges faced by local area plans in India and also helps us to explore the feasible and sustainable mechanism and funding models for improving the financial capacity of urban local bodies for the successful implementation and execution of local area plans. The study adopts a mixed method approach by combining the comparative analysis of national and international case studies along with the expert consultation to identify the financial gaps. Also explore the financing instruments and models like land value capture, public private partnership , Transfer development right and special purpose vehicles, also the findings highlights that integration of this instruments into a well organised financial Framework will help us to enhance the viability and long term sustainability of the Local area plan implementation.The research concludes with suggestion of a sustainable financing Framework for local area plan in India that emphasis the diversification of revenue sources focusing on accountability, institutional, and coordination. The framework facilitates the transformation of planning into actionable blueprints by addressing the financial gap in Local Area plans,allowing cities to execute inclusive, climate responsive and financially sustainable interventions at the neighbourhood scale.

CE14

STRENGTH AND SUSTAINABLE EVALUATION IN CONCRETE USING SILICA FUMES

Ms. Manasa Mukundan, Amshith Retheesh, Anamika N, Mridul Murali, Hiba Noushad
Department Of Civil Engineering
St Thomas College Of Engineering And Technology, Mattanur, Kannur, Kerala, India

ABSTRACT

Concrete is the most extensively used construction material in civil engineering, and improving its performance through mix modification is an important area of research. Silica fume, an industrial byproduct obtained during the manufacture of silicon and ferrosilicon alloys, is used in this study as a mineral admixture in concrete. Due to its extremely fine particle size and high pozzolanic reactivity, silica fume improves particle packing, reduces pore spaces, and enhances the microstructure of the cementitious matrix. In the present investigation, concrete mix design is carried out for M25 grade concrete in accordance with standard guidelines, and silica fume is incorporated into the mix in varying percentages. Laboratory testing is conducted to evaluate the performance of the specimens at different curing ages. The experimental results indicate a gradual improvement with increasing silica fume content up to an optimum level of 10%, beyond this introducing coir fibers at different percentages for enhancing the strength and properties.

TRACK ID: CE CIVIL ENGINEERING

CE15

MECHANICAL RESPONSE OF SAND REINFORCED WITH GEO-COMPOSITES FORMED BY NON-WOVEN GEOTEXTILE AND PVC FLEX BANNER GRID

Raja. K, Athishpranav V S, Chandra Mouleeswaran J, Kavinkumar S, Malathy R
Department Of Civil Engineering
Sona College Of Technology, Salem, Tamil Nadu, India

ABSTRACT

Sand is a commonly available soil; however, it may undergo significant deformation when subjected to external loads, limiting its engineering performance. Improving the mechanical response of sand is therefore essential to enhance its load-carrying capacity and stability. Soil reinforcement using geo-composites has emerged as an effective and economical technique to improve strength and reduce deformation behavior. In the present study, an experimental investigation is carried out to evaluate the mechanical response of sand reinforced with geo-composites formed by non-woven geotextile and PVC flex banner grid. The basic properties of sand were determined through specific gravity test and sieve analysis, and the compaction characteristics were obtained using the Standard Proctor test. The shear strength behavior of sand was evaluated using the direct shear test. The performance of unreinforced and reinforced sand was assessed using the California Bearing Ratio (CBR) test under controlled laboratory conditions. The results indicate that reinforced sand exhibits higher CBR values compared to unreinforced sand, with the combination of non-woven geotextile and PVC flex banner grid providing the maximum improvement. The study confirms that geo-composite reinforcement is an effective solution for enhancing the strength and deformation resistance of sand, making it suitable for subgrade and foundation applications.

