



ICIRIST 2K26



INTERNATIONAL CONFERENCE

ON

**POWER SYSTEMS, COMMUNICATION ENGINEERING &
MANAGEMENT STUDIES (ICPCMS-2026)**

Organized by

EEE, ECE & MBA

In Association with



Editor's

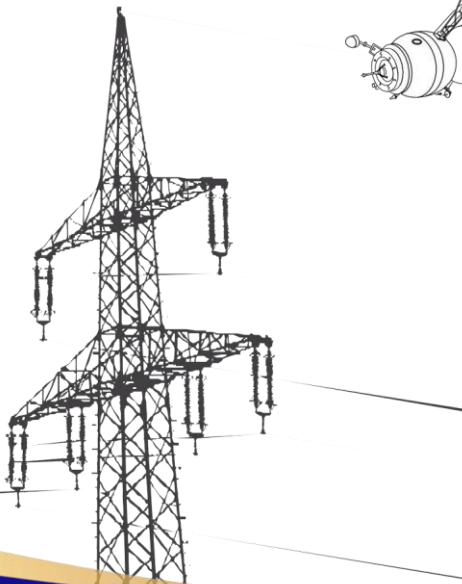
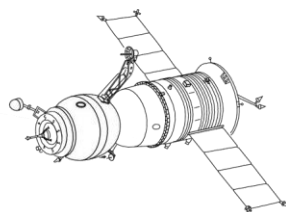
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Perambalur - 621212 , Tamil Nadu

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DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

(AUTONOMOUS)

Approved by AICTE, New Delhi

Affiliated to Anna University,

Chennai Accredited with "A"

Grade by NAAC

Accredited by NBA AERO, BME, CSE, ECE, EEE, IT, MECH)

PERAMBALUR - 621 212. TAMIL NADU, INDIA



PROCEEDINGS

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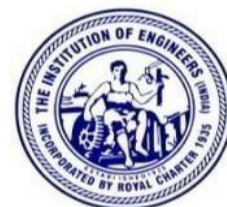
**“INTERNATIONAL CONFERENCE ON POWER SYSTEMS,
COMMUNICATION ENGINEERING & MANAGEMENT**

STUDIES” ICPCMS 2026

27th March, 2026

Organized by

Department of EEE, ECE & MBA



Patrons

About the Principal



Dr. D. Shanmugasundaram is the Principal of Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu. With over 29 years of experience in engineering education, his research expertise spans powder metallurgy, energy, and composites. He has published numerous articles in international journals and conferences, and has been a keynote speaker at International Conference in Malaysia, Hong Kong, and Tokyo. Dr. D. Shanmugasundaram serves on editorial boards, reviews for reputed journals, and is a member of several professional societies.

About the Vice Principal



Dr. K. Anbarasan is the Vice Principal of Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu, with 22 years of teaching and administrative experience in engineering education. He completed his Ph.D. in Control Systems Engineering from National Institute of Technology Tiruchirappalli. His research interests focus on emerging areas in engineering and technology. He has published numerous research papers in reputed national and international journals, including SCI, Scopus, and IEEE indexed journals, along with book chapters, and has published several research papers at national and international conferences.

About the Editors



Dr. P. Rajeswari Sundaram, is working as Associate Professor & Head, Department of Electronics and Communication Engineering, Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur Tamil Nadu, India. She has a total of 17 YEARS of Teaching Experience. She received her B.E. degree in Electronics and Communication Engineering, Anna University, Chennai, India, in 2006, the M.E. degree in Computer & Communication from Anna University, India, in 2008. She completed her Ph.D. degree from Anna University Chennai, Tamil Nadu, India, in 2022. Her research interest includes Mobile Application Development, Communication and Networks, Mobile Adhoc Networks, Wireless Communication Networks, Micro Strip Patch Antennas.



Dr. M. Parameswari working as Professor and Head of the Department of Electrical and Electronics Engineering at Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur. She has 16.9 years of teaching experience in engineering colleges. She completed her Doctor of Philosophy at Anna University, Chennai. She did her Post Graduate programme at Sathyabama University, Chennai. She completed her Under Graduate programme at Jayaram College of Engineering and Technology, Trichy. Her area of specialization is Electronics and Instrumentation Engineering and area of interest is Process control, Sensors and measurements, Internet of Things and data acquisition systems. She published more than 15 international journals at reputed journals. She has published 3 books, published papers in 15 international conferences, 7 national conferences and she has published one patent.



Mrs. N. Suguna is currently serving as an Associate Professor in the Department of Master of Business Administration at Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu, and India. She holds an MBA from J.J. College of Engineering and Technology and has over 23 years of teaching experience in management education. She has consistently contributed to academic excellence and student development through her dedicated teaching approach. Her areas of expertise include Systems, Business Analytics, and Information Management. She adopts a practical-oriented teaching methodology by integrating case studies, real-time business applications, and experiential learning techniques. She actively engages students in analytical thinking and data-driven decision-making processes essential for managerial roles. She has been actively involved in curriculum development and academic mentoring for MBA students. Her guidance in project work, particularly in model creation, data analysis, and business simulations, enhances students' practical exposure. She emphasizes bridging the gap between theoretical knowledge and industry practices.

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Proceedings of

**“INTERNATIONAL CONFERENCE ON POWER SYSTEMS,
COMMUNICATION ENGINEERING
& MANAGEMENT STUDIES**

ICPCMS-2026

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DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

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Department of Master of Business and Administration

Mrs. S. Jayasri M.B.A

Assistant Professor

Department of Master of Business and Administration

FOREWORD

It gives us immense pleasure to present the proceedings of the International Conference on Power Systems and Communication Engineering & Management Studies (ICPCMS-2026), held on 27th March 2026 at Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu. This conference, jointly organized by the Departments of Electrical and Electronics Engineering, Electronics and Communication Engineering and Master of Business and Administration serves as a platform to bring together academic minds, industry professionals, research scholars, and students to explore innovations in engineering and technology for a sustainable and smart future.

The conference theme - "Power Systems and Communication Engineering & Management Studies" resonates deeply with the global call for environmentally responsible development and transformative technological progress. Through a multitude of research papers, keynote sessions, and technical presentations, the conference has fostered insightful discussions on the advancement of technologies, interdisciplinary research, and emerging engineering solutions. The contributions compiled in this volume reflect the intellectual rigor and innovative spirit of the participants. They not only address contemporary challenges but also propose novel solutions and futuristic approaches to drive sustainable development across various sectors.

We extend our heartfelt gratitude to all contributors, reviewers, session chairs, and participants whose active involvement and enthusiasm made this conference a resounding success. A special acknowledgment is due to the organizing committee, whose tireless efforts ensured the seamless execution of the event. We hope that the ideas exchanged and the collaborations initiated through this platform will inspire future innovations and contribute meaningfully to the creation of a smarter, greener world.



SHRI. A. SRINIVASAN

Esteemed Chancellor

Dhanalakshmi Srinivasan University,

Tamil Nadu, INDIA.

CHANCELLOR MESSAGE

I am delighted to know that the Departments of Electrical and Electronics Engineering, Electronics and Communication Engineering and Master of Business and Administration of Dhanalakshmi Srinivasan Engineering College (Autonomous) is hosting the **"International Conference on POWER SYSTEMS, COMMUNICATION ENGINEERING AND MANAGEMENT STUDIES (ICPMS-**

2026) The event is scheduled to take place on **27th March 2026 at Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu. INDIA**

The constant emergence of innovative inventions in Science, Engineering, and Technology is a promising trend. The decision to organize an International Conference on **"POWER SYSTEMS, COMMUNICATION ENGINEERING & MANAGEMENT**

STUDIES" is commendable. The primary objective of this conference is to provide a substantial platform for intellectual exchange. Researchers, industry experts and students can come together to share their findings and insights in the realm of **'Innovative Research'**, contributing to the enhancement of human life on both global and local scales. It is anticipated that the conference will serve as a catalyst for fostering a deeper understanding of various recent innovations from a broader perspective. I extend my best wishes to the organizing committee of **ICPCMS-2026**, hoping for the success of the event. May the academic deliberation sessions with esteemed scientists be fruitful and zcontributed significantly to the advancement of knowledge.



Prof. Dr.D.SHANMUGASUNDARAM

Principal
Dhanalakshmi Srinivasan Engineering College
(Autonomous)
Perambalur - 621212.

Principal Message

I am delighted to learn that the Departments of Electrical and Electronics Engineering, Electronics and Communication Engineering and Master of Business and Administration at Dhanalakshmi Srinivasan Engineering College, Perambalur, are organizing the "**International Conference On “Power Systems, Communication Engineering and Management Studies (ICPCMS-2026)”** on **27th March 2026**, within the esteemed premises of Dhanalakshmi Srinivasan Engineering College, Perambalur. Additionally, there will be the release of a souvenir and conference proceedings as well, marking this scientific gathering as a significant milestone. The conference proceedings are anticipated to offer valuable insights and perspectives, fostering suggestions for further research and applications in the dynamic fields of innovations in Science, Engineering, and Technology. This holds particular relevance to our region.

In light of this auspicious occasion, I extend my warmest greetings to the dedicated Conveners and Organizing Secretaries of the **ICPCMS-2026** and all the esteemed participants of the conference. May this gathering serve as a catalyst for intellectual exchange and collaboration, propelling advancements in research and applications. I convey my sincere wishes for the success of the conference and extend my hopes for a future filled with accomplishments for everyone involved. May the **ICPCMS-2026** be an outstanding and grand success.



Prof. Dr. K. ANBARASAN

Vice Principal
Dhanalakshmi Srinivasan Engineering College
(Autonomous)
Perambalur - 621212.

Vice Principal Message

I am delighted to extend my warm greetings to all the participants of the **International Conference on Power Systems, Communication Engineering & Management Studies (ICPCMS-2026)** hosted by **Department of Electronics and Communication Engineering, Electrical and Electronics Engineering & Management studies** , Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur.

The Global world of Science and Engineering is an electrifying platform with enlarged space for research, design, development and testing on their own diverse innovative regions. The **International Conference on Power Systems, Communication Engineering & Management Studies (ICPCMS-2026)** on **27.03.2026** will prolong the charm engineers to meet the ideas and solutions for different research challenges of their belonging engineering studies. This happen, by making the young minds to participate constantly in different academic and technical oriented activities regularly for enriching their Innovative ideas in new dimensions.

As the Vice Principal, I firmly believe that such scholarly gatherings enrich the academic fabric of our institution. I welcome all the delegates to stay engaged, keep themselves proactive in shaping the future technologies. Finally, I'd like to congratulate each of my colleagues for bringing young Innovators to this session-Engineering.

KEYNOTE SPEAKERS

	<p>Dr. S. Ganesh kumar</p> <p>Assistant Professor in the Department of Electrical and Electronics Engineering (EEE) at the College of Engineering, Guindy (CEG), Anna University, Chennai.</p> <p>.</p>
	<p>Dr. M. Muthu gopalakrishnan</p> <p>Associate Professor Accounting Finance and Control Area School of Business and Management CHRIST (Deemed to be University) Bangalore Bannerghatta Road Campus (BRC) I Bengaluru</p>
	<p>Dr. Chitra venugopal</p> <p>BS REE Program Director Associate Professor Oregon Institute of Technology</p>
	<p>Dr. Elhassan kotb Radwan</p> <p>Research and Faculty Member University of Technology and Applied science (UTAS) Ibri, Oman.</p>

COMMITTEE LIST

S. NO.	COMMITTEE LIST	FACULTY INCHARGE		
		ECE	EEE	MBA
1.	Organizing Chair	Dr. P. Rajeswari	Dr. M. Parameswari	Dr.M.Chandrasekaran
2.	Organizing Secretaries	Dr. K. Kalaiselvan Mrs. S. Sasikala	Mr.R.Sathish, Mrs. M. Bhuvaneswari Mr. M. Asaithambi	Mr.B Baskar Mrs.N Suguna Mr.A.G Siddard
	Finance and accounts (Budget S Expenditure)			
3.	Invitation, Flex and Banner	Mrs. M. Saritha, Mrs. Valarmathi Dr.S.Karpagaraja n	Mr. C. Kavikumar, Mr. Muruganantham Mr.Ramar	Mrs.N Suguna Mr.A.G Siddard
4.	Chief Guest Shawl S Momentum	Dr. A. Yogeswaran	Mr.G.Chandrasekar	Mr.A.G Siddard
5.	Proceedings Soft and Hard copy Preparation, Publication, ISBN approval work	Dr. A. Yogeswaran	Mr.G.Chandrasekar	Mr.A.G Siddard Ms.S.Jayasri
6.	Paper Scrutinizing,	Mrs. R. Gayathri	Mr.R.Sathish Mrs. M. Bhuvaneswari	Ms.S Jayasri
7.	E-Mail S Communication.	Mrs. M. Noorjahan	Mr.R.Sathish Mrs. M. Bhuvaneswari	Mr.B Baskar
8.	Reception	Mrs. S. Susidra	Ms. A. Thamijunisha	Ms.S Jayasri
9.	MC Desk, Prayer song, Agenda Preparation, National Anthem	Mrs. A. Parimala Mrs. R. Gayathri	Mr.G.Chandrasekar	Mrs.N Suguna

S. NO.	COMMITTEE LIST	FACULTY INCHARGE		
		ECE	EEE	MBA
10.	Registration and feedback Auditorium arrangement, Decoration	Mrs.R.Gayathi Ms.R.Abinaya	Mrs. T. Thenmozhi	Ms.S Jayasri
11.	Certificates, Prize Preparation S Distribution	Mrs. B. Sujitha, Mrs. M. Saritha Mrs. Anitha	Mrs. T. Thenmozhi Mrs.S.Mageswari	Mrs.N Suguna Ms.S Jayasri
12.	Stage Arrangement, LCD S PA System arrangement	Mr.R.Prakash	Mr. C. Kavikumar	Mr.B Baskar
13.	Snacks S Lunch Arrangements for Chief guest and Participants	Mr. T. Ramji Mr. D. Murugesan	Mr. Baburajan Mr. Muruganantham	Mr.B Baskar Mr.A.G Siddard
14.	Press, Media and Photo S Video	Mr. T. Ramji	Mr. M. Asaithambi	Mr.B Baskar
15.	Conference Report Preparation	Mr.T.Boopathy	Mr.R.Sathish Mrs. M. Bhuvanewari	Mrs.N Suguna
16.	Discipline Committee	All Department Faculty		

INSTITUTION PROFILE



ABOUT THE COLLEGE

Our **Dhanalakshmi Srinivasan Engineering College (An Autonomous Institution)** has **25 years** of enchanting Education, as established in the year of **2001** at Perambalur, Tamil Nadu. Our Institution is accredited with ‘A Grade’ by **NAAC**. Our Institute is conferred with Autonomous status from UGC and Anna university for a period of ten years. Departments of **AERO, BME, CSE, ECE, EEE, IT** and **MECH** are accredited by **NBA**. Our Institution is run by the **Silver Jubilee celebrated** Group of **Dhanalakshmi Srinivasan Charitable and Educational Trust, Perambalur, Tamil Nadu**.

Our endowed educational trust started the college with motto of promoting Engineering Technical Education to the Students in rural area of the backward Districts of Tamil Nadu. Our Institution offer **11 UG Programme** and **6 PG Programme**.

The aspirants of the Institution both the Faculty and Students are vibrant in congregating the cutting-edge technologies in their respective fields. This motto is aided by the regular **Professional Society** and **Club Activities**. The College offers a good scope for Service – oriented Programme organized by **NSS, Fine Arts Association** and Student Care Centre. The Rainwater Harvesting units are also built with a societal impact in our college premises. The Human Resource Development Centre focuses on the full-fledged placements for all department Students.

As now with another great Milestone of receiving Autonomy we are working together with a hope of consequential development of the students in all aspects. We have introduced Skill based Module which helps our students to mold themselves with variety of Skill based Learning. These Courses are designed to groom budding Engineers, become Employable and a responsible Citizen of the Nation.

Regarding infrastructure, our campus is lush green campus and has well equipped laboratories and smart classrooms. Separate hostel facility is available for both boys and girls with multi cuisine food. 24 hours Wi Fi facility is available in our institution and also, we have specialized central auditorium with fully air-conditioned facility and having the seating capacity of 2500 with state of art facilities.

Highly Competent faculty with Industry and Academic experience caters the needs of students on curriculum which helps them to meet the global challenges and the needs of employers. Project based learning is incorporated to equip Research skills among the students. Various activities are performed by our institution in a student centric basis such as Continuous assessment, Assignment strategies, Student initiative Material, Virtual Lab, Project Monitoring Committee, etc. Regarding Training and Placement, Personality Development program classes are arranged to ensure the transformation of students as campus to corporate level and nearly 85% of students were placed in reputed industries each and every year. Major recruiters are **TCS, HCL, Urjitha Electronics, Sutherland** and so on.

Moreover, we encourage the spirit of entrepreneurship and empower students to share ideas and develop creativity through Project Based Learning. We provide the scope for the students to participate in various level of extension activities such as **NSS, Fine arts, Sports, Club activities**, etc rather than academic competency. Each and every year we organize Student Enrichment Programme through **professional societies** such as **IEEE, IETE, IE(I), ISTE, BMSI, SESI ,IFERP** and so on. National and International symposium and conference were also arranged to enrich the technical competency of the student. We have a regular practice of applying a proposal to funding agencies, in which we have **received fund** on **MODROBS, SPDC, TNSCST** for **modernizing the laboratories, Organizing Symposium, conference** and soon.

ABOUT THE DEPARTMENT

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING:

The department of Electronics and Communication Engineering was established in the year 2001 during which the undergraduate programme was introduced. Post graduate programme was established in the year 2007 and it offers communication systems. Under the UG programme, the total sanctioned student strength is 60 and now it is increased 120 to 180 in the Academic Year (2012-2013). Under the PG programme, the total sanctioned student strength is 18. The department is accredited by NBA and received an AICTE fund of Rs: 1, 25, 0000 and Rs: 5, 00, 000 for MODROBS.

The department has highly qualified, committed and research-oriented faculty members and supported by trained technical non-teaching staff. The department enjoys the privilege of having spacious and well-equipped laboratories that provide students, the industrial environment much needed for real life training. The department has very close interaction with many leading industries in the country and research laboratories. Guest lectures, workshops, Industrial Visits, In-plant training, seminars, symposia, in-house projects in collaboration with well-established companies and other personality development that cater to the quest of today's society as well as student professionals.

Vision

To be a center of excellence in higher education and research, fostering the dissemination of knowledge in the field of Electronics and Communication, nurturing innovation, entrepreneurship, and startups to meet the evolving needs of industry, and transforming students into responsible and ethical individuals.

