JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

Springer 2025 ICETESS

CELEBRATING 25 YEARS OF BUILDING TALENT

International Conference on ENGINEERING TRENDS IN EDUCATION SYSTEMS & SUSTAINABILITY ICETESS-2025

18TH - 19TH April, 2025

SOUVENIR

Springer

MATEC Web of Conferences

Organised By:

Jaipur Engineering College & Research Centre

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Opp. EPIP Gate

Tonk Road, Jaipur-302022

Proceedings of
International Conference on Engineering Trends in Education System & Sustainability
(ICETESS-2025)
18-19, April 2025

ICETESS - 2025 Conference Proceedings

International Conference on Engineering Trends in Education Systems & Sustainability (ICETESS-2025)18 - 19, April 2025

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Dr. Vinay Kumar Chandna
Principal, JECRC

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Dr. M. P. Singh
Professor & Head, Department of Mechanical, JECRC

Dr. Vijeta Kumawat
Professor & Head,
Department of Computer Science & Engineering, JECRC

Dr. Fauzia Siddiqui
Professor, Department of Mechanical, JECRC

Jaipur Engineering College and Research Centre, Jaipur
Shri Ram Ki Nangal, Via Sitapura RIICO Tonk Road, Jaipur

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28. Mr. Abhishek jain

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Shri O.P. Agrawal
Chairman JECRC

I am happy to note that all Department of JECRC, Jaipur is organizing International Conference on Engineering Trends in Education Systems & Sustainability ICETESS - 2025. The conference would be another milestone in the academic trajectory of JECRC.

Our future and sustained growth depends on the innovations of scientists and engineers. The contributions and innovative ideas to be presented in the conference will certainly benefit the participants.

Jaipur is known for its rich cultural heritage which I am sure will be an ideal venue for such an intellectual interaction.

I wish to extend my good wishes for the success of the conference.

O.P. Agrawal

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Shri Amit Agrawal
Vice Chairperson, JECRC

It gives me great pleasure to welcome you all to the International Conference being organized by all the Department of JECRC, Jaipur. The vision of JECRC is to foster research and technological innovations which lays the foundation of Industrial growth of the country in a globally competitive environment.

We reaffirm our commitment of providing well informed professionals ready to assume their responsibilities in society. Such interactions expedite technological innovations. The drastic changes in engineering sciences have accelerated the need for skilled human resource development in all fields especially technology.

I sincerely thank the keynote speakers, the participants and the core team members who have worked hard to make this event a success.

Amit Agrawal

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Shri Arpit Agrawal
Vice Chairperson, JECRC

Welcome to all the participants of ICETESS - 2025. The overwhelming response to the conference received from participants of various institutions of higher learning across the different parts of the country motivates us to improve ourselves.

We are currently in the era of engineering revolution, spearheaded by recent developments in engineering sciences, providing sustainable solutions to various issues in different areas. The deliberations in different tracks of the conference will highlight the current developments in the field of Engineering that shall create awareness about the dynamics of the Engineering Sciences.

I extend my best wishes for the success of the conference and I am confident that the interaction will be a source of inspiration to upcoming educationists, technocrats, academia who shoulder the responsibility of bringing in the desired innovations in their fields leading to the advancement of the country.

Arpit Agrawal

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Shri Dheemant Agrawal
C.E.O JECRC Incubation Center

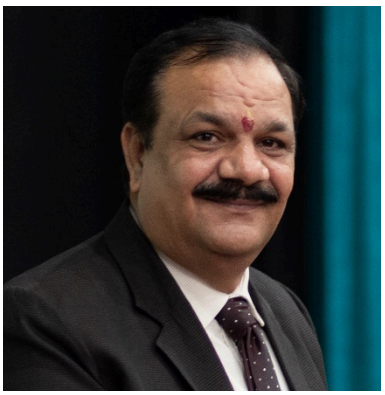
Welcome to all participants of ICETESS 2025. The enthusiastic response from institutions across the country encourages us to strive for excellence.

As we navigate through a transformative era in engineering, this conference aims to showcase cutting-edge developments that offer sustainable solutions to real-world challenges. The sessions will spark meaningful discussions and promote awareness of the evolving landscape of engineering sciences.

I extend my best wishes for a successful conference and hope it inspires educators, technocrats, and researchers to drive innovation and contribute to national progress.

Dheemant Agrawal

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE



Prof. V.K. Chandna
Principal JECRC

It is gratifying to note that all the Department of JECRC is hosting the International Conference on Engineering Trends in Education Systems & Sustainability ICETESS-2025.

Nowadays, organizing such technical conference provides a platform where the researchers can expose their ideas of their research concern. They may also be able to listen and get aware of the recent trends in research and education in a particular field of their interest in the education of invited lectures from different subject experts.

I convey my best wishes to all the conveners, of this conference 'ICETESS-2025' for putting paramount efforts for the success of the conference.

I am confident that the conference shall benefit all the participants in finding the solutions of their research problems through discussion.

I also convey my best wishes & greetings to all the participating delegates and wish the conference a great success.

Prof. V.K. Chandna

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Dr. M. P. Singh

Head Mechanical Engineering

It is a matter of immense honor and privilege to share a few words on the esteemed occasion of the "International Conference on Engineering Trends in Education Systems & Sustainability (ICETESS 2025)."

This conference stands as a testament to the power of collaboration and innovation, bringing together thought leaders, educators, researchers, and industry experts to engage in meaningful dialogue on transformative trends in engineering and sustainable education. ICETESS 2025 aims to spark new ideas, promote inclusive learning through digital platforms such as MOOCs, and encourage the development of resilient and future-ready education systems across the globe.