TRACK ID: CE CIVIL ENGINEERING

CE16

ANALYSIS AND REDESIGN OF WATER DISTRIBUTION NETWORK AT PANNIYODU WARD OF TRIVANDRUM DISTRICT USING EPANET

Prof. Karthika Priyadarsiny S, Nandhitha P S, Aswathy M S, Nandana A S, Ashnamol Yesudas
Department Of Civil Engineering
Govt. Engineering College Bartonhill, Thiruvananthapuram, Kerala, India

ABSTRACT

Panniyode is a densely populated locality within the Poovachal panchayat ofTrivandrum district. This area faces acutewater scarcity in many elevated places since years. Aged pipes causing leaks,continuous change in rainfall patterns and several project delays have worsened the situation. Many areas within the ward receive water once in a week or even less than that. In this paper ,we work for a comprehensive water distribution network panniyode by utilizing modern technologies like EPANET. Since the performance of the existing distribution network under current water demand is insufficient, redesign was done by altering pipe diameters and relocation of the water tank to a slightly higher elevation.

TRACK ID: CE **CIVIL ENGINEERING**

CE17

AN EXPLORATORY ANALYSIS OF ACTIVITY–TRAVEL BEHAVIOR OF NON-WORKERS IN AN URBAN AREA

Dr. Devika Babu, Dilna P, Manjima P.S, Meghna P, Nasha B.V
Department Of Civil Engineering
AWH Engineering College, Kozhikode, Kerala, India

ABSTRACT

Urban transportation planning in developing countries requires a comprehensive understanding of activity–travel behavior patterns to effectively address the diverse mobility needs of urban populations. Travel behavior studies from an activity-based perspective view travel as a consequence of individuals' participation in various activities.This approach is particularly important in developing countries, where transportation problems tend to be more severe and complex. This paper aims to explore thactivity–travel characteristics of non-workers, in the context of Calicut city, Kerala State, India. Data collected through home-interview surveys using face-to-face interview techniques formed the database for this study. Several distinct activity–travel patterns were identified for the study area. The findings of this study provide valuable insights for designing inclusive and activity-oriented urban transportation policies that better accommodate the mobility needs of non-working population groups in developing cities.

TRACK ID: CE CIVIL ENGINEERING

CE18

GEOPOLYMER CONCRETE USING RECYCLED AGGREGATES

Thamara C, Abhinand Shajan, Deekshitha Manoj K, Sivani Krishna M, Adarsh Krishna T V
Department Of Civil Engineering
College Of Engineering Thalassery , Kannur, Kerala,India

ABSTRACT

The increasing demand for sustainable and eco-friendly construction materials has led to growing interest in the use of geopolymer concrete as an alternative to conventional Portland cement concrete. This project focuses on the development and performance evaluation of Ground Granulated Blast Furnace Slag (GGBS) and fly ash based geopolymer concrete incorporating Recycled Concrete Aggregates (RCA) as a partial and full replacement for natural coarse aggregates. The main objective is to utilize industrial and construction waste materials to minimize environmental impact while maintaining desirable strength and durability characteristics.

TRACK ID: CE CIVIL ENGINEERING

CE19

GEOPOLYMER CONCRETE WITH COPPER SLAG AS PARTIAL REPLACEMENT FOR M-SAND

Shyni T V, Athira T , Athira P V , Ayishabi T P, Devananda P V
Department Of Civil Engineering
College Of Engineering, Trikaripur, Kasargod, Kerala, India

ABSTRACT

Geopolymer concrete (GPC) will be investigated as a sustainable alternative to ordinary Portland cement concrete due to its reduced carbon footprint and effective utilization of industrial by-products. In this study, copper slag will be examined as a partial replacement for natural fine aggregate in Geopolymer concrete to enhance sustainability and mechanical performance. Copper slag, a by-product of the copper smelting industry, will be characterized by its favorable physical properties such as high density and angular particle shape, making it a potential substitute for river sand.

Geopolymer concrete mixes will be prepared with varying percentages of copper slag replacing fine aggregate (0%, 20%, 30%, 40%, 50% and 60% by weight). A fly ash–based geopolymer binder activated using alkaline solutions will be used. The mechanical properties of the mixes will be evaluated through compressive strength, split tensile strength, and flexural strength tests at different curing ages (7,14,28 days). The effect of copper slag content on workability and strength performance will be analyzed.