Mission

- Foster life-long learning abilities that empower students to adapt to and respond effectively to changes in society, technology, the environment, and career landscapes
- Promote a culture of research and innovation through active collaboration with research organizations, industries, and startup ecosystems.
- Inspire students to become responsible citizens and competent professionals with strong ethical values and entrepreneurial mindsets.
- Equip students with the skills to solve complex technological challenges and provide a framework that encourages collaborative, multidisciplinary activities and startup development

ELECTRICAL & ELECTRONICS ENGINEERING:

The department of Electrical and Electronics Engineering was started in the year 2002-2003 and affiliated to ANNA UNIVERSITY, Chennai. It offers B. E (EEE), M. E (Power Electronics & Drives) Department is accredited by NBA. The department has a very close interaction with many leading research- oriented industries.

The main objective of the department is to provide industrial environment to the learners with help of spacious and well-equipped laboratories. The department offers various seminars, workshops, symposium, entrepreneurship development and IEEE Chapter programmes for the students to help them keep pace with the rapid changes and future technologies in the field of Electrical and Electronics Engineering

Vision

To infuse technical competencies of Electrical and Electronics Engineering and provide research ambience with values.

Mission

M1: To impart quality education and training in Electrical and Electronics Engineering with an overall background suitable for making a successful Engineer in industry and research or higher education.

M2: To develop life-long learning skills that allows them to be adaptive and responsive to changes in society, technology and the environment, as well as career demands.

M3: To provide an accredited dynamic scholarly environment wherein students learn to develop communications and leadership abilities to blossom as a professional.

M4: To ensure that every graduate is aware of the roles and responsibilities of the professional engineer in society through exposure to ethics, equity, safety and health considerations.

MASTER OF BUSINESS ADMINISTRATION

The Department of Management Studies at Dhanalakshmi Srinivasan Engineering College was established in 2005 with a clear and forward-looking vision: to integrate core management principles with emerging technological advancements in order to respond effectively to the demands of a rapidly evolving business environment. Since its inception, the department has consistently strived to bridge the traditional boundaries between management education and technology-driven innovation, thereby shaping a contemporary management paradigm suited to the challenges of the new age. Recognizing that modern organizations operate at the intersection of strategy, technology, and human capital, the department emphasizes a curriculum that balances strong conceptual foundations with practical and technological relevance. Management theories are not taught in isolation; instead, they are contextualized through real-world applications, case analyses, industry interactions, and exposure to digital tools that are transforming business processes. This approach enables students to understand how management concepts function within technologically advanced and highly competitive organizational settings.

Over the years, the department has evolved into a dynamic academic ecosystem that encourages analytical thinking, ethical decision-making, innovation, and leadership. Faculty members bring academic rigor and industry insights into the classroom, fostering an environment of continuous learning and intellectual inquiry. The department also promotes experiential learning through internships, live projects, workshops, and collaborative activities, ensuring that students acquire both managerial competence and technological adaptability.

By aligning management education with technological progress, the Department of Management Studies aims to develop professionals who are not only proficient in managerial functions but are also capable of leveraging technology for strategic advantage. In doing so, the department continues to contribute meaningfully to the institution's mission of producing competent, responsible, and future-ready management professionals.

MASTER OF BUSINESS ADMINISTRATION

VISION

Nurture Managers, Entrepreneurs and Leaders through High quality Teaching, Training and Research.

MISSION

M1: Develop versatile Managerial Professionals to meet the Global Standards.

M2: Build managerial research skills and expose students to the business world to better equip them for the demands of the workplace.

M3: Develop leaders with ethical behavior to excel in Professional and Societal activities.

**INTERNATIONAL CONFERENCE ON “POWER SYSTEMS,
COMMUNICATION ENGINEERING AND MANAGEMENT
STUDIES”-ICPCMS 2026
(27TH MARCH 2026) AGENDA**

VENUE: DS MINI AUDITORIUM

TIMING	SCHEDULE	IN CHARGES
10.00AM – 10.05AM	TAMIL THAI VAZHTHU	CHOIR GIRLS
10.05AM – 10.10AM	WELCOME ADDRESS	Ms V.R JAYASRI/III/ECE
10.10AM – 10.15AM	HONORING OF CHIEF GUEST	VICE PRINCIPAL
10.15AM-10.20AM	ABOUT THE CONFERENCE	Ms M.AAKARSHA SHEELA/III/EEE
10.20AM – 10.25AM	RELEASE OF PROCEEDINGS	CHIEF GUEST
10.25AM – 10.35AM	FELICITATION ADDRESS	PRINCIPAL
10.35AM – 10.45AM	PRESIDENTIAL ADDRESS	VICE PRINCIPAL
10.45AM – 11.15AM	INAUGURAL ADDRESS	Dr.S.GANESH KUMAR
11.15AM-11.45AM	KEYNOTE ADDRESS (ONLINE)	Dr. CHITRA VENUGOPAL
11.45AM-12.15PM	KEYNOTE ADDRESS(ONLINE)	Dr. M. MUTHU GOPALA KRISHNAN
12.15PM-12.45PM	KEYNOTE ADDRESS(ONLINE)	Dr.ELHASSAN KOTB RADWAN
12.45PM-1.30PM	LUNCH BREAK	
1.30PM-2.45PM	PAPER PRESENTATION (SESSION – 1)	Dr. K.KALAISELVAN
2.45PM-4.00PM	PAPER PRESENTATION (SESSION – 2)	Dr. A.YOGESHWARAN
4.00PM-4.15PM	TEA BREAK	
4.15PM-4.50PM	VALEDICTORY	ALL STAFFS
4.50PM-4.55PM	VOTE OF THANKS	Ms SABARNA/III/ECE
5.00PM	NATIONAL ANTHEM	CHOIR GIRLS

SCOPE OF ICPCMS 2026

Objectives:

The aim of the International Conference on Power Systems and Communication Engineering (ICPCMS-2026) is to provide a dynamic platform for emerging researchers, academicians, and industry professionals to disseminate their latest innovations and research outcomes in the fields of intelligent systems, electronics, communication, and allied technologies. The conference also seeks to underscore the practical applications of these technologies in addressing contemporary challenges across various domains.

Benefits for Faculty/Students:

Faculty members and students will gain immense benefits from the sessions and interactions facilitated during the conference. Expert keynote speakers and invited talks from leading professionals will offer participants a deep insight into recent trends, research methodologies, and innovations. The event provides an ideal environment to foster intellectual discussions, strengthen technical acumen, and inspire collaborative efforts across diverse specializations.

Expected Outcome:

ICPCMS 2026 is expected to bring together participants from various institutions across the nation and internationally, fostering a global community of innovation and research. It aims to establish expert networks for collaboration and knowledge sharing, encouraging a multidisciplinary approach to solving real-world problems. Participants will be empowered to exchange their best research practices and form lasting professional connections that extend beyond the conference.

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1. EDGE-INTELLIGENT IOT FRAMEWORK FOR REAL-TIME ENERGY MONITORING AND PREDICTIVE LOAD MANAGEMENT

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ABSTRACT

In this paper, the authors have proposed an edge-intelligent Internet of Things (IoT) framework for real-time energy monitoring and predictive load management in smart grids. The proposed architecture uses the integration of sensors, edge computing, and the cloud to provide efficient data acquisition and processing. A lightweight machine learning model has been proposed to perform predictive analysis of the energy demand at the edge, thereby providing reduced latency and improved communication efficiency. The proposed architecture has the potential to provide improved energy efficiency by allowing dynamic load balancing and anomaly detection, as verified by the experimental results. The proposed architecture is suitable for the development of next-generation smart energy systems due to its cost-effectiveness and improved performance.

2. DEEP LEARNING-BASED FAULT DETECTION AND CLASSIFICATION IN POWER TRANSMISSION NETWORKS USING MULTI-SENSOR DATA FUSION

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ABSTRACT

This paper proposes a deep learning-based approach for fault detection and classification in power transmission networks using multi-sensor data fusion. The proposed approach uses data obtained from current sensors, voltage sensors, and temperature sensors for better accuracy in fault detection. The proposed approach also uses a hybrid CNN model for feature extraction from the fused data. The proposed approach is efficient in detecting various types of faults, such as line-to-ground faults and line-to-line faults, with high precision. The simulation results show that the proposed approach is better than traditional methods in terms of detection speed.

3. AI-ENABLED SMART HEALTH MONITORING SYSTEM BASED ON WEARABLE SENSORS AND WIRELESS COMMUNICATION

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ABSTRACT

This paper proposes an AI-enabled smart health monitoring system, which uses wearable sensors and wireless communication. The proposed health monitoring system enables continuous patient health monitoring by collecting physiological parameters such as heart rate, body temperature, and oxygen saturation. The physiological parameters are transmitted to a central server using low-power communication protocols. The proposed health monitoring system uses a machine learning algorithm to detect anomalies and predict health risks. The proposed health monitoring system is energy-efficient and can be used in remote health monitoring, especially in resource-constrained environments.

4. BLOCKCHAIN INTEGRATED SECURE COMMUNICATION FRAMEWORK FOR IOT BASED INDUSTRIAL AUTOMATION

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ABSTRACT

This research proposes a block chain-integrated secure communication framework for IoT-based industrial automation systems. The proposed framework ensures data integrity, authentication, and secure device communication through decentralized ledger technology. Smart contracts are used to implement access control and device verification processes. The proposed system overcomes various security threats such as data tampering and unauthorized access. The performance evaluation of the proposed framework ensures a fair balance between security and computational complexity. The proposed work presents a reliable solution for secure industrial IoT environments.

5. HYBRID GNN-LSTM MODEL FOR SPATIO-TEMPORAL ANALYSIS IN SMART AGRICULTURE MONITORING SYSTEMS

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ABSTRACT

This paper proposes a novel spatio-temporal model for smart agriculture monitoring systems, which is based on a combination of Graph Neural Networks (GNN) and Long Short-Term Memory (LSTM) models. The model is used for the analysis of data collected from environmental sensors, such as soil moisture, humidity, and temperature, for the prediction of crop health. The proposed model has higher accuracy compared to the existing models. The proposed model is useful for precision agriculture, which improves crop yield and optimizes resources.

6. PH AND ELECTROCHEMICAL SENSOR INTEGRATED DEVICE FOR DETECTION OF BACTERIAL VAGINOSIS

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ABSTRACT

Bacterial vaginosis (BV) is a common vaginal infection resulting from an imbalance in the microbiome, often linked to bacteria such as *Atopobium* and *Gardnerella vaginalis*. Early and accurate detection is essential for timely treatment and improved reproductive health outcomes. This project presents an innovative, user-friendly diagnostic device that integrates pH and electrochemical sensing technology to enable rapid, at-home BV detection. The device ensures hygiene through an automated sterilization mechanism, providing a safe and reusable solution. By offering a non-invasive and accessible diagnostic approach, this device empowers individuals to monitor their vaginal health conveniently while reducing reliance on laboratory testing. Bacterial vaginosis is one of the most prevalent vaginal infections, affecting millions of women worldwide. It is often asymptomatic or presents with mild discomfort, yet if left untreated, it can lead to complications such as increased susceptibility to sexually transmitted infections and pregnancy-related issues. Traditional diagnostic methods require clinical visits and laboratory testing, which can be inconvenient and inaccessible for many. This project aims to address these challenges by developing a portable, easy-to-use device that enables rapid BV detection at home. The device utilizes an integrated pH sensor and electrochemical sensing technology to analyze key biological markers associated with BV. The user-friendly design ensures a seamless testing process, with results displayed in real-time for immediate interpretation. Additionally, the device incorporates an automated sterilization mechanism, allowing safe and hygienic reuse.

7. DISTRIBUTED AND CLUSTERED ROBOTICS METHODOLOGIES

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ABSTRACT

This paper would explore the implementation of distributed and cluster architectures in robotics to enhance fault tolerance and ensure operational resilience. Most of the robots work independently in the current manufacturing environments to support them with the tasks. This creates a vulnerability, that the entire production line could be disrupted due to any single critical mechanical failure. This shows that individual precision shown by robots is insufficient in a fast-moving and complex environment. By integrating the principles from distributed and cluster computing, the robots can be enabled to communicate with each other seamlessly and simultaneously, so that if one of the robots stops or fails working, the other robots could take up the goal of the robot and adjust according to any variable situation. This enables a “self-healing” system where upon the failure of a single unit of robot, the remaining robots could adjust dynamically and redistribute the tasks to all the other nodes. Furthermore, the idea of robots working together to achieve a common goal is also possible using edge computing, to balance the computational load and ensure that the goal of robots is met without any interruption and the collective intelligence is preserved in any variable scenario.

8. DEEP REINFORCEMENT LEARNING FOR SMART CROP HARVESTING IN VARIABLE TERRAIN

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ABSTRACT

Agricultural environments are inherently dynamic and complex, posing significant challenges for autonomous produce harvesting, particularly in varying terrain conditions. This study explores the application of Deep Reinforcement Learning (DRL) to develop adaptive AI algorithms capable of optimizing harvesting operations across diverse agricultural landscapes. The proposed approach leverages advanced DRL techniques to enable real-time decision-making, effective terrain adaptation, and efficient obstacle avoidance. The DRL-based models are trained and tested within a comprehensive simulation environment that accurately replicates different terrain conditions, ensuring scalability and real-world applicability. Experimental results demonstrate that the proposed adaptive system outperforms conventional rule-based and heuristic methods in terms of efficiency, accuracy, and resource utilization. Key outcomes of the study include enhanced operational efficiency, minimized crop damage during harvesting, and improved adaptability to unpredictable terrain features. Overall, the research highlights the significant potential of DRL-driven adaptive AI systems in transforming precision agriculture by enabling reliable and intelligent autonomous harvesting in complex environments, thereby contributing to improved global food production.

9. INTELLIGENT TEMPERATURE CONTROL SYSTEM USING PID WITH LCD AND RELAY INTERFACE

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Industry

Person,Aeronautical,

Qatar

ABSTRACT

This project presents the design and implementation of a smart PID-based temperature controller with relay switching and an LCD interface. The system utilizes a temperature sensor to continuously monitor the process variable and applies a Proportional–Integral–Derivative (PID) control algorithm to maintain the desired set point with high accuracy and stability. A microcontroller processes the sensor data and computes the control output, which is used to drive a relay for switching heating or cooling devices. The integration of PID control ensures minimal steady-state error, reduced overshoot, and improved response time compared to conventional on–off control methods. The LCD display provides real-time visualization of temperature values, set points, and system status, enhancing user interaction and monitoring capability. The proposed system is cost-effective, reliable, and suitable for applications in industrial automation, laboratory equipment, and domestic temperature regulation systems.

10. CLOUD-CONNECTED SMART POWER MONITORING FRAMEWORK

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ABSTRACT

The IoT-based smart energy meter is an intelligent system designed to monitor, record, and manage electricity consumption in real time. It integrates current and voltage sensors with a microcontroller to accurately measure power usage, which is then transmitted to a cloud platform via wireless communication technologies such as Wi-Fi. Users can remotely access energy data through mobile or web applications, enabling better awareness and control over electricity usage. The system supports advanced features including automated billing, real-time notifications, and overload alerts to prevent energy wastage and equipment damage. Additionally, it allows remote switching of electrical loads, enhancing user convenience and operational efficiency. By eliminating manual meter reading and improving data accuracy, the proposed system offers a reliable and cost-effective solution for modern energy management. This technology plays a crucial role in promoting energy conservation and supports the development of smart grids and sustainable infrastructure.

11. INNOVATIVE SENSING AND INTELLIGENT CONTROL TECHNIQUES FOR MODERN ENERGY SYSTEMS

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ABSTRACT

Advanced sensing and control technologies are essential for improving the efficiency and reliability of modern power electronic systems. This paper highlights recent developments in high-precision sensors, including leakage current and magneto resistive sensors, for accurate real-time monitoring. It also discusses advanced control strategies such as model predictive control, adaptive control, and sensor-less techniques to enhance system performance and stability. The integration of sensing with intelligent control enables effective fault detection, reduced harmonic distortion, and optimized energy utilization. Furthermore, the adoption of artificial intelligence and IoT supports the development of smart and autonomous power systems, paving the way for future energy- efficient and resilient power electronics.

12. CAMERA BASED SMART TROLLEY FOR AUTOMATIC BILLING AND PRODUCT RECOGNITION IN SUPERMARKETS

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ABSTRACT

The Camera-Based Smart Trolley for Automatic Billing and Product Recognition in Supermarkets is designed to automate the traditional checkout procedure by combining embedded hardware platforms with artificial intelligence techniques. The proposed system is developed using the Raspberry Pi 4 as the central processing unit, incorporating features such as a 64-bit quad-core processor, 4GB RAM, dual micro HDMI ports, two USB 3.0 ports, two USB 2.0 ports, a Gigabit Ethernet interface, built-in wireless connectivity, and Power over Ethernet support through a PoE HAT, along with a 5V USB-C power supply requirement, enabling reliable and continuous operation in retail environments. The hardware architecture integrates the Raspberry Pi 4 with both a Pi Camera and a USB camera mounted on the shopping trolley to capture images of products placed inside it. The system operates on Raspberry Pi OS and utilizes the Python programming language with the OpenCV library for image processing tasks. The YOLOv8 algorithm is implemented for object detection and product recognition, after which product details and pricing information are retrieved from an SQLite database. The shopping cart is updated automatically, the total bill is calculated dynamically, and billing information is displayed to the customer. A QR code is generated to facilitate digital payment, followed by inventory updates and receipt generation upon successful transaction completion. The proposed system enhances billing efficiency by reducing manual intervention and minimizing error.

13. IOT-BASED SMART VEHICLE ACCIDENT DETECTION AND AUTOMATED EMERGENCY ALERT SYSTEM

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ABSTRACT

Vehicle crashes represent a severe worldwide problem, standing as a top cause of fatalities and injuries. They result in devastating, irreversible damages including loss of life, property, and societal productivity. A significant portion of these tragedies stems from delays in rescue operations, compounded by the absence of immediate crash-site information. Victims often remain stranded during vital moments due to slow detection and imprecise location data. Our innovative solution, the "Intelligent Automotive Safety Platform for Crash Identification and Mitigation," addresses this urgent challenge with a cost-effective, reliable system. It rapidly identifies collisions, determines exact positions, and notifies rescue authorities and medical facilities without delay. The setup integrates robust hardware and software for seamless performance. The core detection relies on the MPU6050 accelerometer paired with Digital Motion Processing (DMP) to monitor sudden shifts in motion, orientation, and angular velocity—hallmarks of impacts or vehicle flips. Upon confirmation of an

14. REAL-TIME SIGN LANGUAGE INTERPRETATION USING CONVOLUTIONAL NEURAL NETWORKS

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ABSTRACT

Individuals who cannot hear or speak have a hard time communicating and connecting with the world. The Real-Time Sign Language Interpretation using Convolutional Neural Networks project attempts to create a way to communicate with people who cannot hear or speak by providing an intelligent, efficient, real-time, two-way translation system that can assist in closing the gap between those without hearing or speech and communicating within society. This project utilizes various technologies, including computer vision, deep learning, Natural Language Processing (NLP), and embedded systems. Using a camera module, hand gestures will be captured in real-time and processed using CNNs to accurately identify sign language gestures and classify them according to their general pattern. Once recognized, these gestures will be converted into meaningful text and then converted to speech using text-to-speech techniques. The opposite will happen for reverse communication; speech will be captured using a microphone and processed using speech recognition software before being presented as text or visually as sign language.