It provides a vibrant environment to present pioneering research, discuss real-world applications, and cultivate lasting academic and professional connections that transcend borders.

I extend my heartfelt gratitude to the management for their consistent encouragement and support. A special note of thanks to Prof. V.K. Chandna, Principal of Jaipur Engineering College & Research Centre, for his visionary guidance and persistent efforts in making this event a grand success.

I am also deeply thankful to all our distinguished guests, keynote speakers, session chairs, organizing and advisory committee members, enthusiastic participants, hardworking volunteers, and media representatives whose collective efforts have been instrumental in shaping ICETESS 2025 into a memorable and impactful conference.

Dr. M. P. Singh

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Dr. Vijeta Kumawat
Head Department of Computer Science & Engineering

It is indeed a great pleasure to pen a few words on the occasion of "International Conference on Engineering Trends in Education Systems & Sustainability (ICETESS 2025)". The conference addresses innovative advancements in Engineering Trends in Education Systems & Sustainability issues. The goal of this conference is to facilitate fruitful discussions on current developments in educational systems, accelerate the building up of infrastructure for communication, promote the openness and sharing of MOOC and online education resources, as well as showcase innovative research and practices, inspire new ideas and trends to contribute the advancement of education globally.

ICETESS 2025 aims to provide an opportunistic forum and vibrant platform for researchers and industry practitioners to exchange state-of-the-art knowledge gained from their original research work and practical developments on specific new challenges, applications and experiences, to establish business or research relations, and to find global partners for future collaboration on emerging issues.

I would want to express my sincere gratitude to the management for their unwavering support. I would like to sincerely thanks to Prof. V.K. Chandna, the principal of Jaipur Engineering College & Research Centre, for his tireless leadership and inspiration in motivating and enabling the successful organization of this conference on such a grand scale.

In addition, I would like to express my sincere gratitude to the invited guests, keynote speakers, session chairs, members of the organizing and advisory committees, participants, my distinguished colleagues, committed student volunteers, media representatives, and everyone else whose efforts have been crucial to the success of this conference.

Dr. Vijeta Kumawat

Head Department of Computer Science & Engineering

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

Dr. Fauzia Siddiqui

It gives me immense pride and joy to extend my heartfelt greetings on the momentous occasion of the "International Conference on Engineering Trends in Education Systems & Sustainability (ICETESS 2025)."

This conference serves as a dynamic platform for knowledge exchange, bringing together visionary minds from academia, research, and industry to explore pioneering trends in engineering and sustainable educational practices. ICETESS 2025 is dedicated to encouraging collaboration, inspiring innovation, and fostering the dissemination of MOOC resources and digital learning tools that are vital for shaping the future of global education.

The event offers a valuable opportunity for delegates to share groundbreaking research, discuss practical solutions to emerging challenges, and build meaningful partnerships that pave the way for future endeavors.

I would like to take this opportunity to convey my deep appreciation to the management for their steadfast support. My sincere thanks also go to Prof. V.K. Chandna, Principal of Jaipur Engineering College & Research Centre, whose exemplary leadership and unwavering commitment have played a pivotal role in the successful orchestration of this grand event.

I also wish to acknowledge the invaluable contributions of our esteemed guests, keynote speakers, session chairs, organizing and advisory committee members, participants, dedicated volunteers, media personnel, and all those who have contributed to making ICETESS 2025 a resounding success.

Dr. Fauzia Siddiqui

JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

PREFACE

It gives us immense pleasure to present the proceedings of the **International Conference on Engineering Trends in Education Systems & Sustainability (ICETESS 2025)**, to be held in the vibrant city of **Jaipur, Rajasthan, India**. This premier conference serves as a distinguished forum for researchers, academicians, industry experts, government officials, and students to share, discuss, and disseminate cutting-edge research and innovations in the realms of **Engineering, Education Systems, and Sustainability**.

ICETESS 2025 is designed to explore emerging trends and address the pressing challenges in engineering education and sustainable development through a multi-disciplinary lens. With participation from institutions of higher learning across the country and abroad, the conference is envisioned as a global platform for networking, collaboration, and knowledge exchange.

The conference covers a wide array of themes across various disciplines including **Computer Science, Artificial Intelligence, Mechanical, Electronics, Electrical, Civil, and Applied Sciences**, aiming to promote innovative thinking and sustainable solutions for modern educational systems and societal needs. Special emphasis has been placed on research that not only demonstrates academic excellence but also holds the potential to make a tangible impact on society.

We are proud to share that selected high-quality papers will be published in reputed journals and conference proceedings indexed in **Scopus, Web of Science, Google Scholar**, and other leading databases. This provides participants with a valuable opportunity to gain international visibility and expand their professional networks through interactions with global peers and stakeholders.

We extend our sincere gratitude to all the authors, reviewers, keynote speakers, organizing

committee members, and volunteers whose collective efforts have shaped this conference into a meaningful and enriching event. We hope that ICETESS 2025 inspires new ideas, fosters impactful collaborations, and significantly contributes to the ongoing advancement of education and sustainability through engineering.