An optimum replacement percentage of copper slag will be determined based on maximum strength development and overall performance of geopolymer concrete. It is

expected that the inclusion of copper slag will enhance the strength characteristics up to an optimum level due to improved particle packing and interfacial bonding. Beyond this level, a reduction in strength may occur due to excess free water and weaker paste–aggregate interaction. The study will conclude that copper slag can be effectively utilized as a partial

replacement for fine aggregate in Geopolymer concrete, contributing to sustainable construction practices and conservation of natural resources.

TRACK ID: CE CIVIL ENGINEERING

CE20

AN INTEGRATED SPATIAL ASSESSMENT FRAMEWORK FOR URBAN VISUAL POLLUTION

Hrishikesh K V, Saranya
Department Of Civil Engineering
Government Engineering College Thrissur,Kerala,India

ABSTRACT

Visual pollution has emerged as an under recognised yet increasingly critical dimension of urban environmental degradation. Unlike conventional forms of pollution, its impacts are predominantly perceptual and psychological, influencing how individuals experience,navigate, and emotionally engage with urban spaces. Rapid urbanisation, the proliferation of commercial signage, and fragmented regulatory frameworks have collectively produced visually chaotic environments that erode aesthetic coherence, cognitive comfort, and social well being. Empirical research further indicates that prolonged exposure to visually cluttered settings is associated with heightened stress, reduced life satisfaction, and weakened environmental legibility. This study conceptualises visual pollution as a multidimensional urban phenomenon operating across physical, perceptual, cultural, and governance domains. It develops a structured analytical framework for identifying, classifying, and evaluating the indicators that constitute urban visual clutter. Grounded in principles of urban aesthetics, environmental psychology, and spatial governance, the research situates visual pollution within broader discourses on urban livability, identity formation, and environmental justice. By integrating spatial analysis, perceptual assessment, and regulatory evaluation, the study advances a holistic understanding of visual pollution and its urban implications. The findings underscore the necessity of recognising visual quality as a legitimate and measurable component of urban sustainability and collective well being. The research ultimately advocates for policy and design strategies that promote coherent, legible, and psychologically supportive cityscapes, positioning visual order as an essential consideration in future urban development and planning practices.

TRACK ID: CE CIVIL ENGINEERING

CE21

EXPERIMENTAL INVESTIGATION ON BACTERIAL CONCRETE

Prof. Athira B Krishnan, Aswathy Kunnummal, Pooja G, Fasalu Rahman Manima, Adwaith P V
Department Of Civil Engineering
St Thomas College Of Engineering And Technology, Mattanur,Kerala, India

ABSTRACT

Concrete is the most widely used construction material due to its high compressive strength and durability; however, its low tensile strength and susceptibility to cracking significantly reduce service life and increase maintenance costs. To address these limitations, this study presents an experimental comparison between conventional concrete and bacterial concrete with the incorporation of Bacillus subtilis. The experimental program focused on evaluating the compressive strength of cube specimens and the tensile/flexural strength of beam specimens for both normal and bacterial concrete mixes. Strength observations were carried out at 7 days and 28 days of curing to assess early-age and long-term performance. Bacterial concrete was prepared using different bacterial dosages, and its performance was systematically compared with that of conventional concrete cast under identical conditions. The test results indicate that bacterial concrete exhibits notable improvement in both compressive and tensile strength compared to normal concrete at both curing ages. Strength enhancement increased with bacterial dosage up to an optimum level, beyond which marginal or reduced gains were observed. This behaviour confirms that bacterial activity contributes to matrix densification through calcium carbonate precipitation, leading to improved load-carrying capacity. Based on the comparative analysis, an optimum bacterial dosage was identified that delivered maximum strength improvement without adversely affecting concrete performance. The study concludes that bacterial concrete, when used in appropriate proportions, offers superior mechanical performance and can be effectively adopted as a sustainable alternative to conventional concrete for structural applications.