15. AI POWERED NO HARM REPELLENT FOR FARMLAND PROTECTION

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ABSTRACT

Farmers have lost hundreds of thousands of dollars' worth of crops to repeated attacks from wildlife mostly at night. Presently available methods of protecting crops from wildlife include fencing, firecrackers and other means; however, these forms of protection have shown to be unreliable, unsafe, too expensive and/or not long-term solutions. Accordingly, this project addresses the need for a safe and sustainable method of providing intelligent crop protection through the creation of the innovative AI Powered No Harm Repelling system. The system will use artificial intelligence to search the environment for wildlife such as elephants and boars; therefore, wildlife will not be harmed, nor will crops, as a result of the application of this system. The AI Powered No Harm Repelling system will operate using an Arduino Uno computer, and it will be augmented with PIR motion sensors, infrared sensors, ultrasonic sensors, and a camera module to obtain the movement of wildlife through these various sensors, measure how far away the wildlife is from the motion, and provide data regarding temperature differences from human beings and wild animals to help identify the size of the wildlife in the field. In order to complete the AI powered reptilian and mammalian identification process, an external processing unit (PC or compatible module) will assist with processing the data that is read from the sensor array connected to the Arduino Uno. The systems will activate non-lethal deterrents based on a pre-established classification using relay modules to deter animals by means of ultrasonic sound emitters, strobe lights, odor dispensing sprinklers, buzzers or sirens. This system uses solar power to operate, and further supported with batteries and temporary sources of power to enable continuous operation in remote/off-the-grid farmland areas; an additional optional communication technology using LoRa or mobile notifications allow for remote monitoring of the system and flexibility of use

16. WEARABLE DEVICE WITH AI FOR REAL-TIME ASTHMA RISK ASSESSMENT AND ALERTS

*T. Logasundari, b. Puviyarasu, ragul, shanmugapriyan,
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ABSTRACT

This project presents the development of a wearable device integrated with Artificial Intelligence (AI) for real-time asthma risk assessment and alert generation. Asthma, being a chronic respiratory disease, often requires constant monitoring to prevent sudden and life-threatening attacks. The proposed device continuously tracks key physiological and environmental parameters such as respiratory rate, heart rate, blood oxygen saturation (SpO₂), temperature, humidity, and air quality indicators like PM2.5 and CO₂ levels. These data points are processed using AI algorithms, specifically trained machine learning models, to detect abnormal patterns and predict the likelihood of an impending asthma episode. The system is designed to provide immediate alerts to the user through haptic feedback, audio signals, and smartphone notifications, ensuring timely intervention. Additionally, alerts can be shared with caregivers or medical professionals via cloud connectivity for remote monitoring. The wearable also offers personalized insights and recommendations, helping users to better manage their condition. By combining real-time sensing with intelligent risk analysis, this device aims to improve asthma management, reduce emergency situations, and enhance the overall quality of life for asthma patients.

16. SMART PARKING SOLUTION FOR ON-STREET AND OFF-STREET PARKING

*K.Dhanasekaran, Tharnish R N, Venkatesh K G, Pranav Aaditya V, Rishikeshwar K
SRM Institute of Science and Technology, Ramapuram Campus - 600089*

ABSTRACT

Growing vehicular density in urban centers has made locating a vacant parking bay a time-consuming and fuel-inefficient ordeal for millions of daily commuters. Addressing this gap, the present work introduces a sensor-fused, cloud-backed parking guidance framework that combines Radio Frequency Identification (RFID) technology with Infrared (IR) detection modules to achieve reliable, bay-level occupancy awareness across both on-street and off-street facilities. Each instrumented bay hosts an IR emitter-receiver unit that registers vehicle arrival and departure events within milliseconds, while a paired RFID reader captures vehicle identity, enabling future integration with access-control or fee-collection subsystems. Raw occupancy signals from all bays converge at a microcontroller-based gateway, where embedded firmware applies state-machine logic to suppress transient noise, compiles a facility-wide occupancy vector, and relays the result to a cloud-hosted Internet of Things (IoT) platform over an encrypted wireless link. The platform archives time-stamped records for trend analysis and simultaneously exposes a color-coded, browser-accessible dashboard that drivers can consult before or during their journey to pinpoint available bays without entering the facility. Bench testing of the prototype across simulated peak and off-peak traffic scenarios confirmed detection accuracy exceeding 97 percent and average status propagation latency below 1.2 seconds, metrics that satisfy the

17.DESIGN AND ANALYSIS OF COMPACT MULTIBAND CONCENTRIC SPIRAL PATCH ANTENNA FOR S-BAND AND C-BAND WIRELESS APPLICATIONS

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ABSTRACT

This paper presents the design and analysis of a compact multiband concentric spiral microstrip patch antenna for S-Band and C-Band wireless communication applications. The proposed antenna consists of a circular disc radiating patch with three concentric ring-shaped slots etched on its surface to enable multiband operation. The antenna is designed on an FR-4 dielectric substrate with a relative permittivity of 4.4 and thickness of 1.6 mm. The design and performance evaluation are carried out using CST Studio Suite 2024. Simulation results demonstrate that the antenna achieves triple-band resonance at 2.7 GHz in the S-Band and at 5.145 GHz and 5.685 GHz in the C-Band, with a minimum return loss (S11) of -41.81 dB and VSWR values of 1.016, 1.515, and 1.152 at the respective resonant frequencies. The compact structure, low VSWR, and satisfactory radiation performance confirm that the proposed antenna is suitable for satellite communication, WLAN, and radar sensing applications in the S-Band and C-Band frequency ranges.

Index Terms — Multiband antenna, concentric ring slots, spiral patch, S-Band, C-Band, CST Studio Suite 2024, FR-4 substrate, return loss, VSWR.

18. DESIGN AND IMPLEMENTATION OF A SMART SENSOR SYSTEM USING MACHINE LEARNING ALGORITHMS FOR CHEMICAL RESIDUE DETECTION IN FRUITS AND VEGETABLES

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ABSTRACT

This paper presents the design and implementation of a Smart Sensor System integrated with Machine Learning (ML) algorithms for the detection of chemical residues in fruits and vegetables. The system employs a USB camera module and a Decision Tree (DT) classification algorithm to identify produce based on visual features including shape, colour, and size, achieving a classification accuracy of 91.25% across eight produce categories. A multi-sensor hardware platform comprising DHT11, MQ-3, and pH sensors interfaced with an Arduino UNO microcontroller acquires real-time temperature, humidity, gas concentration, and pH measurements. A reference dataset containing safe threshold values for each produce category is maintained in Excel format and compared against live sensor readings to classify produce as 'Normal' or 'Abnormal'. An audible buzzer alarm is activated upon detection of abnormal chemical parameters. The system achieved 100% detection sensitivity in controlled experiments and an end- to-end response time of approximately 3.8 seconds, demonstrating its suitability as an affordable and automated solution for food quality monitoring.

Keywords: chemical residue detection, decision tree, machine learning, Arduino, food quality monitoring, sensor fusion, pH sensor, MQ-3 gas sensor

19. IOT-INTEGRATED PANIC BUTTON FOR WOMEN SAFETY

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ABSTRACT

The GPS-Based Tracking System for Farm Animals is an innovative embedded solution designed to enhance livestock management through real-time monitoring and security. Built upon the Arduino platform, the system integrates a NEO-6M GPS module to acquire precise geographical coordinates and a SIM800L GSM module to facilitate wireless data transmission. By continuously parsing satellite data, the microcontroller monitors the animal's position and compares it against a predefined virtual boundary, a feature known as geofencing. If the animal strays beyond this "safe zone," the system automatically triggers an SMS alert containing a direct Google Maps link to the farmer's mobile device. Powered by a rechargeable Li-ion battery and housed in a rugged, wearable enclosure, this system effectively addresses the challenges of animal theft and straying. Ultimately, this project offers a cost-effective, scalable, and reliable alternative to manual supervision, promoting the adoption of smart farming practices in rural agricultural sectors.

20. FEDERATED LEARNING-BASED SMART ENVIRONMENTAL MONITORING SYSTEM USING IOT

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ABSTRACT

In recent decades, rapid industrialization, urbanization, and climate change have significantly deteriorated environmental quality, making continuous and intelligent environmental monitoring a pressing global need. Traditional centralized monitoring systems often suffer from high latency, privacy vulnerabilities, and limited scalability, rendering them insufficient for modern smart city and industrial IoT applications. To address these challenges, this paper proposes a Federated Learning-Based Smart Environmental Monitoring System that synergizes Internet of Things (IoT) sensor technology, Edge Artificial Intelligence (Edge AI), and privacy-preserving distributed machine learning to deliver a robust, real-time, and intelligent monitoring framework. The proposed system employs the ESP8266 Wi-Fi microcontroller as the primary computational and communication hub, interfaced with four environmental sensing modules: a Temperature Sensor for thermal condition measurement, a Humidity Sensor for moisture level tracking, a Gas Sensor for detecting harmful gases such as CO, CO₂, LPG, and smoke, and an Air Dust Sensor for particulate matter (PM) concentration monitoring. These sensors collectively provide comprehensive multi-parameter environmental data acquisition, enabling a holistic assessment of air quality and ambient conditions in real time. A key innovation of this system is the deployment of a lightweight Edge AI anomaly detection model directly on the ESP8266 microcontroller. Unlike conventional cloud-dependent approaches, this on-device intelligence enables instantaneous identification of hazardous environmental anomalies such as sudden gas leaks, abnormal temperature spikes, or dangerous dust concentration levels, without incurring cloud communication latency. Upon detecting an anomaly, the system immediately triggers local alert mechanisms including a Buzzer and LED indicator, ensuring rapid response and timely notification to nearby occupants or operators

21. A SMART UWB TEXTILE WEARABLE ANTENNA FOR CHILDREN TRACKING THROUGH IOT SYSTEMS

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ABSTRACT

The antenna is fabricated on a 0.7 mm thick jeans substrate to ensure high flexibility and take advantage of its universal availability. Machine learning (ML) techniques are applied to optimize the antenna's performance. A ring-shaped patch with DGS and C- type stubs is used to achieve a large bandwidth and reduce size. The total dimension of the proposed flexible antenna is 38x26x1.7 mm³. The primary aim of this article is to design a flexible UWB antenna with a remarkable impedance bandwidth of 131.45%, which covers frequencies from 2.56 GHz to 12.38 GHz. It operates at 3, 8, and 11.32 GHz frequencies with 99%, 98.30%, and 96.71% radiation efficiencies, respectively. The realized gain is 2.51, 3.70, and 5.46 dBi at frequencies 3, 8, and 11.32 GHz, respectively, with a peak gain of 5.46 dBi at 11.32 GHz. Specific absorption rate (SAR) values were tested using a human phantom and met FCC limits, confirming suitability for wearable and flexible IoT

22. AI AND IOT ENABLED PREDICTIVE MAINTENANCE AND INTELLIGENT POWER SYSTEMS FOR RENEWABLE ENERGY INTEGRATION

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ABSTRACT

This research explores the integration of Artificial Intelligence and Internet of Things technologies to enable predictive maintenance in electrical power systems with a focus on renewable energy integration. The study synthesizes approaches from recent literature that highlight how AI driven models combined with IoT based sensor networks can optimize fault detection, enhance asset life cycles and reduce operational costs. A comprehensive review of twenty high impact studies identifies the role of digital twins, data driven analytics and intelligent control strategies in advancing smart grid reliability. The proposed framework emphasizes a unified AI IoT architecture that supports continuous condition monitoring, proactive maintenance scheduling and efficient renewable energy utilization. The outcomes of this research aim to address current gaps in grid resilience, data interoperability and cybersecurity while contributing to the development of next generation sustainable power infrastructures.

23. AI & IOT BASED SMART AGRICULTURE MONITORING SYSTEM FOR SOIL AND CLIMATE PREDICTION

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ABSTRACT

This project presents an intelligent and efficient AI & IoT Based Smart Agriculture Monitoring System for Soil and Climate Prediction aimed at improving modern farming practices. Agriculture is highly dependent on environmental conditions such as soil quality, temperature, humidity, and rainfall. Traditional farming methods lack real-time monitoring and predictive analysis, which often leads to reduced crop yield and inefficient resource utilization. In this system, Internet of Things (IoT) technology is used to continuously monitor important agricultural parameters. Various sensors such as soil moisture sensors, temperature sensors, and humidity sensors are deployed in the farmland. These sensors collect real-time data related to soil condition and climate factors. The collected data is transmitted to a cloud platform through IoT modules, enabling remote access and monitoring from anywhere. The system can also automate irrigation by turning water pumps ON or OFF based on soil moisture levels. This reduces water wastage and ensures efficient irrigation management. Additionally, the system supports data storage in the cloud, allowing historical data analysis for better decision-making in future farming cycles. By implementing this smart agriculture system, farmers can reduce manual effort and improve crop yield through data-driven decisions. It enhances resource management by optimizing the use of water, fertilizers, and energy.

24. HOSPITAL APPOINTMENT BOOKING AND GENERATE DIGITAL TOKENS

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ABSTRACT

Many hospitals continue to rely on traditional or semi-digital appointment systems that create significant operational and patient management challenges. Patients are often required to visit the hospital physically or make phone calls to book appointments, leading to long queues, overcrowded waiting areas, and confusion regarding consultation timings. There is no proper real-time token tracking mechanism, which causes uncertainty about waiting times and increases patient frustration. As a result, patients waste valuable time sitting in waiting halls without clear updates about their turn. On the hospital side, staff members struggle with manual record maintenance, appointment overlaps, scheduling conflicts, and inefficient coordination between departments. Doctors may experience uneven patient distribution, leading to either excessive workload during peak hours or underutilization during off-peak periods. Additionally, the absence of a centralized digital monitoring system limits transparency, reduces workflow efficiency, and affects overall service quality. These issues highlight the urgent need for a fully digital appointment booking system with real-time token generation to improve scheduling accuracy, reduce congestion, and enhance patient satisfaction.

25. AN EMPIRICAL STUDY ON LITTLE TREAT CULTURE (TREATONOMICS) AMONG GEN Z IN TRICHY CITY

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ABSTRACT

The emergence of *Treatonomics*, prevalently known as “little treat culture,” reflects a growing behavioral trend among Gen Z consumers who engage in frequent, small-value discretionary spending as a form of self-reward and emotional gratification. This study aims to examine the daily Little Treat Culture of Gen Z in Trichy City, with a focus on understanding the underlying motivations, spending patterns, and psychological drivers associated with such consumption behavior. The research adopts an empirical approach, collecting primary data from Gen Z through structured questionnaires. The study explores key variables such as frequency of purchases, preferred spending categories (food, beverages, online subscriptions, fashion, etc.), average daily expenditure, and the influence of factors like stress, social media exposure, peer pressure, and instant gratification. Statistical tools are employed to analyze the relationship between emotional triggers and micro-spending tendencies. The findings of the study are revealed that Little Treat Culture is not merely impulsive but is often driven by the need for emotional relief, self-identity expression, and lifestyle alignment. Additionally, the study highlights how digital platforms and marketing strategies subtly encourage such behavior among young consumers. This research contributes to the growing body of knowledge in consumer behavior and marketing by providing insights into the evolving spending psychology of Gen Z. It also offers practical implications for marketers, financial educators, and policymakers to better understand and guide responsible consumption patterns among youth.

Keywords: Treatonomics, Generation Z, Little Treat Culture, Consumer Psychology, Emotional Triggers, Social Media Impact, Behavioral Analysis,

26. SMART CITY TRANSPORTATION:DEEP LEARNING ENSEMBLE APPROACH FOR TRAFFIC ACCIDENT DETECTION

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ABSTRACT

Vehicle accidents are one of the most destructive and life-threatening incidents in modern transportation systems. Most road accidents occur due to driver unawareness, uncontrolled speed, and delayed emergency response. Additionally, reaching the accident location on time remains a major challenge due to lack of real-time communication and monitoring systems. To address these issues, this project proposes a Smart Intelligent Transportation System (ITS) Communication System integrated with IoT technology and YOLO-based AI accident detection. The system is designed to prevent accidents, automatically control vehicle speed during critical situations, and instantly notify responsible individuals when an accident occurs.

27. INTERNET OF THINGS-ENABLED MACHINE LEARNING MODELS FOR EFFICIENT MONITORING OF SMART AGRICULTURE

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ABSTRACT

The integration of Internet of Things (IoT) technologies into agriculture—commonly referred to as Smart Agriculture—has revolutionized traditional farming practices by enabling real-time data collection, remote monitoring, and precision farming. This review explores the current state, applications, challenges, and future prospects of IoT in agriculture. IoT-based systems utilize sensors, actuators, and communication networks to monitor environmental conditions such as soil moisture, temperature, humidity, and crop health, thereby enhancing decision-making and resource management. The adoption of smart irrigation systems, automated fertilization, and livestock monitoring significantly boosts productivity and sustainability. Despite its advantages, the implementation of IoT in agriculture faces barriers such as REAL-time charge analytics and autonomous fire suppression for electric vehicles

28. MINE CREW GUARD – IoT-ENABLED SMART BAND FOR AUTONOMOUS SAFETY AND HEALTH MONITORING IN MINES

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ABSTRACT

Mining environments are highly hazardous due to the presence of toxic gases, extreme temperatures, low oxygen levels, and the risk of sudden accidents. Ensuring the safety of mine workers in such conditions remains a major challenge. This project presents Mine Crew Guard – an IoT-enabled smart band system designed to continuously monitor environmental conditions and the health status of miners. The system integrates sensors to detect gas concentration, temperature, humidity, and worker activity. The collected data is processed in real time and transmitted wirelessly to a central monitoring unit. When abnormal conditions are detected, alerts are generated to warn both miners and control room personnel. This system improves situational awareness, enables rapid emergency response, and enhances overall mining safety.