Organizing Committee

ICETESS 2025

About JECRC

JECRC, Jaipur (INDIA) is among the pioneers in Rajasthan in imparting high quality engineering education in different streams. A journey of 25 years for JECRC, having more than 5000 students on campus under 8 UG programs, has earned laurels to their students, faculty members and for the institute in many ways. More than 15000 alumni's spread over the globe have climbed the ladder to leadership positions and provide mentorship to their juniors by way of skill development, incubation, startup, research and angel funding. Grants from government agencies for setting up centres of excellence, state of art facilities for startups, providing a platform to the students to develop their technical and managerial skills to get placement in reputed organizations. Also JECRC University was established in the year 2012 and at present more than 25000 students enrolled.

Socially rich atmosphere at the campus enabling fourfold grooming of students that is recognized at National and International level and enabling students to work as interns with personalities recognized in their field of expertise. JECRC has become synonymous to placements and JECRCians have made their presence felt at every reputed company / government organization. To improve the quality of teaching learning, the institute on regular basis is getting the appreciations from Government and Non Government Organizations viz., NITTTR Chandigarh, National Board of Accreditation, Rajasthan Technical University, AICTE, ASSOCHAM, Computer Society of India, The Week, Outlook, India Today etc. and two programs Mechanical Engineering and Electronics & Communication Engineering are accredited by the National Board of Accreditation for providing outcome based education.

Vision:

Vision To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities.

Mission:

1.Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project-based learning.

2.Identify, based on informed perception of Indian, regional and global needs, areas of focus and provide platform to gain knowledge and solutions.

3.Offer opportunities for interaction between academia and industry.

4.Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

Proceedings of
International Conference on Engineering Trends in Education System & Sustainability (ICETESS-2025)
18-19, April 2025

Date: 18th April 2025 Time:2:30pm-4:30pm
Technical Session- 1 (Offline)
Venue – LT-3, A-Block

Session Chair: 1. Dr. Darshanaben Dipak Kumar Pandya
2. Prof (Dr.) Abid Hussain

Keynote Speaker: Dr. Ankit R. Patel

S.No	Paper ID	Paper Title	Author Name
1	102	Temporal Attention-Based Multimodal Networks for Real-Time Proctoring of Online Examinations	B H V S P Subrahmanyam
2	260	Advancements in Crop Disease Detection: A CNN-Focused Approach	Yash Upadhyay
3	147	Novel strategies for electric vehicle charging with solar PV based charging station having power back-up arrangement	Singh Sanjay Ram Singh
4	251	Analyzing Software Defect Prediction using AI Approaches	Divya Sharma
5	40	IoT-Driven Smart Surveillance: Architecture, Design, and Implementation	Dr. Darshanaben Dipak kumar Pandya
6	217	Gamification and Learning through Digital Platforms	Keshav Dev Gupta
7	187	Using AI-Powered Sign Language Generation, Deepfake GAN Technology, and Rural Education Insights to Advance Deaf Education and Communication	Shalini Kulshrestha
8	208	Conceptualizing Learned Helplessness in Higher Education: Investigating the Impact of Multiple Factors	Kusum Lata Jain
9	276	AI-Driven Object Recognition for Sustainable Agriculture: Enhancing Precision with Bounding Box Identification	Dr. Nikita Gupta
10	170	Mobile App for Direct Market Access for Farmers	Charu Upadhyay

Session Coordinator
Dr. Parul Tyagi (9772970343)
Dr.Shalini Kulshrestha (9887295484

Technical Assistant
Mr. Rakesh Prajapat (9653704654)

Date: 18th April 2025 Time:2:30pm-4:30pm
Technical Session- 2 (Offline)
Venue – A block Auditorium

Session Chair: 1Dr. Vishal Rajendra Trivedi
2. Dr. Sarvesh Kumar

Keynote Speaker: Dr. Anuj Prakash

S.No	Paper ID	Paper Title	Author Name
1	270	Evaluation of services provided by JECRC College Jaipur in Central library	Dr. Kamlesh Maharwal
2	248	DE-FAKE: Counterfeit currency detection	Rakshit Sawarn
3	246	Multi-Agent Traffic Management System for Smart Cities – A Review	Ankita Kapoor
4	245	Tiny ML on Microcontrollers: A Review	Ugyen Jigme Rangdrel
5	244	Diabetes Prediction Based on Machine Learning Techniques: A Review	Agnishwar Raychaudhuri
6	243	Anomaly detection in human behavior using computer vision: A review	Ishika Sahu
7	242	A Multi-Mode Transportation System: Integrating Land, Air, and Water mode	Amit Mithal
8	289	Presentation Attack Detection in Facial Recognition: A Survey into Facial Spoofing Countermeasures.	Ahana Nair
9	254	An AI Driven Approach for Bird Species Conservation	Seema Jogad
10	218	Performance analysis of IEEE 33 Bus and IEEE 69 Bus radial distribution system using backward forward sweep load flow	Ms. Sonali Chadda
11.	292	Efficient circular Fractal Antennas for UWB applications in wireless network	Ms. Vinita Mathur

Session Coordinator
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Ms. Sonali Chadda(8058600010)

Technical Assistant
Mr. Shyam Sundar Sharma (9829610551)

Date: 18th April 2025 Time: 2:30pm-4:30pm
Technical Session- 3 (Offline)
Venue – LT-4, A- Block