TRACK ID: CE CIVIL ENGINEERING

CE22

USE OF DREDGED MATERIAL IN CEMENT BRICK MANUFACTURING

Prof. Vijila Balakrishnan ,Sandra P, Ashish K, Nadha Fathima K, Safwath Minna Ismail

Department Of Civil Engineering

St Thomas College Of Engineering And Technology, Mattanur,Kerala, India

ABSTRACT

The rapid depletion of natural river sand, combined with the environmental challenges posed by the disposal of dredged material, has created an urgent need for sustainable alternatives in the construction industry. This project explores the feasibility of utilising dredged material as a partial and full replacement for fine aggregate in the production of cement bricks, offering a potential solution to both resource scarcity and waste management issues. Cement bricks were manufactured by substituting natural sand with dredged material at varying proportions. The raw materials were carefully measured and mixed, and the bricks were cast in standard moulds. The specimens were cured under controlled conditions for 7 and 28 days to ensure proper hydration and strength development. Compressive strength tests were conducted to evaluate the mechanical performance of the bricks at both curing intervals. The experimental findings indicate that bricks incorporating dredged material achieved satisfactory strength, with optimum replacement levels displaying compressive strength comparable to conventional cement bricks and can be used for non-structural applications. The study demonstrates that dredged material can be effectively utilised as a sustainable substitute for fine aggregate, reducing reliance on natural sand and providing an environmentally friendly approach to the management of dredged waste. These findings highlight the potential of dredged material bricks as a viable and sustainable construction material, encouraging further research into their durability, water absorption, and long-term performance in practical applications.

TRACK ID: CE CIVIL ENGINEERING

CE23

NUMERICAL ANALYSIS OF CANTILEVER RETAINING WALL

Prof. Sneha K T V, Riya Rasheed, Murshid M, Neeraj N K, Vinaya P
Department Of Civil Engineering
St Thomas College Of Engineering And Technology, Mattanur,Kerala, India

ABSTRACT

This study presents the numerical modelling and analysis of a cantilever retaining wall designed to stabilize a laterite soil slope of approximately six metres in height at Valiyannur, Kerala, where recurring instability occurs during monsoon seasons. The objective of the study is to evaluate the structural response and overall stability of the retaining wall–soil system under realistic field conditions using advanced numerical analysis. PLAXIS 2D, a finite element-based geotechnical software, was used to simulate the retaining wall and surrounding soil by defining appropriate material properties, geometry, and boundary conditions. The wall–soil interaction was incorporated to capture realistic lateral earth pressure transfer and deformation behaviour. Displacement contours, stress distribution, and deformation patterns were obtained from the analysis, and slope stability was assessed using the Strength Reduction Method to determine the Factor of Safety. The results confirm that the proposed retaining wall configuration effectively improves slope stability in laterite soil conditions.

TRACK ID: CE **CIVIL ENGINEERING**

CE24

PLANNING, DESIGNING AND ANALYSIS OF NEW BLOCK AT MATTANNUR HIGH SCHOOL

Prof. Jean Mary Jacob, Sangeeth P, Sreya V, Sreerag M, Ahmed K P
Department Of Civil Engineering
St Thomas College Of Engineering And Technology, Mattanur,Kerala, India

ABSTRACT

This project presents the planning, designing and structural analysis of Mattannur Higher Secondary School Building. The objective of the project is to design a safe, functional, economical and durable educational building by following the guidelines of relevant Indian Standard (IS) codes. The planning of the school building is carried out by considering important aspects such as site conditions, orientation, ventilation, natural lighting, safety, accessibility and future expansion. Proper space planning is done to provide comfortable and efficient accommodation for classrooms, laboratories, staff rooms, administrative offices, corridors, staircases and sanitary facilities. Special importance is given to smooth circulation of students and staff and compliance with safety requirements. The structural design of the building is carried out using the limit state method as per IS 456:2000. Structural components such as slabs, beams, columns, staircases and foundations are designed to safely resist applied loads. Dead loads, live loads and wind loads are calculated in accordance with IS 875. The type of foundation is selected based on the soil bearing capacity and site conditions. Structural analysis is performed to ensure adequate strength, stability and serviceability of the building. Checks for bending, shear and deflection are carried out for all major structural elements. Economy in material usage, structural safety and long-term durability are considered throughout the design process. The results of the analysis show that the proposed school building is structurally safe, stable and economical, and fully suitable for educational purposes. This project demonstrates the practical application of civil engineering principles in the planning and design of a public building.