29. INTELLIGENT PHYSIOLOGICAL SENSING VIA TINYML: TOWARD HIGH- AUTONOMY WEARABLES FOR EARLY-STAGE CLINICAL ANOMALY IDENTIFICATION

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ABSTRACT

The rapid evolution of Internet of Things (IoT) technologies has enabled continuous and low-cost health monitoring through wearable systems. This paper presents an ESP32-based intelligent physiological sensing framework integrated with Tiny Machine Learning (TinyML) for early-stage clinical anomaly detection. The system collects physiological parameters such as heart rate, body temperature, and motion data using wearable sensors. These signals are processed locally on the ESP32 microcontroller, where a lightweight TinyML model performs real-time anomaly detection. By enabling on-device inference, the system reduces latency, power consumption, and dependence on cloud infrastructure. IoT connectivity is used for remote monitoring, data visualization, and alert generation. Experimental results demonstrate improved efficiency, fast response time, and reliable detection accuracy. The proposed system provides a scalable, low- cost, and privacy-aware solution for next-generation wearable healthcare applications.

30. IOT-BASED VEHICLE TELEMATICS & PREDICTIVE MAINTAINANCE

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ABSTRACT

This article investigates the convergence of artificial intelligence, telematics, and predictive maintenance methodologies in connected vehicle ecosystems. It examines how machine learning algorithms, particularly Graph Neural Networks, can process complex telematics data streams to detect anomalies, predict component failures, and optimize maintenance scheduling. The article demonstrates that AI-integrated predictive maintenance systems can reduce unplanned downtime while decreasing overall maintenance costs compared to traditional schedule-based approaches. The architecture proposed in this study leverages edge-cloud collaborative processing, multimodal sensor fusion, and real-time streaming capabilities to enable proactive rather than reactive maintenance paradigms. By modeling vehicles as complex systems with interdependent components, it captures subtle patterns in the relationships between subsystems that precede failures. The implementation of transfer learning methodologies further enables knowledge sharing across heterogeneous fleets, while event-driven processing pipelines deliver actionable insights with minimal latency. This data-centric framework fundamentally transforms fleet management operations by converting maintenance from a reactive cost center to a proactive strategic advantage

31. MACHINE LEARNING BASED CRIME SCENE INVESTIGATION IMAGE RETRIVAL USING KNN ALGORITHM

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ABSTRACT

Crime scene investigation (CSI) image retrieval is used to search for crime evidences and is critical in helping in solving various crimes. In recent years, using Convolutional Neural Network (CNN) has demonstrated outstanding performances in large-scale image database retrieval. However, to prevent over-fitting in the training of CNN model due to limited number of CSI images, this project proposes a system that uses KNN algorithm for the purpose of crime scene investigation (CSI) image retrieval. This technique is a content-based image retrieval system that search for the whole content of the image. In this system images are captured and processed to detect the essential crime related parameters like shoe print, fingerprint, footprints, foot impression of humans, weapons, tier marks of vehicles. Those processed and detected images will be compared with the images stored in the database which consists of images with footprints or any other parameters of persons involved with previously recorded crime scenes.

By comparing, it can find the related person with those identification marks. Thus, our system provides a smart solution to find out the culprits involved with unresolved crimes.

Keywords: Convolutional Neural Network, fingerprint, weapons, crime, vehicles

32. INTERNET OF THINGS AND SMAERT DEVICE

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ABSTRACT

The rapid advancement of communication technologies has led to the emergence of the Internet of Things (IoT), a paradigm that connects physical devices to the internet, enabling seamless data exchange and intelligent decision-making. IoT integrates sensors, software, and network connectivity into everyday objects, transforming them into smart devices capable of sensing, processing, and communicating information without human intervention. These smart devices, ranging from wearable health monitors and smart home appliances to industrial automation systems, are revolutionizing various sectors by improving efficiency, accuracy, and convenience. This paper explores the concept of IoT and its relationship with smart devices, highlighting their architecture, components, and working principles. IoT systems typically consist of sensing units, communication networks, cloud-based data processing, and user interfaces, forming a complete ecosystem for real-time monitoring and control. The integration of IoT with emerging technologies such as artificial intelligence, machine learning, and 5G communication further enhances the capabilities of smart devices, enabling predictive analysis and autonomous operations.

33. BILL-BEFORE-BIN: AN EMBEDDED SELF-CHECKOUT TROLLEY WITH ANTI INSERTION CONTROL

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ABSTRACT

Traditional retail billing systems rely on checkout counters, leading to long queues, billing delays, and opportunities for product mismatch or unauthorized insertion. This project presents Bill Before-Bin, an embedded self-checkout shopping trolley designed to perform billing at the point of product placement. The system enforces an anti-insertion control mechanism, where products can be placed into the trolley only after successful barcode scanning. A servo-controlled lid restricts access to the trolley bin and opens exclusively upon valid product authorization, ensuring secure and accurately billing. An onboard display continuously updates the customer with product details, item count, and total cost in real time. The system also supports controlled product removal, dynamically adjusting the bill when items are taken out. All transaction data is transmitted wirelessly to a centralized billing interface, enabling seamless monitoring of multiple trolleys through unique identifiers. By integrating embedded control, real-time billing, and secure access, the proposed system reduces checkout time, minimizes human intervention, and enhances transparency and security in modern retail environments.

KEY FEATURES: Bill-Before-Bin Mechanism.

34.HYBRID SOLAR CHARGING SYSTEM FOR ELECTRIC BICYCLE

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ABSTRACT

This paper presents the design and simulation of a hybrid solar charging system for an electric bicycle using MATLAB and Simulink. The proposed system integrates solar energy with conventional battery charging methods to improve efficiency and sustainability. Solar photovoltaic panels act as the primary power source and are managed through a charge controller to safely charge a rechargeable battery, which in turn powers the electric motor of the bicycle. In situations where solar energy is unavailable, the system automatically switches to conventional power for charging. The simulation carried out in MATLAB and Simulink evaluates the system's performance and efficiency in utilizing both solar and conventional energy sources. The results demonstrate that the hybrid solar charging approach offers improved efficiency and greater sustainability compared to relying solely on conventional power.

**35. AN EFFECTIVE DEEPLARNINGTECHNIQUE FOR CLASSIFYING
NODULES OF LUNG IN
COMPUTEDTOMOGRAPHYVISUALIZATIONS:
BCD U-NET (D = 5)**

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ABSTRACT

Cancer is a prevalent cause of death in today's society, especially among those over 50 years old. Detecting cancer early is crucial to avoiding serious problems. Deep learning algorithms have made it possible for specialists to diagnose diseases accurately. Detecting pulmonary nodules in the lungs at an early stage can significantly contribute to lowering the occurrence of lung cancer. Over the past few years, various methods rooted in a deep learning framework have proven to be successful in the segmentation of medical images. Within the realm of deep neural networks, the U-Net has particularly excelled, demonstrating significant success in this domain. In this study, we proposed the BCD U-Net (d = 5) model, which is the subsequent phase of U-net, and it can be used for the separation and categorization of nodules. In our architectural framework, we strategically employ Bidirectional Convolutional Long Short-term Memory as a sophisticated integrator module, diverging from the conventional practice of utilizing simple concatenators. The contracting path is reinforced by the incorporation of five densely connected convolutional layers, enhancing the robustness and efficacy of our design. This model can help classify whether the nodules are cancerous or benign. The visualization and quality are enhanced by preprocessing the LUNA16 dataset and segmenting pulmonary nodules. Ultimately, the deep learning model suggested has been evaluated against a dense layer (D = 3) in regards to accuracy, F1 score, sensitivity, and specificity.

36. REAL - TIME CHARGE ANALYTICS AND AUTONOMOUS FIRE SUPPRESSION FOR ELECTRIC VEHICLES

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ABSTRACT

Challenges connected with temperature regulation in electric vehicle (EV) battery management systems (BMS) include overheating, delayed cold charging, energy depletion, efficiency degradation, cell imbalance, and durability concerns. These difficulties can be addressed by the measurement of voltage, current, and temperature of individual cells, real-time data processing via microcontrollers, state of charge (SoC) and state of health (SoH) estimations, thermal modelling, and defect detection. This paper presents a comprehensive BMS that monitors the SoC and SoH of the battery pack, while integrating advanced thermal management and fire prevention features to mitigate potential hazards. The charging and discharging circumstances of the suggested approach are evaluated using the MATLAB Simulink tool. The outcomes of the hardware implementation and testing indicate that the proposed method enhances battery longevity and electric vehicle safety while also resolving critical issues related to charging efficiency and fire safety and temperature management in electric vehicles. This concept facilitates the development of safer, more intelligent, and more dependable battery systems for electric vehicle.

37. IOI BASED CHEMICAL FACTORY SAFETY AND HAZARD MONITORING SYSTEM INTRODUCTION

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ABSTRACT

Chemical industries play a vital role in modern industrial development, producing essential materials used in pharmaceuticals, agriculture, plastics, and many other sectors. However, chemical factories also involve the handling and processing of hazardous substances such as toxic gases, flammable chemicals, and corrosive materials. These conditions make chemical plants highly vulnerable to accidents like gas leaks, explosions, fires, and environmental pollution if proper monitoring systems are not implemented. Traditional safety monitoring methods in many industries rely on manual inspection and basic alarm systems. These methods may not always provide continuous monitoring or immediate detection of dangerous situations. Delayed detection of hazards can lead to severe consequences, including worker injuries, equipment damage, and environmental contamination. With the advancement of technology, the Internet of Things (IoT) has emerged as an effective solution for industrial monitoring and safety management. IoT enables the integration of sensors, communication networks, and cloud platforms to monitor environmental and operational parameters in real time. By deploying sensors such as gas sensors, temperature sensors, flame detectors, and humidity sensors, it becomes possible to continuously track the conditions inside a chemical factory.

38. SMART BEEKEEPING

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ABSTRACT

Smart beekeeping has become an important approach for improving honey production and maintaining healthy bee colonies through modern monitoring technologies. Traditional beekeeping methods require frequent manual inspection of hives which can disturb the bees and reduce productivity. To overcome these limitations this project proposes an IoT-based Smart Beekeeping Monitoring System using an ESP32 microcontroller. The system integrates sensors such as a DHT11 temperature sensor vibration sensor and load cell with HX711 module to continuously monitor environmental conditions inside the beehive. The ESP32 collects sensor data and transmits it through WiFi to a cloud platform or mobile application for real-time monitoring. In addition a GSM module is used to send SMS alerts to the beekeeper when abnormal conditions such as high temperature hive disturbance or sudden weight changes are detected. This system helps reduce manual monitoring improves hive safety and increases honey production efficiency. The proposed solution demonstrates the practical application of IoT technology in modern agriculture and smart beekeeping systems. Keywords: Internet of Things (IoT) ESP32 Smart Beekeeping Temperature Monitoring Load Cell HX711 Vibration Sensor GSM Alert Honey Production Monitoring Smart Agriculture

39. SMART HELMET SYSTEM FOR DETECTING ACCIDENT AND MONITORING ALCOHOL USING IOT

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ABSTRACT

Road accidents involving two-wheelers are a major concern due to the high risk of injury and fatalities. A significant number of these accidents are caused by riding under the influence of alcohol, non-usage of helmets, and delayed emergency response. This project presents the design and development of an accident and alcohol detection system using a Bluetooth-enabled smart helmet for bikers to enhance rider safety. The proposed system integrates an alcohol sensor to detect the presence of alcohol in the rider' s breath and an impact or vibration sensor to identify accident occurrences. The helmet communicates with the bike unit through Bluetooth technology. If alcohol consumption exceeds a predefined limit, the system restricts the ignition of the vehicle, thereby preventing unsafe riding. In the event of an accident, the system automatically sends an alert to predefined contacts along with location details, ensuring timely medical assistance. This smart helmet system combines embedded electronics, wireless communication, and safety mechanisms to reduce road accidents and improve emergency response time. The project demonstrates an effective and practical approach to promoting safe riding habits and minimizing the consequences of road accident

40. A SMART TRAFFIC CONTROL SYATEM BASED ON TRAFFIC DENSITY AND EMERGENCY VEHICLE DETECTION

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ABSTRACT

Rapid urbanization and the increasing number of vehicles have made traffic congestion a major challenge in modern cities. Conventional traffic signal systems operate on fixed timing mechanisms and are unable to adapt dynamically to real-time traffic conditions, leading to unnecessary delays and inefficient traffic flow. This project proposes a Smart Traffic Control System based on Traffic Density and Emergency Vehicle Detection using Deep Learning to overcome these limitations. The proposed system utilizes cameras installed at road intersections to capture real-time traffic images and video streams. A deep learning model is employed to analyse traffic density by detecting and counting vehicles in each lane. Based on the traffic density, signal timings are adjusted dynamically to optimize traffic flow. Additionally, the system incorporates emergency vehicle detection, enabling automatic signal clearance to provide priority passage for ambulances, fire trucks, and police vehicles. By integrating deep learning techniques with intelligent traffic signal control. The proposed solution demonstrates an efficient, scalable, and cost-effective approach for modern smart city traffic management systems

41. AI-ENABLED AIRCRAFT FAULT PREDICTION SYSTEM

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ABSTRACT

The aviation industry requires high levels of safety, reliability, and operational efficiency, where unexpected component failures can lead to costly delays and potential safety risks. Traditional maintenance strategies, such as reactive and preventive maintenance, often result in either unplanned downtime or unnecessary component replacements. To address these limitations, this project proposes an AI-Enabled Aircraft Fault Prediction and Maintenance Optimization System that leverages machine learning and real-time sensor data to predict failures in advance. The system integrates historical maintenance records, flight operation data, environmental factors, and real-time sensor inputs from critical aircraft subsystems such as engines, hydraulics, avionics, and structural components. Machine learning techniques, including Long Short-Term Memory (LSTM) networks for time-series analysis, Random Forest algorithms for fault classification, and anomaly detection models, are used to identify patterns and detect early signs of component degradation. Key parameters such as temperature, vibration, pressure, and fuel efficiency are continuously monitored to estimate the Remaining Useful Life (RUL) of components. To enhance prediction accuracy, data preprocessing methods such as normalization, missing value handling, noise reduction, and feature engineering are applied. The system is deployed through a cloud-based dashboard that provides real-time alerts, risk assessment, and maintenance recommendations for engineers and operators. A feedback loop mechanism enables continuous model improvement using post-maintenance data. The proposed system minimizes unplanned downtime, optimizes maintenance scheduling, reduces operational costs, and improves overall aircraft safety and reliability. It aligns with Industry 4.0 principles by integrating artificial intelligence, IoT, and data analytics, and can be extended to commercial aircraft, UAVs, and defense aviation systems.

42. ADVANCED RIDER SAFETY AND ANTI-THEFT SYSTEM USING EMBEDDED AND IOT SOLUTIONS

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ABSTRACT

With the increasing number of road accidents and vehicle thefts, ensuring the safety and security of two-wheeler riders has become a significant concern. This paper presents a comprehensive system that integrates the Internet of Things (IoT) and embedded systems to enhance rider safety and vehicle security. The proposed design incorporates real-time monitoring using sensors to detect parameters such as helmet usage, alcohol consumption, and accident impact. Additionally, Global Positioning System (GPS) and Global System for Mobile Communications (GSM) modules are embedded to enable location tracking and emergency alerts. The system prevents ignition if safety criteria are not met, thereby enforcing responsible riding behavior. Cloud connectivity ensures data logging and remote access through a mobile application, enabling family members or authorities to receive alerts in critical situations. The fusion of IoT with embedded hardware offers a scalable, cost-effective, and reliable solution that not only safeguards the rider but also contributes to the development of intelligent transportation systems.

43. NAES-ICS: A LIGHTWEIGHT NANO-AES ALGORITHM FOR SECURE IMAGE CRYPTOGRAPHY AND STORAGE

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ABSTRACT

The rapid expansion of digital imaging and networked multimedia systems has intensified the demand for robust image security mechanisms, particularly in sensitive fields such as healthcare, surveillance, and defense. Traditional encryption standards like AES and DES often struggle with the high data redundancy and pixel correlation inherent in images, leading to significant computational overhead. This paper introduces NAES-ICS, a lightweight Nano-AES-based algorithm optimized for secure image cryptography and confidential storage. The proposed framework utilizes a nano-block processing architecture combined with optimized AES transformations to achieve strong confusion and diffusion while minimizing computational costs. Experimental evaluations using standard benchmark images demonstrate that NAES-ICS provides exceptional performance, achieving an encryption time of just 0.162 s for a 1024 \times 1024 image. Security analysis reveals near-ideal entropy values of up to 7.9991, ensuring high randomness. Furthermore, the algorithm exhibits strong resistance to differential attacks, with a Number of Pixels Change Rate (NPCR) of 99.79% and a Unified Average Changing Intensity (UACI) of 33.57. Reconstruction fidelity remains a core strength of the system, yielding a Mean Square Error (MSE) as low as 0.21 and a Peak Signal-to-Noise Ratio (PSNR) of 54.91 dB, facilitating near-lossless image recovery. These results confirm that NAES-ICS offers a superior trade-

44. CMTD-NET: A COGNITIVE MULTI-SCALE DEEP LEARNING FRAMEWORK FOR MRI BRAIN TUMOR DETECTION AND CLASSIFICATION

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ABSTRACT

Magnetic Resonance Imaging (MRI) plays a vital role in the early detection and diagnosis of brain tumors, aiding in effective treatment planning. However, manual analysis of MRI scans is time-consuming and prone to human error, necessitating automated diagnostic solutions. This paper proposes a novel deep learning framework, the Cognitive Multi-Scale Tumor Detection Network (CMTD-Net), for accurate detection and classification of brain tumors from MRI images. The model integrates preprocessing, multi-scale feature extraction, cognitive scale selection, and feature fusion to effectively capture tumor characteristics across varying sizes and structural patterns. A key component, the Cognitive Scale Selection Module (CSSM), dynamically assigns importance to different feature scales based on entropy and texture variation, enabling the model to focus on the most relevant tumor features. The proposed approach is evaluated on a publicly available MRI dataset and compared with existing models such as CNN, VGG16, ResNet50, and U-Net. Experimental results demonstrate superior performance, achieving a sensitivity of 97.4%, Dice score of 0.97, Matthew's correlation coefficient of 0.93, and Intersection-over-Union (IoU) of 0.97, along with a low false positive rate of 2.2%. These results highlight the effectiveness and reliability of the proposed framework for automated brain tumor detection and classification.