Session Chair: 1. Dr. Udit Mamodiya
2. Dr. M. Firdos Sheikh

S.No	Paper ID	Paper Title	Author Name
1	100	ICT Applications as a Generic Tool to Enhance Communication	Dr. Gaurav Kumar Jain
2	18	Machine Learning for Early Diagnosis and Prognosis of Prostate Cancer: A Comparative Analysis of Predictive Models	Jeeva Jothi. J
3	194	Deep Learning-Based User Behavior Analysis: A Neural Network Approach for Predicting Purchasing Patterns	Swati Paliwal
4	158	Dune Sand Stabilization Using Marble Dust	Subhash Rajpurohit
5	164	A Hybrid model for Classification: Neutrosophic logic meets Machine Learning	Kanika Bhutani
6	86	Unsupervised Information Retrieval: From Classical Models to Neural Architectures	Dr.Swati Agrawal
7	62	Enhancing Retail Marketing Strategies through Big Data Analytics of Consumer Behavior	Ms. Madhu Choudhary
8	235	Performance Evaluation of Photovoltaic Thermal System integrated with Fresnel Lens: A Comprehensive Review	Mr. Ajay Kumar Vashist
9	281	Deep Fuzzy Hypersphere Neural Network model for Anomaly Detection in Edge Computing	Sonali Bhushan Jadhav
10	254	An AI Driven Approach for Bird Species Conservation	Utkarsh Maurya

Session Coordinator
Ms. Kanika Bhutani (9996331017)
Ms. Charu Upadhyay (9549364030)

Technical Assistant
Mr. Yash Kumar Saini (9530028615)

Date: 18th April 2025 Time: 2:30pm-4:30pm
Technical Session- 4 (Online)
Venue – IBM Lab, A-Block

Session Chair: 1. Dr. K. D. Gupta
2. Dr. Shikha Sharma

Keynote: Dr. Vijay Kr. Banga

Link: http://meet.google.com/xmw-jzvx-ecm

S.No	Paper ID	Paper Title	Author Name
1	225	ITAS: Intelligent Traffic Automation System	Nikita
2	210	Optimizing Brain Tumour Classification Models through Advanced Image Segmentation Techniques	Anshul Khemka
3	204	AI-Driven Innovations for Genetic Risk Prediction in Healthcare.	Saptadip Das
4	133	Advanced Kinetic Modelling of Poly ethylene glycoladipate–Co–1,12–Dodecane Adipate Synthesis Integrating 2nd Order and Reversible Reactions	B. Yamini
5	7	Innovative Solar Lawn Mower for Smart Agriculture and Sustainable Lawn Care	Sanjay T
6	266	Real Time Carbon Footprint Monitoring in Manufacturing Industries using IOT and ML	Ishita Rakchhit
7	104	A Lightweight Framework for Obstacle Detection in Railway Images Using Fast Region Proposal and Improved YOLO-Tiny Network	Dhanush H
8	222	An In-Depth Analysis of Security and Privacy Issues in Smart Home IoT Systems	Atul Kumar
9	81	Unraveling the Influence of Sensor Characteristics on Robotic Exploration: A Comprehensive Analysis	Sonia Sethi
10	80	Prediction of Rotor Faults in Motor using Non-Decimated Wavelet Transform and Multiple Linear Regression through Multimodal Sensor Signals	S. Selvi
11	219	Geometric approach to calculate motion parameters by implementing inverse kinematics	Harsh Kumar Dixit

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Ms. Kusum Yadav (9251039750)
Mr. Brijesh Kr. Singh (9587456711)

Technical Assistant
Mr. Manoj Sharma(6375356010)

Proceedings of
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Date: 18th April 2025 Time: 2:30pm-4:30pm
Technical Session- 5 (Online)
Venue – Conference Room, A-Block

Session Chair: 1. Dr Deepali Atheaya
2. Dr Paramjit Thakur

Link: http://meet.google.com/bfn-obdf-czw

S. No	Paper ID	Paper Title	Author Name
1	67	Electric Vehicle Warning Sound System	K. Santhakumari
2	17	Development of an Electronic System for Tinnitus Frequency Detection and Management	P. Sinthia
3	119	Real-Time IoT Based Monitoring Robot for Women's Security in Public	J. Anish Kumar
4	192	Enhanced Thermal Control in Space Radiators: An SQP-Based Optimization Approach	Irigela Bharghava Vardhan Reddy
5	255	Dynamic Spectrum and Security in Cognitive Radio Networks with Unlicensed Bands	Dolley Maria C
6	166	Integrated Sensing and Communication Using Affine Frequency Division Multiplexing for High-Mobility Scenarios	R. Anil Kumar
7	109	Comparative Analysis of Banana Peel Powder and Neem Leaf Powder as Eco-Friendly Coagulants for Industrial Wastewater Treatment: A Sustainable Environmental Solution	Sheetal Thapa
8	121	Sustainable Industrial Wastewater Treatment: A Comparative Study of Tamarind Seed Powder and Hyacinth Peel Powder as Natural Coagulants	Asha Rani N R
9	11	Enhancing Real-Time Systems: Multi-Rider Transport, Safety Equipment Adherence, and License Plate Modernization	Hemalatha R
10	21	Smart Guardian Women Safety System Based on IOT Technologies	Dr S. Kavitha
11	115	Wear Characteristics of SS308L Fabricated by Wire Arc Additive Manufacturing (WAAM): A Review	Priyanshu Tiwari

Session Coordinator
Dr. Gaurav Jain (6376113352)
Mr. Rizwan Khan (9351539978)

Technical Assistant
Mr. Aashish Sharma (7568440969)

Proceedings of
International Conference on Engineering Trends in Education System & Sustainability (ICETESS-2025)
18-19, April 2025

Date: 18th April 2025 Time: 2:30 pm-4:30pm
Technical Session- 6 (Online)
Venue – CP-4, A- Block