ME01

THERMAL PERFORMANCE ENHANCEMENTS OF AIR-COOLED HEAT SINKS IN ELECTRONIC DEVICES

Prof. Chandrajith E, Jishnu Kishor C K, Mohammed Nafees Latif, Parvan A C,Ninjul Sajeevkumar
Department of Mechanical Engineering
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

Thermal management is a critical requirement for ensuring the reliability and performance of modern electronic devices, as power densities continue to escalate. Traditional air-cooled aluminum heat sinks tend to have limited heat spreading capabilities at the base and sub-optimized geometric parameters, thereby leading to increased operating temperatures. This paper proposes an optimized air-cooled heat sink design with a copper base plate and aluminum fins, along with the optimization of critical heat sink geometric parameters to enhance overall thermal performance.

The copper base plate enhances heat spreading capabilities owing to its superior thermal conductivity properties, while the aluminum fins ensure a lightweight and economical design. The critical geometric parameters of the heat sink, including base plate thickness, fin height, fin spacing, and fin thickness, are optimized to strike a balance between conduction and convection heat transfer mechanisms under forced convection conditions. A cooling fan is used to augment airflow, and a thermal interface material is used to reduce contact resistance between the heat source and the heat sink.

The thermal performance of the optimized copper base aluminum heat sink is assessed in terms of base plate temperature drop, thermal resistance, and heat removal capacity under steady-state operating conditions. The results show a significant enhancement in cooling performance compared to a conventional non-optimized aluminum heat sink. The proposed design offers a viable, feasible, and scalable solution for thermal management applications in electronic devices such as microprocessors, power electronic modules, and LED devices.

TRACK ID: ME **MECHANICAL ENGINEERING**

ME02

PASSIVE COOLING OF SOLAR PANELS USING FINS AND PCM

Aswinkanth K, Roshindas M P
Department of Mechanical Engineering
Govt. College of Engineering Kannur, India

ABSTRACT

The performance of solar photovoltaic panels decreases with an increase in operating temperature, reducing power output and efficiency. This study investigates the thermal and electrical performance of solar panels using Phase Change Material (PCM), fins, and a combined fins–PCM cooling system. Experimental results show that PCM and fins reduce panel temperature and improve power output compared to conventional panels. The combined fins and PCM system showed the best performance, providing maximum temperature reduction and highest electrical output . The study concludes that effective thermal management using PCM and fins significantly improves solar panel efficiency and performance.

TRACK ID: ME MECHANICAL ENGINEERING

ME03

ELECTRO-MECHANICAL SYSTEM FOR WASTE REMOVAL IN URBAN DRAINAGE LINES

Dr Ramesh Krishnan S, Anandakrishnan U P, Ajmal Ahad S, Arpith P, Gourilekshmy J R
Department Of Mechanical Engineering
Rajiv Gandhi Institute Of Technology,Kottayam, Kerala, India

ABSTRACT

Urban roadside drainage systems frequently suffer from blockage due to the accumulation of silt, plastic waste, and organic debris, resulting in overflow and unhygienic conditions. Manual drain cleaning methods are inefficient and expose workers to serious health hazards. This paper presents the design and development of a compact electro-mechanical system for waste removal from rectangular urban drainage lines. The proposed system uses a chain and paddle mechanism driven by a DC geared motor to lift accumulated waste and discharge it into a collection container. A rechargeable battery enables portable and standalone operation. Key design calculations were carried out to determine waste load, torque requirement, motor power, and battery capacity under wet operating conditions. A three-dimensional CAD model was developed and refined to improve stability and ease of operation. The proposed system provides a safer, economical, and efficient alternative to conventional manual drainage cleaning practices.