45. DUAL BAND PRINTED MONOPOLE ANTENNA FOR ISM

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ABSTRACT

The design and implementation of a compact dual-band printed monopole antenna intended for Industrial, Scientific, and Medical (ISM) band applications. The antenna is realized on an FR-4 substrate and utilizes a modified planar monopole structure combined with an optimized ground plane to achieve stable dual-resonant behavior. By integrating a pair of resonant branches and introducing a slot-loading technique, two distinct operating bands are generated, enabling reliable coverage of widely used ISM frequencies. A detailed study is carried out to investigate the influence of key geometrical parameters on the antenna's impedance characteristics, radiation properties, and resonance tuning. Measured results show close agreement with simulations, confirming broadband behavior, omnidirectional radiation patterns, and adequate gain for short-range wireless links. Simulation results indicate that the lower band is predominantly controlled by the monopole's effective electrical length, while the upper band is governed by the slot-induced current paths, allowing relatively independent frequency adjustment. The antenna exhibits wide impedance bandwidths, omnidirectional radiation patterns, and satisfactory gain values suitable for short- and medium-range communication. A prototype is fabricated, and experimental measurements closely match the simulated performance, validating the design approach. The proposed dual-band monopole antenna offers advantages of low profile, simple geometry, and ease of fabrication. Its compact size and robust electromagnetic behavior make it highly suitable for integration into wireless sensor networks, IoT devices, medical telemetry equipment, and various low-power communication platforms operating in the ISM spectrum. Parametric analysis demonstrates that the resonant frequencies can be independently tuned by adjusting the monopole length and slot configuration, allowing flexible optimization for various ISM sub-bands. The design methodology presented in this work can also be extended to develop multiband antennas for emerging wireless technologies.

46. A HYBRID DEEP LEARNING FRAMEWORK FOR MULTI-TYPE CHEST X-RAY ABNORMALITY CLASSIFICATION AND LOCALIZATION USING EXPLAINABLE AI TECHNIQUES

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ABSTRACT

Early and accurate detection of multiple cardiac abnormalities from chest X-ray images remains a challenging yet critical task in clinical diagnosis. This project presents an intelligent multi-disease prediction framework that integrates deep learning with explainable artificial intelligence to enhance diagnostic reliability. A modified Grad-CAM++ (Gradient-weighted Class Activation Mapping) approach is employed alongside a convolutional neural network (CNN) model to not only classify various cardiac conditions but also provide visual explanations for each prediction. The proposed system processes chest X-ray images through pre-processing techniques to improve image quality and standardization, followed by feature extraction using a pre-trained deep learning architecture. The enhanced Grad-CAM++ technique highlights disease-specific regions in the X-ray, enabling clinicians to understand the model's decision-making process. This approach ensures transparency, interpretability, and improved trust in automated diagnosis systems. The model is capable of detecting multiple cardiac-related diseases such as cardiomegaly, pulmonary edema, and other thoracic abnormalities with high accuracy. Experimental results demonstrate improved performance compared to conventional methods, making the system suitable for real-time clinical support. This work bridges the gap between automated prediction and clinical interpretability, contributing to more efficient and reliable healthcare solutions.

Keywords: Multi-disease detection, Chest X-ray, Deep Learning, CNN, Grad-CAM++, Explainable AI (XAI), Cardiac abnormalities, Medical image analysis, Feature extraction, Diagnostic support system

47. FPGA BASED LOW POWER RECONFIGURABLE FIR FILTER DESIGN USING HYBRID MULTIPLIER USING COMMON MODE OPERATIONAL SHARING

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ABSTRACT

This paper presents a novel low-power and programmable Finite Impulse Response (FIR) filter architecture designed to efficiently utilize FPGA platforms for digital signal processing applications. Conventional MUX-based reconfigurable FIR filters often involve redundant arithmetic computations across multiple filter taps, leading to higher hardware utilization, increased power consumption, and slower performance. To overcome these limitations, the proposed architecture employs Common Operation Sharing (COS), which identifies repeated coefficient decoding and partial-product computations across different filter stages and shares them, thereby reducing resource usage and power dissipation. Furthermore, a Hybrid Karatsuba- Urdhva Multiplier is integrated to optimize multiplication operations by combining recursive decomposition of the Karatsuba algorithm with the parallel partial-product generation technique from the Urdhva Tiryagbhyam Sutra. This hybrid approach significantly decreases arithmetic operations, improves operational speed, and minimizes energy consumption. The complete FIR filter design is described using Verilog HDL and synthesized on a Xilinx FPGA, demonstrating its effectiveness in real hardware implementation. Experimental results show substantial reductions in area, delay, and power compared to conventional FIR filter architectures while maintaining high configurability. The proposed design is highly suitable for applications that demand low-power consumption, high performance, and reconfigurability, such as Internet-of-Things (IoT) devices, biomedical signal processing systems, and other digital signal processing tasks where efficiency and hardware optimization are critical.

48. LI-FI DEVICE FOR ALZHEIMER'S PATIENT SAFETY

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ABSTRACT

Alzheimer's disease is a progressive neurological disorder that affects memory, thinking ability, and daily activities of patients. As the disease progresses, patients may experience disorientation, wandering behavior, and accidental falls, which pose serious safety risks. Continuous monitoring is therefore necessary to ensure patient safety and provide timely assistance from caregivers. This paper presents an Internet of Things (IoT) based monitoring system designed to improve the safety and independence of Alzheimer's patients. The proposed system integrates an accelerometer for fall detection, a Global Positioning System (GPS) module for real-time location tracking, and a Global System for Mobile Communication (GSM) module for sending emergency alerts to caregivers. When a fall or abnormal activity is detected, the system automatically sends an alert message along with the patient's location coordinates. A medication reminder module also provides audio alerts for timely medicine intake. The Arduino Nano based system operates autonomously without requiring patient interaction. Experimental results show reliable fall detection, accurate location tracking, and quick alert transmission. The system is portable, cost-effective, and suitable for continuous home monitoring of Alzheimer's patients.

Key Words: Alzheimer's disease, IoT monitoring, Patient safety, GPS tracking, fall detection, GSM alert system.

49. AN ULTRA-LOW LEAKAGE AND WIDE-RANGE VOLTAGE LEVEL SHIFTER FOR LOW-POWER DIGITAL CMOS VLSI

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ABSTRACT

In modern System-On-Chip (SoC) architectures, different modules operate at multiple voltage domains to balance performance and power efficiency. A voltage level shifter (LS) is essential to enable signal transfer across these domains. However, conventional LS designs suffer from high leakage currents, reduced output swing, and significant propagation delays, particularly in sub threshold operation. This project presents the design and analysis of an ultra-low leakage and wide range voltage level shifter implemented in 45nm CMOS technology. The proposed LS architecture employs leakage shut-off transistors to minimize static power, voltage hysteresis transistors to resolve swing degradation, and low-threshold NMOS devices to accelerate transitions. Simulation results in 45nm technology demonstrate a wide conversion range from sub-threshold 0.2V to 1.2V with significant improvements in propagation delay and energy efficiency compared to conventional designs. The proposed design is well-suited for low-power IoT devices, portable electronics, and energy-efficient VLSI systems. The methodology of this system is to design a low-power and fast voltage level shifter that can convert signals between different voltage domains efficiently. It mainly focuses on reducing leakage, delay, and power consumption while maintaining reliable operation at very low voltages. The proposed methodology combines leakage control, fast switching, and wide voltage conversion in a compact 45 nm design suitable for low-power IoT applications.

50. AIRCRAFT SIGNAL RECEIVER USING RTL-SDR AND DUMP1090

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ABSTRACT

This project focuses on developing a low-cost aircraft signal receiving system using RTL-SDR and DUMP1090 software. With the help of Software Defined Radio technology, the system captures ADS-B signals broadcasted by aircraft at 1090 MHz. These signals contain essential flight information, including aircraft identity, location, altitude, and velocity. The DUMP1090 decoder processes the received signals and converts them into readable data, which can be displayed on a real-time monitoring interface. Compared to traditional radar systems, this approach is economical, portable, and easy to implement. The project highlights the effectiveness of SDR in wireless communication applications and provides a practical solution for aircraft tracking, educational experiments, and aviation analysis.

51. LI-FI BASED VEHICLE COMMUNICATION SYSTEM

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ABSTRACT

The Li-Fi based vehicle communication system is an advanced approach to improve road safety by enabling real-time communication between vehicles using visible light instead of traditional radio frequency signals. In this system, the transmitting vehicle uses LED headlights or taillights to send information such as braking or obstacle alerts by rapidly varying the light intensity, which is then detected by a photodiode sensor in the receiving vehicle. The received light signals are converted into electrical signals and processed by a microcontroller to provide immediate alerts to the driver through a display or buzzer, thereby reducing reaction time and preventing accidents. This system is cost-effective, energy-efficient, and secure due to its line-of-sight communication, while also avoiding issues like signal interference and spectrum congestion. Although its performance may be affected by obstacles and adverse weather conditions, it offers significant potential for application in intelligent transportation systems and future smart vehicle technologies.

52. VLSI IMPLEMENTATION OF AN IMAGE-BASED REAL - TIME ASTHMA DETECTION SYSTEM

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ABSTRACT

Asthma is a chronic respiratory disease that requires timely monitoring and early detection to prevent severe health complications. This paper presents the design and simulation of an image-based real-time asthma monitoring and detection system using VLSI architecture. The proposed system utilizes image processing techniques to analyze respiratory patterns, such as chest movements, for identifying abnormalities associated with asthma. The captured visual data is processed to extract relevant features, which are then analyzed using digital signal processing methods. The core detection algorithm is implemented using VLSI design techniques, enabling high-speed and low-power operation suitable for real-time applications. The system is modeled and simulated using hardware description languages such as Verilog, ensuring efficient hardware realization. The results demonstrate that the proposed system can accurately identify abnormal breathing patterns, providing a reliable method for early asthma detection. This approach offers advantages such as reduced power consumption, faster processing, and suitability for portable healthcare devices. The proposed system can be further enhanced by integrating advanced machine learning techniques and IoT based monitoring for continuous healthcare support.

53. DESIGN AND OPTIMIZATION OF CIRCULAR SW PATCH ANTENNA WITH ENHANCED RADIATION PERFORMANCE FOR 5G

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ABSTRACT

This paper proposes a Substrate Integrated Waveguide (SIW) antenna with a circular patch on the rectangular substrate. The proposed antenna offers resonance in the n48 band at 3600 MHz. The proposed antenna uses 4 vias to provide (air) on the top of the circular patch which enhance the radiation efficiency of the proposed antenna by providing electrical discontinuity on the top of the circular patch. All four vias are separated at angle of 90 degrees. The proposed antenna achieved voltage standing wave ratio under 2 at the resonance frequency. The radiation efficiency of the proposed antenna exceeds 90 % at the resonance frequency at 3600 MHz. the proposed antenna performance has been analyzed using parametric analysis as function of via radius further enhancement of radiation efficiency. Also, this paper analyzes the radiation pattern of the proposed antenna as a function of air vias. the strategic placement and optimization of air vias play a crucial role in improving impedance matching and minimizing surface wave losses, thereby enhancing overall antenna efficiency. The circular SIW configuration ensures a uniform current distribution across the patch, which contributes to stable and consistent radiation characteristics. Moreover, The antenna demonstrates improved gain and directivity, making it highly suitable for mid-band 5G communication applications. Its compact size and low-profile structure allow easy integration into modern wireless devices and compact communication systems. Hence, the proposed antenna design offers an effective and reliable approach for achieving high radiation efficiency and superior performance in next-generation 5G networks.

54. HYBRID ENERGY HARVESTING AND WIRELESS CHARGING SYSTEM FOR ELECTRIC VEHICLES USING SMART ROADS

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ABSTRACT

The growing demand of electric vehicles (EVs) worldwide has led to pressure on the development of sustainable and autonomous electric charging systems capable of alleviating the pressure on the traditional electrical grid. The current paper provides a hybrid energy-harvesting and wireless charging structure incorporating piezoelectric transducers, solar photovoltaic modules, and resonant inductive power transfer to allow dynamic charge to be imposed on EVs. Under road sensors piezoelectric (PZS) sensors transform vibrations on the road (in vehicles) into electrical energy whilst solar panels on the roadside supply supplementary renewable energy which guarantees a steady and clean energy source. The energy collected is stored in a centralized battery bank and regulated by voltage-conditioning modules in order to ensure a stable operation. The system is controlled by an Atmega328 microcontroller that measures the flow of energy, regulates the flow of the inverter output, and real-time data display. The EV carries a special coil receiver that absorbs the power wirelessly sent to it, and directs it through a controlled charging interface where it can be safely used. The proposed system will be more efficient in energy consumption and will allow constant recharging when the vehicle moves as well as will considerably reduce the reliance on external grid power. This comprehensive strategy shows a bright prospect to self-sustaining transportation infrastructure, which is part of the overall smarter mobility and urban ecosystems that run on renewable energy.

Keywords—Electric cars, piezoelectric power harvesting, wireless power delivery, dynamic charging, green energy, Atmega328, resonant inductive coupling.

55. SMART PATIENT HEALTH MONITORING SYSTEM

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ABSTRACT

Health monitoring plays a vital role in detecting and preventing medical emergencies, especially for patients with chronic illnesses, the elderly, or those requiring continuous observation. Traditional health checkups are often periodic and may fail to detect sudden fluctuations in vital signs, leading to delayed response and severe consequences. To address this issue, the development of a smart health monitoring system offers a reliable, real-time solution for tracking and managing patient well-being. This project introduces a smart health monitoring system that continuously measures key health parameters such as heart rate, body temperature, and blood oxygen levels using sensors like the MAX30100/MAX30102 (for SpO₂ and heart rate) and DS18B20/LM35 (for temperature). These sensors are connected to a microcontroller, such as the ESP32 or ESP8266, which collects and processes the data. The microcontroller compares the readings against predefined medical thresholds to assess whether the patient's condition is normal or requires attention. When abnormal health readings are detected, the system triggers an alert mechanism. A buzzer provides immediate audible warnings, while LED indicators display health status—green for normal conditions and red for danger alerts. Beyond local alerts, the system integrates with IoT platforms like Blynk or ThingSpeak, enabling seamless remote monitoring. Real-time health data is sent to a mobile application, allowing caregivers, doctors, or family members to track the patient's condition anytime and receive instant notifications in case of emergencies. Compact, cost-effective, and scalable, this smart health monitoring system provides a practical approach to modern healthcare needs. It can be deployed in homes, hospitals, and elderly care facilities, ensuring timely interventions and improved patient safety. By combining hardware sensors with IoT connectivity, the system delivers an efficient, user-friendly solution to safeguard human health.

56. CONVOLUTIONAL NEURAL NETWORK–DRIVEN AUTOMATED SKIN CANCER DETECTION USING DERMOSCOPIC IMAGE ANALYSIS

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ABSTRACT

Skin cancer remains one of the most prevalent and life-threatening malignancies worldwide, with melanoma being particularly aggressive due to its rapid metastatic potential. Early diagnosis significantly improves survival rates; however, conventional diagnostic methods rely heavily on expert dermatological assessment, which can be subjective, time-consuming, and inaccessible in resource-limited settings. This project proposes a robust, automated skin cancer detection framework leveraging Convolutional Neural Networks (CNNs) to achieve high-precision classification of dermoscopic images into benign and malignant categories. The system utilizes a deep learning architecture designed to extract hierarchical feature representations from input skin lesion images. Initially, a comprehensive dataset comprising annotated dermoscopic images is preprocessed through normalization, resizing, hair artifact removal, and contrast enhancement techniques such as adaptive histogram equalization. Data augmentation strategies—including rotation, flipping, scaling, and translation—are applied to mitigate overfitting and enhance model generalization. The core model is built using a multi-layer CNN architecture consisting of convolutional layers with ReLU activation, batch normalization, max-pooling layers for spatial downsampling, and fully connected dense layers for classification. Advanced architectures such as transfer learning models (e.g., ResNet, EfficientNet, or VGG variants) are optionally incorporated to leverage pretrained weights, accelerating convergence and improving accuracy. The model is trained using stochastic gradient descent or adaptive optimizers like Adam, with categorical cross-entropy as the loss function. To address class imbalance, techniques such as weighted loss functions and synthetic sample generation (SMOTE) are integrated. Performance evaluation is conducted using metrics including accuracy, precision, recall, F1-score, and area under the ROC curve (AUC). Additionally, Grad-CAM (Gradient-weighted Class Activation Mapping) visualization is employed to enhance interpretability by highlighting salient regions influencing model predictions, thereby increasing clinical trustworthiness. The proposed system aims to deliver a scalable, cost-effective diagnostic tool capable of assisting dermatologists and supporting telemedicine applications.

57. LI-FI BASED VEHICLE COMMUNICATION SYSTEM

*Dr B.Karthiga, A.Avanthitha, P.Deepa, R.Dhanusri, A.Jerita nelci
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ABSTRACT

The Li-Fi based vehicle communication system is an advanced approach to improve road safety by enabling real-time communication between vehicles using visible light instead of traditional radio frequency signals. In this system, the transmitting vehicle uses LED headlights or taillights to send information such as braking or obstacle alerts by rapidly varying the light intensity, which is then detected by a photodiode sensor in the receiving vehicle. The received light signals are converted into electrical signals and processed by a microcontroller to provide immediate alerts to the driver through a display or buzzer, thereby reducing reaction time and preventing accidents. This system is cost-effective, energy-efficient, and secure due to its line-of-sight communication, while also avoiding issues like signal interference and spectrum congestion. Although its performance may be affected by obstacles and adverse weather conditions, it offers significant potential for application in intelligent transportation systems and future smart vehicle technologies.

58. SURFACE CURRENT STEERING IN COMPACT UWB MIMO ARRAYS FOR ENHANCED PORT ISOLATION

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ABSTRACT

This paper presents the design and analysis of a compact Ultra-Wideband (UWB) Multiple-Input Multiple-Output (MIMO) microstrip antenna for broadband wireless applications. The antenna is implemented on a 1.6 mm FR-4 substrate and analyzed using ANSYS HFSS to evaluate its electromagnetic performance. The objective is to achieve wide impedance bandwidth, strong inter-element isolation, and stable radiation behavior within a compact planar configuration. The proposed antenna operates from 2.9 GHz to beyond 10 GHz, ensuring full coverage of the standard UWB band. Two strong resonances are observed at 3.25 GHz and 6.02 GHz, with return losses of -33.07 dB and -41.90 dB, respectively. The corresponding VSWR values of 1.088 and 1.021 confirm efficient impedance matching and minimal reflection loss across the operating frequencies. Mutual coupling between the antenna elements is effectively reduced, achieving an isolation level of -29.653 dB. Radiation analysis shows a realized gain between 3 dBi and 4.40 dBi, with a maximum directivity of 5.38 dBi. Surface current distribution indicates controlled element interaction, which contributes to improved decoupling and stable radiation characteristics. The overall results demonstrate that the proposed compact UWB MIMO antenna achieves wideband operation, strong isolation, and reliable diversity performance while maintaining structural simplicity. These characteristics make it suitable for high-speed short-range wireless communication systems and indoor positioning applications.