Session Chair: 1. Dr. Reena Dadhich
2. Dr. Nistha Keshwani

Link: http://meet.google.com/ynx-fiks-tfh

S. No	Paper ID	Paper Title	Author Name
1	111	A Modelling Review and Recent Progress on Enhancement of Heat Transfer in Microchannel	Sandeep Kandwal
2	220	Development of Waste Heat Recovery Technologies – A comprehensive Review	Dr. Deepali Atheaya
3	122	Futuristic Approach to Cholesterol Detection by Utilizing Non-Invasive Techniques	V.Malathy
4	123	Optimizing Low Light Image Restoration through Deep Learning and Non-Local Means Denoising	V.Malathy
5	124	Harnessing Quantum Computing for Advanced Business Analytics: A New Frontier	Nagendar Yamsani
6	125	Precision Cardiovascular Care: Leveraging LLMs and Leopard Seal Optimization for Automated Diagnosis	Bura Vijay Kumar
7	175	Integration U-net Segmentation and Resnet50 classification model of Aloe vera Plant Leaf Disease Detection and Severity Assessment Techniques	Sakshi koli
8	26	IoT-Based Industrial Safety System for Monitoring Environmental and Electrical Hazards	Dr S. Kavitha
9	293	Advancements in ADAS and integration with Legacy systems	Nouhaad Raza Abidi
10	282	Pedagogical Innovation: Emerging Trends in Engineering Education	Eilia Jafar
11	199	Investigation of Obstacles and Indicators in the Manufacturing Industry: Case Study	Dr. M. P. Singh

Session Coordinator
Ms. B. Uma Maheswari (7014199072)
Mr. Rajan Jha (9664015955)

Technical Assistant
Mr. Bhupendra Singh (9929456216)

Proceedings of
International Conference on Engineering Trends in Education System & Sustainability (ICETESS-2025)
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Date: 19th April 2025 Time:
10:00am-12:30 pm
Technical Session-7 (Online)
Venue – Auditorium, A- Block

Session Chair: 1. Dr. Ruchi Nanda
2. Dr. Sandeep Sharma

Keynote Speaker: Dr. Lavika Goel

Link: meet.google.com/uvo-hybc-oiq

S.No	Paper ID	Paper Title	Author Name
1	182	Improving Complex Emotion Recognition Using Transfer Learning and CNN Architectures	Shabanam Bano
2	183	A Comparative Study on Voila Jones and Adaboost Algorithms	Shabanam bano
3	73	A High Boost Transformer less DC/DC with Improved Efficiency for Solar PV Powered Applications	Kanchana, K.
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18-19, April 2025

Date: 19th April 2025

Time: 10:00am-12:30

Noon Technical Session- 8 (Online)
Venue – CP-6, A- Block

Session Chair: 1. Dr. K. Suresh Sharma
2. Dr. S. Kavitha

Keynote Speaker: Dr. Sergei N. Polbitsyn

Link:https://meet.google.com/cvz-fbxc-mkv

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Date: 19th April 2025 Time:
10:00am-12:30 Noon
Technical Session- 9
(Online)
Venue – CP-4, A- Block

Session Chair:1. Dr. P. Sinthia Dioneda
2. Dr. Deepa Parasar

Keynote Speaker: Mr. Mel

Link: https://meet.google.com/xmt-rrbj-maz

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3	5	Microseismic Monitoring For Real-Time Landslide Detection	KarpagaPriya R
4	95	Analysis of FCN8 and YOLOv8 in Enhancing Road Segmentation for Autonomous Driving	Deepa Parasar
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Date: 19th April 2025 Time:
10:00am-12:00 Noon
Technical Session- 10
(Online)
Venue – IBM, A- Block

Session Chair: 1. Dr. Gaurav Kumawat
2. Dr. Jinesh Jain

Keynote Speaker: Vladimir Gritsichine

Link: https://meet.google.com/jza-ixnf-gga?authuser=0

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ICETESS2025-005

Micro seismic Monitoring for Real-Time Landslide Detection

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Abstract: Infrastructure and human life are at a great risk with landslides. Herein, the system is a landslide warning system, which blends the use of deep learning, as well as IoT sensors for its use to alert in real-time prediction. It monitors the environment from MPU6050 (ground vibration), soil moisture, DHT22 for temperature and humidity, an ESP32 microcontroller, and LCD display, and gives out information to a Recurrent Neural Network model trained on historical landslide data. This model monitors data to classify landslide risk by sending alerts through Blynk whenever probability exceeds a predetermined threshold. The system issues timely and accurate warnings that allow for early preventive action and evacuation before a disaster, thus promoting disaster preparedness and response. This approach results from a combination of IoT and deep learning for powerful landslide early warning capabilities.

Keywords: Landslides, IoT, Deep Learning, ESP32, RNN, Early Warning, Disaster Management.

ICETESS2025-006

Intelligent Fabric Defect Detection System Leveraging CNN and GAN Algorithms

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Abstract: Detection of faults in fabrics is crucial for the textile industry because detection of faults is required for the standard quality. Traditional methods of detecting faults are manual, time-consuming, and susceptible to human errors. This paper proposes an automated fabric fault detection system that uses image processing techniques to solve these issues. Using high-resolution images, the system will identify different types of defects in the fabric, such as holes, stains, and misweaves. The proposed solution involves edge detection, feature extraction, and classification algorithms such as CNN+GANs for the real-time analysis of images of fabrics. This should improve the accuracy, speed, and efficiency of the defect detection processes, thus minimizing waste and enhancing overall quality control. The proposed system is highly scalable and supports various fabric types, providing the benefit of continuous monitoring without any manual interventions, hence being more cost-effective

compared to current conventional manufacturing processes in the modern textile industry.
Keywords: Fabric Fault Detection, Image Processing, Quality Control, Defect Identification.