ME04

ELECTRO-HYDRAULIC HILL HOLD MECHANISM

Prof. Adarsh Madhu, Harikrishna Ramkishore , Akshay K, Anuj K K
Department of Mechanical Engineering
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

Hill Hold Assist (HHA) is an advanced driver-assistance system developed to prevent vehicle rollback during uphill starting conditions. Rollback incidents are common in hilly regions and off-road environments, often caused by improper coordination between the clutch, brake, and accelerator. Such situations increase driver stress and can lead to accidents, particularly on steep slopes and low-traction surfaces. The proposed system aims to enhance vehicle safety and drivability by automatically maintaining braking force when the vehicle is stopped on an incline.

The working principle of the Hill Hold Assist system involves detecting the road gradient and vehicle standstill conditions using appropriate sensors. When the driver releases the brake pedal on an incline, the system temporarily holds the brake pressure, allowing sufficient time for clutch engagement. The braking force is released automatically once adequate engine torque is generated, typically at the half-clutch point, ensuring smooth forward motion without rollback. This automated control reduces dependency on driver skill and improves start-up stability on slopes.

The developed system significantly reduces driver effort and improves confidence while driving in hilly and challenging terrains. Performance evaluation under varying slope angles and surface conditions demonstrates effective rollback prevention and smooth vehicle launch. The implementation of Hill Hold Assist contributes to improved road safety, reduced accident risk, and enhanced comfort, making it a valuable feature for modern vehicles operating in urban, hilly, and off-road conditions.

ME05

EXPERIMENTAL INVESTIGATION OF MECHANICAL PROPERTIES OF FRICTION STIR WELDED STAINLESS STEEL 304 JOINTS

Prof. Aswin P, Kashinathkrishna V, Abhay Sasi C P , Snehith N, Jishnu Saj,
Department of Mechanical Engineering
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

Friction Stir Welding (FSW) is a modern solid-state joining technique in which materials are bonded without reaching their melting point. Unlike conventional fusion welding methods, FSW relies on mechanical stirring and frictional heat rather than an external heat source. This makes it particularly suitable for materials such as aluminum and its alloys, which are often difficult to weld using traditional processes due to issues like high thermal conductivity, oxidation, and solidification defects.

In the FSW process, a specially designed hard, non-consumable rotating tool is pressed into the joint line between two metal plates. As the tool rotates and moves along the joint, friction between the tool and the workpieces generates heat, softening the material to a plastic state. The rotating tool then stirs and forges the softened material from both sides of the joint, forming a strong, continuous bond upon cooling, without the material ever becoming molten.

One of the major advantages of friction stir welding is the high quality of welds it produces. Since melting is avoided, common fusion welding defects such as cracks, porosity, shrinkage, and excessive distortion are greatly reduced. The process also offers better mechanical properties, improved dimensional stability, and reduced need for post-weld finishing. The aim of this project is to gain a clear understanding of the working principle of friction stir welding and to study the key process parameters—such as tool design, rotational speed, and welding speed—that influence the strength and quality of the welded joint.

TRACK ID: ME MECHANICAL ENGINEERING

ME06

SOLAR POWERED CAR CABIN COOLING SYSTEM

Prof.Rahul S R, Muhammed Rizwan, Sreeram K, Akash M, Abhinav Rosmen V C
Department of Mechanical Engineering
St. Thomas College of Engineering and Technology, Kannur, Kerala, India

ABSTRACT

This project focuses on the development of a solar- powered passenger cabin cooling system for cars that operates when the vehicle is parked. In many regions with hot climates, the temperature inside a parked car can rise rapidly, causing discomfort and potential health risks for passengers. The proposed system aims to address this issue by using solar energy to power a cooling mechanism that helps maintain a lower cabin temperature. Solar panels mounted on the roof of the car capture sunlight and convert it into electrical energy, which is then used to operate the cooling system without drawing power from the vehicle's main battery. By continuously ventilating or cooling the cabin during parking, the system reduces heat accumulation inside the vehicle and improves overall passenger comfort once the car is re-entered. The use of solar power makes the system energy-efficient and environmentally friendly, as it relies on a renewable energy source and does not increase fuel consumption. This setup is particularly useful in hot and sunny regions, where solar energy is readily available and parked vehicles are exposed to high temperatures for extended periods.