59. 6G ADAPTIVE BEAMFORMING SYSTEM

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ABSTRACT

The rapid evolution of wireless communication has led to the emergence of sixth-generation (6G) networks, which aim to deliver ultra-high data rates, extremely low latency, and massive device connectivity. Adaptive beamforming is a critical technology that enhances signal strength and spectral efficiency by dynamically adjusting the direction of signal transmission and reception. This paper presents the design and analysis of a 6G adaptive beamforming system, including its architecture, operational principles, and implementation techniques. The system utilizes advanced algorithms and antenna arrays to focus signals toward intended users while minimizing interference and noise. As a result, it significantly improves communication reliability, coverage, and energy efficiency. The proposed approach is highly suitable for next-generation applications such as smart cities, autonomous vehicles, and Internet of Things (IoT) environments, where high speed and stable connectivity is essential.

60. AI-BASED THROAT HEALTH PREDICTION SYSTEM USING REAL TIME ENVIRONMENTAL AND RESPIRATORY DATA

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ABSTRACT

An AI-based throat health prediction system is proposed to monitor and analyze environmental and respiratory parameters in real time. The system uses sensors to measure respiration levels, harmful gases, temperature, and humidity, which are key indicators affecting throat health. The collected data is displayed on an LCD screen and transmitted to the Blynk application using IoT technology for continuous monitoring. The AI model processes this sensor data to identify patterns associated with throat conditions such as dryness, irritation, and respiratory discomfort. Based on the analysis, the system predicts the likelihood of throat-related health issues and provides early warnings along with preventive suggestions. By integrating real-time data with artificial intelligence, this system enables proactive health management. It offers a non-invasive and continuous monitoring solution, helping users take early action to maintain better throat and respiratory health

Adaptive IoT-Based Micro Air Safety Zones for Individual Health Monitoring

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ABSTRACT

Air pollution poses a significant threat to human health, particularly in densely populated urban environments where exposure levels vary dynamically across space and time. This paper proposes an **Adaptive IoT-Based Micro Air Safety Zones for Individual Health Monitoring** system that leverages edge intelligence and real-time sensing to create personalized protective environments. The framework integrates a network of low-cost IoT sensors, wearable devices, and edge computing nodes to continuously monitor key air quality parameters such as particulate matter (PM2.5, PM10), carbon monoxide (CO), nitrogen dioxide (NO₂), temperature, and humidity. The proposed system utilizes adaptive algorithms to analyze environmental data locally at the edge, reducing latency and ensuring faster decision-making. Based on real-time data, the system dynamically establishes “micro air safety zones” around individuals by providing alerts, route recommendations, and automated control of nearby smart devices such as air purifiers and ventilation systems. Additionally, the framework incorporates machine learning models to predict pollution trends and personalize safety thresholds based on individual health profiles, including respiratory conditions and activity patterns. The architecture emphasizes scalability, energy efficiency, and data privacy by minimizing cloud dependency and enabling secure data processing at edge nodes. The system also supports integration with smart city infrastructure, enabling broader environmental monitoring and coordinated pollution mitigation strategies. Experimental analysis demonstrates improved responsiveness and accuracy in detecting hazardous air quality conditions compared to conventional centralized systems. Overall, the proposed adaptive IoT framework enhances personal safety by delivering real-time, context-aware air quality insights and proactive health protection mechanisms. This approach represents a significant step toward intelligent, human-centric environmental monitoring systems that prioritize individual well-being in modern urban ecosystems.

Keywords: Internet of Things (IoT), Edge Computing, Air Quality Monitoring, Micro Air Safety Zones, Adaptive Systems, Real-Time Monitoring, Smart Cities, Health Monitoring, Machine Learning, Environmental Sensing

61. DESIGN AND IMPLEMENTATION OF A WEB-BASED SCHOOL MANAGEMENT SYSTEM

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ABSTRACT

This paper presents the design and implementation of a web-based School Management System developed to streamline administrative and academic operations within educational institutions. The system is designed as a centralized platform to manage student records, attendance, timetable scheduling, examination processes, and result generation efficiently. The application is developed using modern web technologies and follows a modular architecture to ensure scalability, security, and ease of maintenance. The objective is to reduce manual workload, minimize data redundancy, and enhance real-time accessibility of information for different stakeholders including administrators, teachers, students, and parents. The system provides role-based access control, ensuring secure data handling and efficient workflow management. Key functionalities include automated attendance tracking, digital record management, performance evaluation, and communication support between users. The web-based nature of the system enables remote access and seamless integration across multiple devices. Performance evaluation of the system demonstrates improved accuracy, reduced processing time, and enhanced data organization compared to traditional manual methods. The results indicate that the proposed system offers a reliable and efficient solution for managing school operations while maintaining simplicity and flexibility. Overall, the developed School Management System provides a scalable

62. IOT-ENABLED SMART HELMET FOR REAL-TIME RIDER SAFETY MONITORING AND AUTOMATED EMERGENCY RESPONSE

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ABSTRACT

Road accidents are one of the major causes of death worldwide, mainly due to negligence such as not wearing helmets, drunk driving, and delayed emergency response. To address these issues, this project proposes an IoT-Enabled Smart Helmet for Real-Time Rider Safety Monitoring and Automated Emergency Response. The system integrates various sensors such as an IR sensor for helmet detection, an MQ-3 sensor for alcohol detection, an eye blink sensor for drowsiness monitoring, and a vibration or accelerometer sensor for accident detection. These sensors are connected to a microcontroller (ESP32/Arduino), which continuously monitors the rider's condition. The proposed system ensures that the motorcycle starts only when the rider is wearing the helmet and is not under the influence of alcohol. In case of an accident, the system automatically detects the impact and sends an emergency alert message along with the rider's location to predefined contacts using IoT technology. This project enhances road safety by preventing accidents and ensuring quick medical assistance. It is cost-effective, efficient, and can significantly reduce fatalities caused by road accidents.

Keywords: IoT Smart Helmet, Rider Safety System, Accident Detection Module, Alcohol Detection Sensor (MQ-3), Drowsiness Detection System, ESP32 Microcontroller, Sensor-Based Monitoring, Real-Time Data Processing,

63. SKIN CANCER CLASSIFICATION USING DEEP LEARNING

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ABSTRACT

This project presents an automated skin cancer classification system using deep learning techniques to support early diagnosis and effective treatment. Dermoscopic skin images are used as input, with preprocessing applied to enhance image quality. A pre-trained Inception-V3 convolutional neural network is employed to extract deep features, which may be combined with hybrid features to improve classification accuracy and robustness. The extracted features are classified into different skin cancer categories, reducing manual diagnostic effort and improving consistency. The proposed approach provides reliable decision support for early detection and prevention of skin cancer.

64. SMART BED OCCUPANCY MONITORING SYSTEM FOR HOSPITALS USING IOT AND SENSOR NETWORKS

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ABSTRACT

In hospitals, continuous monitoring of patient presence and bed occupancy is essential for ensuring patient safety and efficient utilization of medical resources. This project presents a Smart Bed Occupancy Monitoring System using IoT and Sensor Networks to automatically detect patient presence and measure patient weight in real time. The proposed system uses four load cells placed at the corners of the hospital bed to accurately calculate the patient's total weight, ensuring stability and precision. Additionally, four IR sensors are used to detect the presence or absence of the patient on the bed. The collected sensor data is processed by a microcontroller, which determines the bed occupancy status based on predefined threshold values. The patient's weight and occupancy status are displayed locally on an LCD display for immediate reference. Using IoT technology, the system transmits real-time data to a remote server or cloud platform, enabling hospital staff to monitor multiple beds simultaneously from a central location. This system reduces the need for manual checking, improves patient monitoring efficiency, and helps prevent unattended bed exits. The proposed solution is low-cost, reliable, and suitable for real-time hospital applications, enhancing both patient safety and hospital management.

65. SLOT ANTENNA DESIGN AND ANALYSIS OF A TE MODE RECTANGULAR SLOT ANTENNA FOR 5G WIRELESS APPLICATIONS

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ABSTRACT

Based on the Transverse Electric (TE) mode principle, this paper presents the design and performance analysis of a high-gain rectangular slot antenna optimized for 5G mobile communication in the n38 band (2.57–2.62 GHz). A planar waveguide structure is employed to excite the dominant TE mode, addressing the need for compact and efficient radiators in mobile platforms. To achieve optimal impedance matching, a detailed parametric analysis was conducted, focusing on the slot width (W). The results indicate that a slot width of $W = 7$ mm provides excellent impedance matching, with a minimum return loss of approximately -33 dB. The antenna demonstrates a consistent peak gain above 9.5 dB across the desired frequency band, showing competitive performance. Furthermore, the radiation patterns confirm a symmetrical broadside beam with minimal back radiation. This study validates the TE-mode rectangular slot antenna as a reliable single-element solution for enhancing 5G mobile communication. Keywords: Rectangular Slot Antenna, Waveguide Antenna, Peak Gain, 5G, Mobile Communication, High Gain

66. HYBRID NLMS & FXLMS ALGORITHM FOR HIGH FREQUENCY NOISE CANCELLATION

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ABSTRACT

The amount of the environmental noise in urban dwellings is becoming more and more intensive due to the railway horns and the temple bells or the mosque loudspeakers, and it can severely worsen the quality of sleep and the overall well-being. The hybrid feed forward Active Noise Control (ANC) amplifier described in this paper is specially developed to address the problem of sleep enhancement in these settings. The system uses directional reference microphones that are mounted outside the building to record incident noise before it enters into the building. An adaptive algorithm based on Filtered-x LMS is a hybrid algorithm that incorporates Normalized LMS based on an adaptive algorithm that ensures speedy and steady changing filter coefficients in non-stationary noises. The Secondary Path Estimation (SPE) is a method that estimates the loudspeaker-room-microphone transfer function with the help of controlled excitation signals, which provides a more accurate real-time generation of anti-noise. Pre-emphasis filter boosts high-frequency content so that the cancellation can be increased in the frequencies that passive acoustic barriers are not effective. The anti-noise is provided through a wide band indoor loudspeaker and optimized with the help of error microphone that is situated in the quiet area of the listener. The optional passive acoustic treatments are used in addition to the active system in the frequency range above 1.5 kHz. Indoor noise mitigation and a considerably greater increase in subjective sleep comfort are experimentally proven as compared to traditional insulation-based techniques.

67. DESIGN AND IMPLEMENTATION OF FREQUENCY RECONFIGURABLE ANTENNA FOR WIRELESS APPLICATIONS

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ABSTRACT

Due to exponential growth of wireless technology, the essentiality of the antennas which resonate at multiple frequency bands has increased. Reconfigurable antennas are the best choice to meet these demands. This work proposes the novel design and investigation of planar compact monopole frequency reconfigurable antenna. By employing Flame Retardant 4 (FR4) substrate at 0.16 cm height, the designed antenna produces multiple frequency bands with wider bandwidth. The proposed antenna resonates in one dual band mode and three single band modes reckoning upon the conditions of diode- Radio Frequency Positive-Intrinsic-Negative (RF PIN) diode switches. Various antenna parameters like Gain, radiation pattern, VSWR, return loss are simulated and validated with the measurement results. The fabricated antenna operates between 2.4 GHz-6.3GHz frequency range. In all the operating bands, VSWR is <1.5. The designed antenna structure gives the radiation efficiency in the range of 73%-79% in all the operating resonating conditions. The designed monopole reconfigurable antenna exhibits the fair agreement between simulated and measurement results. It operates at 2.4 GHz (Wi-Fi), 3.5 GHz (sub 6 GHz for 5G applications), 4.7 GHz (Vo5G), 5.8 GHz (Vehicle-to-Everything communications) and C band (6.22 GHz-6.27 GHz). Antenna design simulation is done with High-Frequency Structure Simulator Version 17 (HFSSV17) software.

68. SMART CAR PARKING SLOT DETECTION USING YOLO AND REAL TIME OCCUPANCY HEAT MAP GENERATION

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chidamparam*

ABSTRACT

This project develops a camera-based smart parking system that detects parked vehicles and vacant slots using a YOLO object detector, maps slots automatically, and generates a live occupancy heat- map. YOLO provides fast, robust vehicle detection even on edge devices, while a slot-mapping module converts detection boxes into slot occupancy states. A temporal filtering step reduces false positives from transient occlusions. The system supports dashboard visualization, per-slot status API, and analytics (occupancy rate, peak hours). Results show high real-time accuracy and low latency suitable for urban parking management and user guidance.

69. DIGITAL TWIN-BASED INSULATION DEFECT DIAGNOSIS FOR OIL-FILLED TRANSFORMERS

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ABSTRACT:

The objective of this project is to propose an Integrated Digital Twin System for Power Transformer Monitoring using IoT, which is a smart and efficient system for power transformer monitoring. This project uses IoT technology for continuous acquisition and cloud-based storage of power transformer parameters. The parameters measured for the power transformer include oil temperature, oil level, voltage, and current. These parameters are measured using sensors and processed using an ESP32 microcontroller. The measured parameters are then sent to the cloud using Wi-Fi and stored using Firebase database. The web-based dashboard uses React.js and Node.js for real time monitoring and analysis of power transformer parameters and the performance of the system. The proposed Digital Twin model will help in the real-time analysis of the power transformer condition and detect faults at an early stage. This proposed system will provide efficient monitoring and reduced maintenance costs for power transformers.

Keywords— Power Transformer, IoT, Digital Twin, ESP32, Cloud Computing, Real-time Monitoring.

70. DEVELOPMENT OF A SOLAR-ASSISTED CHARGING SYSTEM FOR A ELECTRIC BIKE WITH MPPT CONTROL

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ABSTRACT:

This paper presents the design and development of a solar assisted charging system for an electric bike integrated with Maximum Power Point Tracking (MPPT) control to enhance energy efficiency. The proposed system utilizes a photovoltaic panel as a renewable energy source and employs an MPPT-based DC–DC converter to extract maximum power under varying environmental conditions. A perturb and observe (P&O) algorithm is implemented to dynamically track the optimal operating point of the solar panel. The generated power is regulated and supplied to the electric bike battery through a controlled charging mechanism. The system is designed to improve battery life, reduce dependency on conventional grid charging, and promote sustainable transportation. Experimental results demonstrate improved charging efficiency and reliable system performance under different irradiance levels. The proposed solution offers a cost-effective and eco-friendly approach for extending the operational range of electric bikes. **Keywords:** Solar-assisted charging, Maximum Power Point Tracking (MPPT), Electric bike, Photovoltaic system, DC–DC converter, Perturb and Observe algorithm, Renewable energy, Battery charging

71. ECG Chest Band for Arrhythmia Detection and Biometric EHR ACCESS

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ABSTRACT

Wearable ECG devices are valuable for heart patients monitoring systems and for fitness tracking and continuous health monitoring for individuals with no heart problems. Current devices are big, and the average person cannot afford them, which is why electronic health records need to be kept so that the ECG signal is integrated to the electronic health record. Keeping this in mind, our purpose is to make a wearable ECG device that is a lot smaller and cheaper than most devices while keeping the ECG signal intact and having smooth integration with electronic health records (EHR). Furthermore, in this case, to elicit the desired health outcome for the target population, which is all ages, we focus on health record usability, data security, and record management

Keywords – ECG monitoring, EHR biometric

72. SMART DRUNKEN DRIVING DETECTION AND IGNITION CONTROL SYSTEM

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ABSTRACT

Drunken driving is one of the major causes of road accidents worldwide, leading to significant loss of life and property. According to the World Health Organization (WHO), approximately 1.35 million people die each year due to road traffic accidents, and alcohol-impaired driving is a primary contributing factor. This paper proposes a smart drunken driving detection and ignition control system using an ESP32-based embedded platform. The system integrates an ESP32-CAM module for rider face verification, an MQ-3 alcohol sensor for breath analysis, and a relay-based ignition control mechanism. AI-based face verification using YOLOv8 and MediaPipe prevents cheating attempts, while on-device processing ensures fast response and reliable detection. Experimental results demonstrate high accuracy in face verification (92%), alcohol detection (96%), and sub-200ms ignition control response. The proposed system is compact, cost-effective, and suitable for real-time vehicle safety application

73. DUAL HEXAGON SLOT CIRCULAR PATCH ANTENNA FOR 5G APPLICATIONS

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ABSTRACT

The design and simulation of a dual hexagon slot circular patch antenna for 5G applications have been completed. The antenna is installed on a 1.6 mm thick, lossy FR-4 substrate with a dielectric constant of 4.4. With an overall substrate size of $30 \times 30 \times 1.6$ mm, the design is small and appropriate for contemporary wireless devices. The circular radiating patch has two hexagonal slots etched into it to improve the antenna's bandwidth performance and impedance matching. The simulation results show that the antenna satisfies the minimal performance requirements for 5G communication systems, resonating at a frequency of 3.52 GHz with a return loss of -14.71 dB. The electromagnetic range from 3.35 GHz to 3.65 GHz, which is inside the sub-6 GHz 5G spectrum, is covered by the -10 dB impedance bandwidth of 140 MHz. Effective impedance matching is shown by the voltage standing wave ratio (VSWR) of 1.45 at the resonant frequency. Furthermore, the antenna attains a total efficiency of 42.3% and a realized gain of 2.1 dBi. The antenna is appropriate for realistic wireless communication applications since the radiation characteristics exhibit stable performance with quasi-omnidirectional behaviour. In terms of return loss, bandwidth, gain, and efficiency, the suggested design performs well overall, indicating that it is appropriate for 5G applications.

74. DEVELOPMENT OF AN ENERGY-AWARE SMART SECURITY FRAMEWORK WITH INFORMATION STAMPING FOR IOT NETWORKS

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ABSTRACT

A security system with CCTV and other network nodes in IoT deals with large amount of data, so the need for devices with larger storage space comes into the picture which is a bit costlier. Traditional security systems are more power consuming as it has to record for 24x7 with more throughput but less efficient. Thus need human in middle to upload into cloud is needed. In this work, we propose a low- cost energy efficient smart security system for CCTV with other network nodes. Whenever motion is detected by passive infrared (PIR) sensor, at that time only the camera and all other security sensor nodes in network are activated (Switched on), the captured video and information (sensor data) are stamped on the image using image processing techniques on Python platform. It will be stored in a local storage device, after certain threshold (based on sensitivity of the location) data will be uploaded into the cloud along with data log created during processing stage by Python programming model. In this way, we can reduce the amount of data to be stored (as no recording when idle), consumed power (as device is switched off when idle), maintenance cost (as fully programmed). No need for human in middle for uploading data into the cloud (as program will upload data in to cloud). Because of time, date and information (data from sensor nodes) stamping on each frame of video using python programming model video access becomes easier, as data log will be created

75. ENHANCED IOT-CLOUD FRAMEWORK FOR PREDICTIVE RESPIRATORY ANALYTICS USING EDGE COMPUTING AND MACHINE LEARNING

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ABSTRACT

The increasing prevalence of respiratory disorders necessitates continuous, real-time monitoring systems that are accurate, secure, and energy-efficient. This paper presents an enhanced IoT-cloud framework for predictive respiratory analytics using edge computing and machine learning, implemented on a NodeMCU-32 (ESP32) controller. Physiological and environmental respiratory parameters are collected through integrated sensors and processed locally at the edge. A pattern-matching-based machine learning algorithm identifies abnormal respiratory patterns, enabling early detection without reliance on fixed thresholds. Secure data transmission is achieved using SSL/TLS encryption, ensuring confidentiality and integrity. Experimental results demonstrate improved prediction accuracy, reduced latency, lower energy consumption, and enhanced security compared to conventional cloud-centric respiratory monitoring systems.