ICETESS2025-007

Innovative Solar Lawn Mower for Smart Agriculture and Sustainable Lawn Care

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Abstract: Design and development of a solar-powered smart lawn mower integrated with mobile-controlled operations and seed sowing technology. The system employs a Raspberry Pi microcontroller with an inbuilt Wi-Fi module, enabling seamless communication between the lawn mower and a mobile phone for remote operation. The mower is powered by a solar panel, which charges the battery to provide an eco-friendly and sustainable energy solution. The battery powers various components of the lawn mower, including its propulsion, cutting mechanisms, and seed sowing technology. The inclusion of seed sowing capability transforms the lawn mower into a multifunctional device that addresses both lawn maintenance and agricultural automation. This innovative approach aims to reduce human effort, enhance efficiency, and promote green energy utilization. The paper details the system design, hardware implementation, and potential applications, highlighting its impact on smart agriculture and sustainable lawn care solutions.

Keywords: Lawn mower, Solar panel, battery charging circuit, seed dispenser system, Wi-Fi module, Mobile consolation.

ICETESS2025-011

Enhancing Real-Time Systems: Multi-Rider Transport, Safety Equipment Adherence, and License Plate Modernization

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Abstract: In this study, we suggested a concept that will screen the continued following of vehicle number plates, caps, and triple riders by presenting a cutting-edge Triple Protective Cap Number Plate Framework, gradually disrupting the observation of head protection consistency and number plates. The study line up with Motor Amendment Act's enforcement of traffic infringement penalties 2019, with an emphasis on addressing India's rising motorcycle-related fatalities. The architecture employs three stages of deep learning, with

YOLOV5 used for consistent image grouping. Its primary purpose is to systematize the identification of riding triples and deceptive number plates, by providing law enforcement useful tools to keep safe traffic and upholding the law.

ICETESS2025-016

Ultrasound-Based Smart Blind Cap for Safe Navigation

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Abstract: This smart blind cap is one of the most innovative concepts wherein safety and independence for individuals with visual impairments are maximized. The device scans its surroundings continuously and instantly identifies obstacles with the aid of cutting-edge ultrasound technology. As soon as the object enters within certain proximity, the cap alerts the wearer in terms of sound or even haptic signals that ensure safe navigation. The user will find themselves moving confidently and even alone with this technology and greatly reduced accidents, which is further complemented by the comfortable light headpiece fit that lasts longer and gives a person maximum liberty in the course of his or her daily activities. Other improvements, such as GPS guidance and smartphone connectivity in conjunction with more complex algorithms, put this far ahead of assistive technologies. This innovative gadget helps the partially sighted people to communicate better with the environment, hence widening the possibility for a more inclusive and accessible society.

Keywords: Assistive technology, Real-time alerts, Safety, Independence, Ultrasonic technology.

ICETESS2025-27

5G-Enabled Intelligent Warehouse Management System with RFID

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Abstract: At present, the smart warehousing and logistics solution faces challenges related to high energy consumption and low operational efficiency. To tackle these issues, a novel design incorporating RFID is introduced to tweak the performance of the hardware framework of the overall system. The warehouse management system's network architecture

is structured into four distinct layers: physical, network, data, and application, each contributing to its overall functionality and organization. By leveraging RFID technology, the system enhances its capabilities to transport materials, track their location within the warehouse during outbound processes, and gather data on dispatched items via an RFID scanner. Retrieved items are further transported using automated tools. Additionally, the system includes a user management module that handles login and administrative functions, while inventory management ensures the efficient clearing and counting of goods. This approach lays the groundwork for advancing research in the domain of intelligent logistics and warehousing.

Keywords: Warehouse Management, RFID, Intelligent Logistics, IoT.

ICETESS2025-021

Smart Guardian Women Safety System Based on IOT Technologies

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Abstract: Women of all backgrounds and young girls in particular, battles every day to protect herself escape the wandering eyes of the disgustingly callous males who routinely abuse, harass, and degrade women. The public spaces, especially the streets and public transportation, have fallen under the control of the hunters. Owing to the horrors that women endure in the current environment Women will get prompt, all-encompassing safety support by pushing the emergency button on the device. In the case of an issue, this technology will alert a local police station and volunteer while also tracking the user's whereabouts in real time. Additionally, this device will tell the user where the closest safe area is located. Additionally, this interface is usable offline as well as online. The computer can also be used to call the local police station and volunteer aid if the user does not have internet access. The system consists of an Arduino Uno, GPS, GSM, Bluetooth, and other parts. Both of these elements work together to make this product affordable and easy to use.

Keywords: Internet of Things, GPS, GSM, mobile application, Arduino UNO, smart safety device, women’s safety.