76. HYBRID CNN-TRANSFORMER FRAMEWORK FOR EXPLAINABLE MULTI- CLASS DIABETIC RETINOPATHY SEVERITY CLASSIFICATION

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ABSTARCT

Diabetic Retinopathy (DR) is one of the most common complications of diabetes mellitus and a leading cause of vision impairment among middle-aged and elderly populations. According to global diabetes statistics, approximately 20.8 million individuals are affected, with only 14.6 million diagnosed cases. Early detection through routine screening is essential to prevent vision loss. However, manual screening is time-consuming and requires significant expertise. To address this, we propose an automated DR diagnostic system leveraging deep learning and machine learning techniques for enhanced accuracy and efficiency. This work introduces a multi-modal approach integrating ResNet18 for feature extraction from fundus images and XGBoost for optimized classification. The ResNet18 model captures intricate retinal features, effectively distinguishing DR severity levels. To improve feature representation, Laplacian filtering is applied to enhance discriminative patterns in the extracted features. Additionally, Anisotropic Dual-Tree Complex Wavelet Transform is utilized to refine the extracted spatial and frequency-based features, ensuring robust DR classification. The proposed framework achieves a classification accuracy of 92.34%, outperforming traditional single-modal models. The cost analysis of the model shows a minimum cross-entropy loss of 0.275, with a processing time of maintaining a trade-off between accuracy and computational efficiency. The model's generalization capability is validated on the ACRIMA dataset, yielding a 91.85% accuracy, ensuring consistent performance across multiple evaluation metrics. The integration of ResNet18 and XGBoost in a multi-modal setting significantly enhances the diagnostic precision, making it a promising tool for early DR detection and grading in large-scale screening programs.

77. EXPLORING 6G WIRELESS SYSTEMS: TECHNOLOGIES, CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Within the last few decades, wireless connectivity has experienced an exponential growth. With far more features than 4G communications, next-generation (5G) will soon be available worldwide. In the year 2027 to 2030, the sixth- generation (6G) wireless system, fully supported by artificial intelligence, will become the dominant paradigm for wireless communication. Beyond 5G, the main factors to consider are higher system capacity, greater data rates, reduced latency, enhanced security, and improved quality of service (QoS) compared to current 5G systems. In this paper, we describe the strategy for future 6G wireless networks, emerging technologies and the architecture within which they will operate. This paper focuses on key performance indicators, applications, new services, and key technologies that could enable 6G networks. By presenting a new perspective on future research directions, this article will make a significant contribution to future research directions. Key words: 5G, 6G, Cyber security, Privacy preservation, wirelessCommunication, data rate, massive connectivity, virtual reality, terahertz (THz), Tactile Internet, Free-space optics (FSO), Backhaul, Front haul.

78. DESIGN INTEGRATION AND AERODYNAMIC ANALYSIS OF SINGLE RIDER ELECTRIC SCOOTER

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ABSTRACT

This project, titled “Design Integration and Aerodynamic Analysis of a Single Rider Electric Scooter,” focuses on the design and development of a single-seater electric scooter prototype in accordance with the Dr. G. Padmanabham Memorial Design Competition – 2025 and SAE India design principles. The primary objective is to create a cost-effective, lightweight, and safe vehicle for single-person urban mobility, with an estimated retail cost of around ₹60,000 and a top speed of 35 km/h, while ensuring proper ergonomics based on a 95th percentile Indian male. The scooter features a single-frame structure to enhance strength and stability, utilizing a mixed-material approach in which high-stress components such as the backbone and head tube are made of IS 3074 ERW-3 steel (approximately 300 MPa), while secondary components like seat rails use IS 3074 ERW-2 steel (approximately 250 MPa) to achieve an optimal balance between cost and performance. It is powered by a 750 W–1000 W BLDC motor paired with a 48V, 24 Ah lithium-ion battery for efficient operation. Safety features include a load monitoring system using a 100 kg load cell integrated with an Arduino to alert the rider in case of over load, along with an automatic indicator system that activates turn signals based on steering movement. Aerodynamic considerations are incorporated to minimize air resistance and improve overall efficiency, and the design is validated using NX CAD modeling and CAE stress analysis. Additionally, the project adheres to the 3R principles—Reduce, Reuse, and Recycle—emphasizing a practical, economical, and sustainable approach.

Keywords: Electric Scooter, Urban Mobility, Aerodynamic Analysis, Lightweight Design, BLDC Motor, Lithium-ion Battery, Structural Design

79. DESIGN, ANALYSIS AND ADDITIVE MANUFACTURING OF SWIRL INDUCED COUNTER- FLOW HEAT EXCHANGER PIPES

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ABSTRACT

The proposed project is expected to design and examine a shark-fin twisted tube heat exchanger that would greatly improve the heat transfer efficiency in case of counter-flow conditions. In this system, hot water at 60°C is pumped through the inner twisted pipe, and cold water at 24°C through the outer cylindrical pipe through the annular space between the twisted and outer cylindrical pipes. The counter-flow structure ensures that there is a high temperature gradient through the length of the heat exchanger, which enhances the total thermal performance. The addition of shark-fin features onto the twisted surface causes the creation of secondary flows and turbulence that effectively interfere with the thermal boundary layer and increase the convective heat transfer. The project will include design modelling and a CFD-based simulation analysis to research the temperature distribution, the pressure drop, and the heat transfer features of the proposed design. The results acquired will be compared to the conventional smooth and standard twisted tube heat exchanger in order to assess the enhancement of the thermal efficiency and performance index. The desired result is a small-scale, low-energy consumption, and high-performance heat exchanger to be used in industrial and renewable energy purposes. The given innovative design is expected to help in the development of sustainable thermal systems because it should raise the heat transfer rates and reduce the energy losses.

Keywords: Counter-Flow Heat Exchanger, CFD Simulation, Swirl Effect, Additive Manufacturing

80. IOT ENABLED SMART NAVIGATION FOOD WEAR FOR VISUALLY IMPAIRED

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ABSTRACT

Navigating independently remains a daily challenge for the visually impaired, especially in unfamiliar or obstacle-rich environments. The & quot; Smart Shoe for Blind & quot; project introduces an intelligent, wearable solution that transforms a standard shoe into a real-time assistive device. Unlike traditional walking canes or basic audio systems, this smart shoe offers a proactive and responsive approach to navigation. It integrates obstacle detection, GPS-based location tracking, and fall monitoring, ensuring both safety and autonomy. Real-time alerts are provided through vibration or sound, enabling the user to react promptly to nearby hazards. Additionally, emergency communication is supported via wireless connectivity, allowing caregivers to receive live updates or distress signals. This system surpasses existing aids by offering continuous environmental awareness and situational feedback. It also eliminates the need for manual intervention, operating passively and intuitively within the shoe. Its compact, lightweight design ensures user comfort and convenience. Most importantly, the system empowers visually impaired individuals to move confidently and independently.

81. MACHINE LEARNING–GUIDED OPTIMIZATION OF HIGH-STRENGTH AL–Zn–Mg–Cu ALLOYS WITH PHYSICS-BASED VALIDATION

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ABSTRACT

The design of high-strength aluminium alloys traditionally relies on extensive experimental exploration of composition and processing conditions. In this study, a materials informatics framework was developed to enable data-driven optimization of aluminium alloy compositions for improved yield strength. An experimental dataset containing alloy chemistry and processing information was used to train multiple regression models, including linear regression, support vector regression, gradient boosting, and random forest. Ensemble tree-based models demonstrated strong predictive performance, achieving $R^2 \approx 0.91$ with an RMSE of approximately 46 MPa. Virtual alloy screening was conducted under fixed T6 heat-treatment conditions to identify promising compositions within the Al–Zn–Mg–Cu system. Prediction uncertainty was quantified using random forest ensemble variance. Physics-based validation using Mat Pro predicted a yield strength of approximately 531 MPa for the optimized alloy, slightly exceeding the benchmark 7075-T6 alloy (≈ 511 MPa). The results demonstrate that uncertainty-aware machine learning combined with physics-based modelling provides an effective approach for accelerated alloy design and performance evaluation.

Keywords: Aluminium alloys, Regression models, J Mat Pro, Tensile Strength, Yield Strength

82. ARDUINO RADAR MISSILE LAUNCHER DEFENSE SYSTEM BY USING ARDUINO AND ULTRASONIC SENSOR

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ABSTRACT

The Arduino Radar Missile Launcher Defence System is a smart surveillance and defence prototype designed to detect and track objects within a specific range using an ultrasonic sensor. The system is built using Arduino Uno and an Ultrasonic Sensor HC-SR04 to identify objects and measure their distance accurately. When an object enters the detection range, the ultrasonic sensor sends signals to the Arduino, which processes the data and rotates a servo motor to track the object's movement. The radar-like scanning mechanism continuously monitors the surrounding area and identifies potential targets. Once a target is detected, the system can trigger a simulated missile launcher or alert mechanism for defence purposes. This project demonstrates the practical implementation of radar-based defence systems in a simplified and cost-effective manner. It is useful for learning concepts such as object detection, automation, embedded systems, and defence technology. The system can be further enhanced by integrating cameras, wireless communication, and AI-based target identification for advanced security applications.

83. AUTOMATIC CLOTH PROTECTION: SMART SOLUTION FOR RAINY DAYS

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ABSTRACT

Automatic Cloth Protection is an innovative smart system designed to protect clothes from sudden rainfall while drying outdoors. In many households, clothes are usually dried on open terraces or balconies, and unexpected rain can cause them to become wet again. This project proposes an automated solution that detects rain and protects clothes without requiring human intervention. The system uses a rain sensor connected to a microcontroller such as Arduino Uno to detect water droplets. When rainfall is detected, the microcontroller automatically activates a motor that moves a protective cover or retracts the clothesline to a sheltered area. This ensures that the clothes remain dry even during un expected weather changes. When the rain stops, the system can return the clothesline to its original position for continued drying. This smart solution is cost-effective, easy to implement, and suitable for home automation applications. This paper demonstrates how simple sensors, automation, and embedded systems can be used to improve daily life by saving time and effort. The Automatic Cloth Protection system provides a practical and efficient approach to managing clothes drying during rainy days.

84. LIGHTWEIGHT VISION TRANSFORMER WITH WINDOW-BASED MULTI-HEAD ATTENTION FOR REAL-TIME WATERMARK VALIDATION IN SPINE MRI

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ABSTRACT

Accurate clinical diagnosis depends on the validity and integrity of spine MRI images since mistakes in the assessment of spinal pathology might have serious treatment repercussions. As digital health records and Picture Archiving and Communication Systems (PACS) become more widely used, spine MRI scans are more susceptible to deliberate forgery, unintentional corruption, and unauthorised manipulation. Current CNN-based watermarking and tamper detection techniques are not appropriate for contemporary clinical deployment situations because to their significant computational overhead, poor real-time processing capability, and restricted spatial feature representation. This work suggests a Lightweight Vision Transformer (L-VIT) combined with a Window-Based Multi-Head Attention (W-MHA) mechanism for real-time digital watermark validation in spine MRI images in order to overcome these drawbacks. In order to effectively capture local anatomical traits and global structural dependencies across vertebral regions, the system uses window-partitioned self-attention and embeds invisible semi-fragile watermarks into MRI volumes. To guarantee viability on clinical hardware with limited resources, the design uses hierarchical patch tokenisation, depth-wise separated attention heads, and decreased parameter complexity. Sensitivity to minute pixel-level manipulation artefacts across different MRI resolutions and scanning techniques is further enhanced by a multi-scale feature fusion module. The model is verified using artificially enhanced spine MRI datasets, in which manipulated samples are methodically produced using region duplication, splicing, and AI-generated manipulation methods. With direct applications to tele radiology, electronic health records, and AI-assisted diagnostic pipelines, the suggested LVIT-W-MHA system provides a clinically feasible, effective, and accurate method for spine MRI integrity verification.

Keywords: Vision Transformer, Multi-Head Attention, Digital Watermarking, Spine MRI, Tamper Detection, Medical Image Security, Lightweight Deep Learning, Real-Time Verification, PACS Security.

85. ARDUINO BASED EMERGENCY BREAKING SYSTEM

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ABSTRACT

The Arduino-based Emergency Braking System is designed to enhance vehicle safety by automatically stopping the vehicle when an obstacle is detected within a critical range. Using ultrasonic sensors, the system continuously monitors the road ahead for potential hazards. The Arduino microcontroller processes sensor data in real time to determine the distance to obstacles. If the distance falls below a predefined threshold, the system triggers a braking mechanism via a servo motor or motor driver. This rapid response helps prevent collisions caused by driver inattention or delayed reaction time. The design is cost-effective, compact, and suitable for integration into small vehicles or robotics. It mimics certain features of advanced automotive safety systems like ABS and collision avoidance. The system can be powered by a simple DC supply and is easy to program for different sensitivity levels. Future enhancements may include wireless alerts, speed adaptation, and integration with IoT for remote monitoring. Overall, it offers a practical, low-cost solution for improving road safety.

86. A SMART AI BASED SOLUTION FOR TRAFFIC MANAGEMENT ON ROUTES WITH HEAVY TRAFFIC FROM DIFFERENT DIRECTION, WITH REAL TIME MONITORING, AND ADOPTION OF TRAFFIC LIGHT TIMINGS

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ABSTRACT

Traffic congestion in urban areas has become a major challenge due to the rapid increase in the number of vehicles and inefficient traffic management systems. Conventional traffic signal systems operate on fixed timing mechanisms, which fail to adapt to real-time traffic conditions, leading to increased waiting times, fuel consumption, and environmental pollution. To address these issues, this paper proposes a smart AI-based traffic management system that dynamically controls traffic signals based on real-time traffic flow from multiple directions. The proposed system utilizes Artificial Intelligence (AI) and real-time monitoring techniques to analyse traffic density using sensors, cameras, or IoT devices. The collected data is processed using machine learning algorithms to estimate traffic congestion levels and optimize signal timings accordingly. The system adapts dynamically to varying traffic conditions, ensuring smoother vehicle movement and reduced congestion at intersections. Additionally, the solution incorporates predictive analytics to anticipate traffic patterns and make proactive adjustments to signal control. The system can also prioritize emergency vehicles and reduce delays in high-traffic routes. Simulation results are expected to demonstrate improved traffic flow efficiency, reduced waiting time, and lower fuel consumption compared to traditional traffic systems. Overall, the proposed AI-driven approach provides an intelligent and scalable solution for modern traffic management, contributing to the development of smart cities and sustainable transportation systems.

87. HYBRID SOLAR CHARGING SYSTEM FOR ELECTRIC BICYCLE

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ABSTRACT

This paper discusses the design and simulation of a " Hybrid Solar Charging System For an Electric Bicycle using MATLAB and Simulink. Quot; the proposed system aims to integrate solar energy with conventional battery charging to make electric bicycles more efficient and sustainable. Solar photovoltaic panels will be used as a power source and will be controlled by a charge controller. Solar power will be used to charge a rechargeable battery, which will power an electric motor on the bicycle. If solar power is not available, conventional power will be used for battery charging. The simulation will be done using MATLAB and Simulink, and it will analyse the performance of the system and its efficiency in using solar power and conventional power for battery charging. The results will show that hybrid solar power is more efficient and sustainable compared to conventional power.)

Keywords— Electric Bicycle, Solar Energy, Hybrid Charging, MATLAB Simulation, Renewable Energy, Battery Management.)

88. INTERACTIVE WEB-BASED IMAGE FORGERY DETECTION USING MACHINE LEARNING

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ABSTRACT

The rapid growth of digital media has significantly increased the risk of image manipulation, creating critical need for reliable forgery detection systems. This project proposes a machine learning-based image forgery detection framework developed in Python, designed to identify tampered images through structured feature analysis and modular processing. The system incorporates pre-processing techniques such as grayscale conversion and standardized image resizing to ensure uniformity and reduce computational complexity. A modular pipeline is implemented, where image data is processed in defined time slots to enable efficient analysis and scalability. The detection mechanism is driven by threshold-based evaluation, where central feature values are computed and compared against learned thresholds to identify inconsistencies in pixel density, texture distribution, and structural integrity. These parameters are collaboratively analysed to perform a comprehensive integrity assessment of then image. The machine learning model is trained on labelled datasets to distinguish authentic and forged images with improved accuracy and robustness. Additionally, the system is deployed on theRunGuardio/Guardia platform, enabling a cross-platform architecture that functions as both a standalone Python application and an interactive web dashboard. This allows users to upload images, visualize detection outputs, and monitor system performance in real time across devices, including mobile interfaces. Key features include automated forgery detection, modular processing architecture, threshold-driven validation, and cross-platform accessibility. The proposed solution offers a scalable and efficient approach to image authentication, making it suitable for applications in digital forensics, cybersecurity, and content verification.

Keywords - Artificial Intelligence (AI), machine learning, image forgery detection, feature analysis, threshold-based detection, web-based system, digital forensics, cybersecurity.

89. AI BASED EMERGENCY ASSIST SYSTEM WITH LIFE SAFE DEVICE FOR AMBULANCE

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ABSTRACT

In critical emergency situations, immediate access to patient information and timely intervention can significantly improve survival chances. This proposed system introduces a smart ambulance framework equipped with advanced biometric identification and real-time health monitoring. When an unconscious or unresponsive individual is brought into the ambulance, a fingerprint sensor is used to instantly retrieve the allergies, or chronic conditions. Simultaneously, vital health metrics such as heart rate and respiration are continuously monitored using heartbeat and respiratory sensors. In cases of severe instability, the system provides an intelligent voice interface that allows emergency personnel to ask questions. The system then plays back pre-recorded doctor-approved instructions or responses via a voice playback module. This AI-supported interaction ensures immediate, life-saving decisions can be made without delay. The integration of biometric, sensor-base monitoring, and voice-assisted communication makes this system highly responsive and valuable for modern emergency medical services.