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ICETESS2025-022

Real Time Characterization of Batteries Used for EV Applications

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Abstract: The purpose of this paper is to design and characterize batteries for electric vehicles (Evs) and compare Lithium-Ion (Li-ion) and Lead-Acid battery technologies. The following can be identified as key parameters for judging which battery is more suitable for EV applications: Energy density, Power density, Lifecycle, Safety, and Cost-effectiveness. Lithium ion has good energy density and cycle life but at very high cost. On the other hand, Lead-Acid batteries are affordable but have low energy density and shorter shelf life, thus not appropriate for long duration EV use. In addition, this research investigates how a battery performs in real conditions of an EV, how temperature, charging cycles, and load demand affect the efficiency and lifespan of the battery. It will help in assessing the strength and flexibility of each type of battery in real life use. Finally, this research outlines particular battery configurations and also recommends series and parallel configurations for various EV energy and power requirements. With regards to these factors, research will be able to guide manufacturers and developers in choosing and optimizing battery solutions in order to enhance the performance, reliability and cost of electric vehicles in current and future models.

Keywords: Lead acid, Lithium ion, battery, EV, BMS.

ICETESS2025-026

IoT-Based Industrial Safety System for Monitoring Environmental and Electrical Hazards

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Abstract: Industrial monitoring is the continuous tracking of critical parameters such as temperature, humidity, and gas levels to ensure safe and efficient operations in industrial environments. It helps in early detection of anomalies, reduces risks, minimizes downtime, and improves overall productivity. The importance of industrial monitoring lies in its ability to prevent potential hazards by providing real-time insights, enabling prompt corrective actions that ensure operational safety and reliability. Without proper monitoring, industries experience more accidents and equipment failure coupled with operational inefficiencies. A dual approach on software simulation and hardware implementation-based Industry

Parameters Monitoring System is here developed. For effective monitoring purposes, the integration of IoT with embedded systems within a virtual or physical environment forms the basis of testing and validation. WOKWI is an online platform that provides cost-effective, scalable prototyping wherein the microcontrollers, sensors, and communication protocols are emulated. The above setup enables rapid experimentation in the initial steps without setting up real hardware componentizes. It's hardware implementation is mainly securing actual components such as microcontrollers and sensors, integrated with communication modules. Real-world testing makes vali-dation of the system's practical output performance, thus fully utilizing it under industrial environments. Together, the software and hardware approaches improve the development process, leading to an efficient and robust monitoring solution.

Keywords: Industrial monitoring, IoT, Sensors, WOKWI, Microcontrollers, Hardware testing, Software simulation, Real-time alerts.

ICETESS2025-073

A High Boost Transformer less DC/DC with Improved Efficiency for Solar PV Powered Applications

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Abstract: Large-scale photovoltaic applications were limited to rural homes with an off-grid rooftop PV system and a calculator with a single solar cell. The article introduces a novel DC-DC converter that can considerably increase voltage gain without relying on a transformer. This is accomplished by combining a boost converter with two inductor, cascaded voltage doubler and capacitor with switches, resulting in a high-performance power conversion system. The converter offers benefits such as ease of use, high efficiency, reduced component strain, and smaller size and weight. However, the converter's performance depends on various design factors. First, SIMULINK software is used to simulate the suggested converter mathematically. Then, the drive applications use the recommended work. Finally, the suggested converter was tested in the laboratory using a 585W prototype with a maximum efficiency of 97% for the motor load system.

Keywords: BLDC, Solar Power, Buck/Boost

ICETESS2025-036

Ethical Implications of Artificial Intelligence in Modern Storytelling and Literature

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Abstract: The amalgamation of Artificial Intelligence (AI) into artistic fields has altered the way stories are created and comprehended, extending advanced chances but also inducing substantial moral establishments. This study unravels the moral consequences of AI in modern storytelling and literature, aiming at how AI tools, such as language simulations and propagative procedures, induce artistic procedures, genesis, and reader involvement. This investigation intends to study the challenges modelled by AI, specifically in the relationships of legitimacy, intellectual property, prejudice, and the changing association between human authors and machine-generated narratives. It recognises chasms in current moral contexts administering AI usage in the literature, accenting the requirement for mature progress and disposition of such tools. Using qualitative methodology, research studies existing AI-driven literary applications and estimates their societal impact through case studies and secondary literature. These findings raise the issue of novelty in AI-generated studies. Conventional literary applications and the probability of prejudice in texts are endangered by these tools. Simultaneously, the investigation also recognises ranges in which it may be possible to work with AI as a co-author to boost innovation and make it more affordable. Keeping these challenges in mind, the research concludes with a proposed framework for the amalgamation of AI in creative writing with transparency, without prejudicing, and IPR protection. We anticipate persistent polishing of this structure, examining the probability of AI amplifying literary categories and multimodal storytelling by shielding ethnic and moral values in this digitalised world.

Keywords: First Keyword, Second Keyword, Third Keyword.

ICETESS2025-040

IoT-Driven Smart Surveillance: Architecture, Design, and Implementation

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Abstract: A key benefit of this project is the ability to integrate small devices into the internet, enabling easy communication, management, and control without human intervention. Additionally, it offers a high level of protection, well-being, ease, and efficiency. efficiency. The proposed home automation system makes use of a Raspberry Pi, which is a small, affordable, and versatile device, portable, the credit card-sized single-board computer supports a variety of peripherals and network interfaces, including an Ethernet jack, multiple USB ports, an HDMI interface, and an SD card reader. This work proposes a method to wirelessly connect several nodes to the Raspberry Pi. Each node can monitor environmental conditions and execute control tasks via a relay, such as switching devices like fans, lights, TVs, or air conditioners on or off, while transmitting all collected data to the Raspberry Pi. Cloud-based solutions facilitate the connection to surrounding devices, allowing users to access and manage anything from anywhere at any time through user-friendly interfaces and built-in applications. Consequently, the cloud serves as the front-end interface for accessing these functionalities.