Keywords: Smart ambulance system; biometric identification; fingerprint sensor; patient medical profile; real-time health monitoring; heart rate sensor; respiratory sensor; Emergency medical

90. SMART CROP MANAGEMENT SYSTEM USING IOT AND AI BASED FERTILIZER GUIDANCE

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ABSTRACT

The Smart Crop Management System using IoT and AI Based Fertilizer Guidance aims to improve the efficiency of agriculture through intelligent crop management and automated decision making capabilities. The proposed system leverages the capabilities of both Internet of Things (IoT) and Artificial Intelligence (AI) to monitor key soil and environmental factors such as moisture, temperature, humidity, and NPK (Nitrogen, Phosphorus, and Potassium) content. These factors are monitored in real time using different sensors connected to the ESP32 microcontroller that sends the data to the cloud for further analysis using AI. The AI algorithm analyses the data collected from the sensors to determine the type and amount of fertilizer that should be used for optimal crop growth. Using a user friendly interface such as a web or mobile interface, farmers are then able to access real time information and data insights to take timely decisions regarding crop management. By using IoT and AI for crop management, farmers can minimize the wastage of resources, maximize crop yield, and ensure sustainable agriculture for a better environment.

91. AI BASED WIRELESS CHARGING STATION FOR EV

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ABSTRACT

The huge amount of sales for Electric Vehicles (EVs) has created a demand for charging systems that are efficient, safe and can be used by non-expert users. Current plug-in charging station standards require manual intervention by the user, require a lot of time and money to maintain the infrastructure and are dangerous to use. This project aims to address the problems associated with traditional plug-ins by proposing an AI based "Wireless Charging Station" for EVs that provides contactless, autonomous, and intelligent energy transfer. The charger will use a method called Wireless Power Transfer (WPT), where electrical energy is transferred through magnetic resonance coupling from the transmitter coil located on the ground to the receiver coil located on the vehicle without making any physical connection between the two. An infrared (IR) sensor will be used for accurately positioning the vehicle on the charging station so that alignment or positioning is correct to provide the most efficient power transfer. The system will be controlled by the ATmega328 microcontroller and sensor that include voltage sensors that can monitor the battery condition in real-time. The artificial intelligence integration in this system is realized by way of a visual basic-based AI analyser.

92. SAFE SPECTRA – ESP32 BASED MULTI-SENSOR OBSTACLE, ALCOHOL AND DRIVER ALERT SYSTEM

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ABSTRACT

Road safety remains a major concern due to increasing accidents caused by driver fatigue, alcohol consumption, and poor obstacle detection. This paper presents SAFE SPECTRA, an intelligent vehicle safety system built using the ESP32 microcontroller. The system integrates multiple sensors to detect obstacles, monitor alcohol levels, and identify driver drowsiness. Upon detecting any abnormal condition, the system generates alerts and can take preventive actions such as disabling vehicle ignition or issuing warnings. The proposed solution is cost-effective, scalable, and suitable for real-time implementation in modern vehicles.

93. GEOLOCATION ATTENDANCE TRACKING SYSTEM WITH BIOMETRICS

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ABSTRACT

Attendance management is a critical administrative task in educational institutions and organizations, yet traditional methods such as manual registers, RFID cards, or proxy-based systems are often inefficient, time-consuming, and prone to manipulation. To address these limitations, this project proposes an AI/ML-based Geolocation Attendance Tracking System integrated with Biometric Authentication to ensure accuracy, security, and automation in attendance monitoring.

94. SMARTRING INTEGRATED YOGA WELLNESS APP

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ABSTRACT

PRANARING – Smart Ring Integrated with Yoga Wellness App is an IoT-based wearable health monitoring system designed to promote digital wellness and preventive healthcare through continuous real-time tracking of essential physiological parameters. The project aims to develop a compact and portable smart ring device embedded with biomedical sensors such as MAX30102 and LM35 to measure heart rate, blood oxygen saturation (SpO₂), and body temperature. The collected data is processed by a microcontroller and transmitted wirelessly to a mobile application using Bluetooth Low Energy (BLE) technology. A dedicated mobile application developed using Flutter and Firebase provides real-time visualization, cloud storage, and historical analysis of health data through an interactive dashboard. Unlike conventional fitness trackers, the system is specifically oriented toward yoga and wellness awareness, offering basic health insights and encouraging relaxation and breathing practices. The complete system integrates smart ring hardware, wireless communication, and a mobile application platform to deliver an affordable, user-friendly, and efficient health monitoring solution. Experimental results demonstrate accurate sensor readings, stable connectivity, minimal transmission delay, and reliable performance. This project successfully highlights the Practical application of IoT in personal healthcare, with future scope for additional sensors, enhanced battery life, and advanced health analytics to further improve wellness management.

95. PROJECT TITLE IOT-ENABLED AIR FILTRATION AND QUALITY MONITORING SYSTEM

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ABSTRACT

Air pollution has emerged as a critical environmental and public health issue affecting both indoor and outdoor spaces. Continuous exposure to harmful gases can lead to severe respiratory and cardiovascular diseases, making real-time monitoring and automated control systems essential. This project proposes the design and implementation of an Internet of Things (IoT)-based Air Pollution Monitoring and Control System using anMQ-6 gas sensor integrated with a Node MCU ESP8266 microcontroller. The system aims to provide a cost-effective, intelligent, and scalable solution for detecting and managing air pollution levels in real time. TheMQ-6 sensor is employed to detect combustible and hazardous gases such as liquefied petroleum gas (LPG), propane, butane, and other volatile compounds present in the atmosphere. The NodeMCU ESP8266microcontroller collects sensor data and transmits it to a cloud platform through built-in Wi-Fi connectivity. This enables continuous real-time monitoring and remote accessibility of air quality data. The system processes gas concentration levels and classifies air conditions into safe and hazardous categories based on predefined threshold values. When pollutant levels exceed safe limits, the system automatically triggers control mechanisms such as exhaust fans or air filtration units to reduce contamination and restore safe air conditions. Additionally, the system supports outdoor environmental monitoring by allowing users to view pollution data through a web dashboard or mobile application. This remote access feature facilitates proactive decision making and awareness regarding environmental health.

96. IOT FRAMEWORK FOR DECODING PLANT STRESS AND HEALTH

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ABSTRACT

Plants are living organisms that depend on environmental conditions such as temperature, humidity, and soil moisture for their healthy growth. When these factors move away from the normal range, plants experience stress that affects their growth, metabolism, and productivity. Traditional methods to check plant health are mostly based on visual observation or laboratory testing, which are slow, expensive, and not suitable for continuous monitoring. To overcome these issues, this project focuses on developing an IoT-based framework for decoding plant stress and health by using both bioelectrical and environmental parameters. The proposed system uses an ESP32 microcontroller as the main processing unit. It is connected with an AD8232 ECG module to capture the plant's bioelectrical signals, a DHT11 sensor to measure temperature and humidity, and a soil moisture sensor to check the water level in the soil. These sensors continuously send data to the microcontroller, which processes the information and classifies the plant condition as "Healthy" or "Stressed." The result is shown on an OLED display and also updated in real time to the Blynk Cloud platform, allowing users to monitor the plant's condition remotely using a mobile application. The project uses a non-invasive method, meaning the sensors do not harm the plant while taking readings. Stable and smooth bioelectrical signals represent a healthy condition, while irregular signals and extreme environmental readings indicate stress. The collected data can be used to identify early signs of stress and help take corrective actions like irrigation or shading. The project shows that combining bioelectrical and environmental monitoring helps in detecting stress at an early stage, improving plant care and promoting sustainable farming practices.

97. SMART DEVICE FOR ALZHEIMER'S PATIENT SAFETY

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ABSTRACT

Alzheimer's disease is a progressive neurological disorder that affects memory, thinking ability, and daily activities of patients. As the disease progresses, patients may experience disorientation, wandering behavior, and accidental falls, which pose serious safety risks. Continuous monitoring is therefore necessary to ensure patient safety and provide timely assistance from caregivers. This paper presents an Internet of Things (IoT) based monitoring system designed to improve the safety and independence of Alzheimer's patients. The proposed system integrates an accelerometer for fall detection, a Global Positioning System (GPS) module for real-time location tracking, and a Global System for Mobile Communication (GSM) module for sending emergency alerts to caregivers. When a fall or abnormal activity is detected, the system automatically sends an alert message along with the patient's location coordinates. A medication reminder module also provides audio alerts for timely medicine intake. The Arduino Nano based system operates autonomously without requiring patient interaction. Experimental results show reliable fall detection, accurate location tracking, and quick alert transmission. The system is portable, cost-effective, and suitable for continuous home monitoring of Alzheimer's patients.

KeyWords: Alzheimer's disease, IoT monitoring, Patient safety, GPS tracking, Fall detection, GSM alert system.

98. AN INTELLIGENT HYBRID SWIN TRANSFORMER FRAMEWORK – CNN FOR ADVANCE MEDICAL IMAGE

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ABSTRACT

Recent advances in vision transformers have significantly improved image understanding by modeling long-range dependencies and hierarchical representations; however, effectively integrating attention mechanisms across multiple stages remains a challenge for robust image representation and performance optimization. This paper presents a Multi-Stage Attention-Driven Framework built upon the Swin Transfer Model to enhance image feature learning and comprehensive performance analysis. The proposed framework leverages the shifted-window self-attention of the Swin Transformer while introducing a cascaded multi-stage attention strategy that progressively refines spatial, channel, and contextual features across different network depths. By combining transfer learning with adaptive attention fusion, the model efficiently captures both local visual patterns and global semantic relationships, leading to discriminative and scalable image representations. The framework is designed to be modular and computationally efficient, making it suitable for high-resolution image processing and real-world vision tasks. Extensive experiments are conducted on benchmark image datasets to evaluate classification accuracy, feature robustness, convergence behavior, and computational performance. Quantitative and qualitative analyses demonstrate that the proposed approach consistently outperforms conventional CNN-based architectures and single-stage transformer models in terms of accuracy, generalization, and feature interpretability.

Keywords: Multi-Stage Attention, Swin Transformer, Transfer Learning, Image Representation, Vision Transformers, Performance Analysis, Feature Fusion

99. "BILL-BEFORE-BIN: AN EMBEDDED SELF-CHECKOUT TROLLEY WITH ANTI INSERTION CONTROL

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ABSTRACT

Traditional retail billing systems rely on checkout counters, leading to long queues, billing delays, and opportunities for product mismatch or unauthorized insertion. This project presents Bill Before-Bin, an embedded self-checkout shopping trolley designed to perform billing at the point of product placement. The system enforces an anti-insertion control mechanism, where products can be placed into the trolley only after successful barcode scanning. A servo-controlled lid restricts access to the trolley bin and opens exclusively upon valid product authorization, ensuring secure and accurately billing. An on-board display continuously updates the customer with product details, item count, and total cost in real time. The system also supports controlled product removal, dynamically adjusting the bill when items are taken out. All transaction data is transmitted wirelessly to a centralized billing interface, enabling seamless monitoring of multiple trolleys through unique identifiers. By integrating embedded control, real-time billing, and secure access, the proposed system reduces checkout time, minimizes human intervention, and enhances transparency and security in modern retail environments.

100. ENERGY EFFICIENT ELECTRIC VEHICLE CHARGING USING SOLID-STATE TRANSFORMER SYSTEMS

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ABSTRACT

When electric vehicles are rapidly increasing in number, the strain on existing distribution networks and traditional charging infrastructure is immense, and traditional fast charging systems can't meet the need. They are clunky, hard to control, can't be scaled up easily and don't use energy very efficiently. Well-known Solid-State Transformers or SSTs are now being suggested as a solution to this problem, and this paper introduces a brand-new, efficient and compact EV fast-charging system that uses SST technology. The proposed system replaces the usual low-frequency transformers and hierarchical layouts with a high-frequency electronic converter consisting of a three- phase PWM rectifier at the front end and a dual- active bridge converter with a medium-frequency transformer at the back end. Developed and simulated in MATLAB/Simulink, the proposed model provides a galvanic barrier and V2G capabilities. This allows EVs to feed electricity back into the grid, and to act as energy storage systems, all of which is confirmed in the simulation results. The system is capable of outputting 320 kW at 800V and 400 A with very high efficiency and very clean output. The use of an SST brings a significant upgrade to the efficiency, compactness and use of renewable energy, and it has the potential to be the go- to technology for the next wave of EV charging stations.

Keywords— Solid State Transformer (SST), Electric Vehicle (EV), Dual Active Bridge (DAB), Vehicle to Grid (V2G), Medium Frequency Transformer (MFT).

103. IOT-ENABLED REMOTE MONITORING AND EARLY DISEASE DETECTION USING WEARABLE SENSORS

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ABSTRACT

To enable continuous and real-time patient monitoring, the rapid advancements of Internet of Things (IoT) technologies have significantly transformed modern healthcare systems. Particularly, the promising solution for early disease detection and Remote Patient Monitoring (RPM) emerges IoT-enabled wearable sensors. This paper presents a comprehensive review based on IoT based healthcare framework, which integrates wireless communication technologies, wearable sensor devices and intelligent data analytics for proactive health management. The various kinds of wearable sensors, such as blood pressure sensors, temperature and electrocardiogram (ECG), which has the role to monitor physiological parameters are systematically analyzed. For early disease prediction, recent advancements in Artificial Intelligence (AI) techniques including both machine and deep learning approaches are explored in this review. The statistical measure of latency, sensitivity, specificity and accuracy provide a comparative analysis of existing approaches. Additionally, the key challenges of this review including IoT system reliability, interoperability, energy efficiency and data privacy is highlighted and potential research directions are discussed.

Keywords: Internet of Things, Wearable Sensors, Remote Patient Monitoring, Electrocardiogram and Artificial Intelligence.

104. VEHICLE COLLISION AVOIDANCE SYTEM USING Li-Fi COMMUNICATION

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ABSTRACT

Road accidents caused by vehicle collisions are one of the major safety concerns in modern transportation systems. Most accidents occur due to delayed driver response, poor visibility, and lack of real-time communication between vehicles. To address this problem, this project proposes a Vehicle Collision Avoidance System using Light Fidelity (Li-Fi) communication, which enables high-speed wireless communication between vehicles using visible light. The proposed system uses LED headlights and photodiodes to transmit and receive data between nearby vehicles. When a vehicle detects sudden braking, obstacle presence, or change in speed, the information is transmitted through Li-Fi signals to surrounding vehicles. The receiving vehicle processes the data using a microcontroller and immediately alerts the driver through visual or audible warnings. Since Li-Fi operates using visible light, it provides low latency, high data rate, and minimal electromagnetic interference, making it suitable for vehicular communication. The system consists of a Li-Fi transmitter, Li-Fi receiver, microcontroller unit, sensors, and alert modules. The transmitter converts vehicle status information into light signals using LEDs, while the receiver captures the signal using a photodiode and converts it back into electrical data for processing. This enables real-time vehicle-to-vehicle (V2V) communication for collision prevention. The implementation of the proposed Li-Fi based collision avoidance system can significantly reduce road accidents, improve driver awareness, and enhance transportation safety. Compared to conventional RF-based communication systems, Li-Fi offers better security, faster communication, and efficient spectrum utilization, making it a promising technology for future intelligent transportation systems.

Keywords:

Li-Fi, Collision Avoidance, Vehicle- to-Vehicle Communication, Visible Light Communication, Road Safety

105. VLSI DESIGN OF AI-ASSISTED IMAGE COMPRESSION FOR EDGE DEVICES

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ABSTRACT

This project presents a VLSI implementation of an efficient medical image compression algorithm tailored for telemedicine applications. The proposed system reduces data size while preserving critical diagnostic details, enabling faster transmission and real-time processing of medical images over bandwidth-limited networks. The hardware design ensures low power consumption, high speed, and compact architecture, making it suitable for portable and embedded telemedicine devices. This implementation enhances the accessibility and reliability of remote healthcare services.

106. INFINITY BOT: SMART MULTI-AGENT AI ORCHESTRATION USING N8N LOW-CODE AUTOMATION PLATFORM

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ABSTRACT

The rapid evolution of Artificial Intelligence (AI) demands robust orchestration frameworks capable of managing multiple intelligent agents concurrently. This paper presents **Infinity Bot**, a novel smart multi-agent AI orchestration system built on the n8n low-code automation platform and validated through live experimental deployment. The proposed architecture integrates dual heterogeneous AI agents — a Llama-based language agent and a Google Gemini-based reasoning agent — operating in parallel, each equipped with persistent MongoDB-based chat memory and independent tool access. A Transcribe Switch node enables intelligent input routing, while a Merge node fuses agent outputs for synthesis by a central Infinity Bot orchestrator, delivering responses via Telegram. Experimental evaluation across 60 real-world test queries demonstrates a 94.7% task completion rate, 5.3% hallucination rate, and 93.2% memory retention accuracy. Comparative analysis against LangChain, AutoGen, and CrewAI establishes n8n as a viable enterprise-grade AI orchestration substrate, democratising multi-agent AI development for communication engineering applications including IoT, 5G network management, and embedded cyber-physical systems.

Keywords: *Multi-Agent AI, n8n, Low-Code Automation, LLM Orchestration, Infinity Bot, Llama, Gemini, Telegram Bot, MongoDB, AI Workflow, 5G, IoT*

ABOUT THE PRINCIPAL



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ABOUT THE VICE PRINCIPAL



Dr. K. Anbarasan is the Vice Principal of Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu, with 22 years of teaching and administrative experience in engineering education. He completed his Ph.D. in Control Systems Engineering from National Institute of Technology Tiruchirappalli. His research interests focus on emerging areas in engineering and technology. He has published numerous research papers in reputed national and international journals, including SCI, Scopus, and IEEE indexed journals, along with book chapters, and has published several research papers at national and international conferences.

ABOUT THE EDITOR'S



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Mrs. N. Suguna is currently serving as an Associate Professor in the Department of Master of Business Administration at Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur, Tamil Nadu, and India. She holds an MBA from J.J. College of Engineering and Technology and has over 23 years of teaching experience in management education. She has consistently contributed to academic excellence and student development through her dedicated teaching approach. Her areas of expertise include Systems, Business Analytics, and Information Management. She adopts a practical-oriented teaching methodology by integrating case studies, real-time business applications, and experiential learning techniques. She actively engages students in analytical thinking and data-driven decision-making processes essential for managerial roles. She has been actively involved in curriculum development and academic mentoring for MBA students. Her guidance in project work, particularly in model creation, data analysis, and business simulations, enhances students' practical exposure. She emphasizes bridging the gap between theoretical knowledge and industry practices.



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