Keywords: Smart technology, Microcontroller, Intelligent home management, Sensing devices, Cloud computing, Monitoring Devices.

ICETESS2025-041

Development in Malaria Diagnosis utilizing Artificial Intelligence Technologies

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Abstract: Innovative solutions to improve malaria diagnosis using the latest artificial intelligence (AI) technologies. Traditional approaches such as optical microscopy and rapid diagnostic tests (RDTs) are effective but have limitations in terms of time, cost, and the need for trained professionals. Furthermore, the automation of malaria diagnosis using blood smear images is at a relatively early stage, where AI-based techniques show great potential compared to traditional methods. AI systems are expected to demonstrate the ability to separate infected and uninfected RBCs using large data sets of digital images as input. For example, some models such as YOLOv5 and Efficient Net have demonstrated diagnostic accuracy of over 98%, which compares well with experienced microscopists. These technologies not only help triage the diagnostic pathway, but also enable this in low-resource settings where trained staff and/or modern equipment may be limited. The convenience of smartphone apps for image capture and analysis facilitates the transfer of these AI solutions to endemic areas. But these advances are not without challenges. Challenges to

population-level implementation include insufficient data sets, algorithm robustness issues, and the need for clinical validation. Existing studies have focused on creating robust training datasets to ensure diverse data from multiple geographic contexts and malaria strains to improve model performance. There are also active efforts to develop automation systems capable of operating microscopes and performing image analysis independently - reducing human error and increasing throughput. Innovative, adaptable AI technologies that are scalable to local healthcare systems will pave the way for malaria diagnosis in the future. The use of these innovations could potentially not only improve diagnostic accuracy, but also play a critical role in malaria control on a global scale. As we advance in AI, its role in public health diagnostics will increase, leading to more successful global disease management strategies.

Keywords: Artificial Intelligence, Development, Diagnostic, Technologies, Management.

ICETESS2025-062

Enhancing Retail Marketing Strategies through Big Data Analytics of Consumer Behaviour

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Abstract: A research paper on bettering retail marketing strategies with Big Data Analytics by examining consumer behaviour. Their research will attempt a predictive approach by using the large transaction records, customer profiles and social media interaction data to enhance marketing effectiveness through a new idea in town called Big Data analytics framework. This approach was performed using a general methodology which includes data collecting, preprocessing and predictive modelling by means of machine learning models like Random Forests and Neural Networks. The findings show that retailers can effectively predict consumer behaviour to better customize their marketing campaigns and drive more engagement, satisfaction. Real-time analytics led to a rapid change in marketing strategies based on the then ongoing consumer trends that provided massive growth in sales as well customer retention. The results highlight the role of Big Data Analytics in improving retail marketing and show that data quality, privacy, and ethical dilemmas are limiting factors. The study extends the related literature by offering a comprehensive solution to utilise Big Data in retail marketing and provides avenues for further research, concerning AI and IoT technologies utilisation data governance improvement changeling familiar source of insights about consumer.

Keywords: Big Data Analytics, retail marketing strategies, predictive analytics, transaction records, customer profiles, social media interactions, marketing effectiveness, machine learning, Random Forests, Neural Networks, predictive models, real-time analytics, consumer trends, sales increase, customer loyalty, data quality, data privacy, ethical considerations, AI, IoT, data governance, consumer insights.

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Electric Vehicle Warning Sound System

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Abstract: The Electric Vehicle Warning Alert System (EVWAS) is designed to generate minimal yet effective sound levels to aid pedestrians, visually impaired individuals, and cyclists in identifying the presence and direction of electric vehicles. This system produces a sequence of alert sounds tailored to ensure awareness in the vicinity of electric vehicles. The proposed solution dynamically adjusts the frequency and volume of pre-stored WAV files based on the vehicle's speed, transmitting the audio signals to an audio power amplifier. The application modulates the frequency of the WAV files in accordance with the vehicle's speed, akin to the engine stroke. WAV files are stored in flash memory and customized as per the end user's requirements. Based on the accelerator input, the system selects the appropriate WAV file from flash memory, modifies its frequency and pitch, and sends the processed signal to the audio power amplifier.

Keywords: Dynamic Volume Control, Sound mixing, Pitch shifting, Mixer, SPI flash, Graphical Programming Interface, Program memory, Revolutions Per Minute, European Union, Electric Vehicle, Waveform Audio File, Random switching frequency pulse width modulation.

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A Comprehensive Framework for Conducting Creative Visualization Opportunity Workshops

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Abstract: In applied perception research, joint effort with area specialists is fundamental for uncovering imaginative utilizations of representation methods. Nonetheless, the underlying period of these joint efforts frequently includes extensive conversations to acquire a profound comprehension of the space’s difficulties. To address this, inventive representation opportunity (CVO) studios have been presented, empowering fast assembling of key prerequisites through concentrated exertion inside a short time span. In spite of their viability, there is an absence of laid out rules for directing these studios. This paper presents the discoveries of a two-year study including 17 studios across 10 particular perception settings. The fundamental commitment is the improvement of a complete system for directing CVO

studios, which incorporates: an organized cycle for working with studios, an itemized diagram of fruitful studio parts, 25 reasonable rules for future executions, and an example studio with explicit strategies. This system, worked from an examination of assorted contextual investigations and encounters, offers significant bits of knowledge to refine and further develop representation rehearses.

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Embedded system-based brewing

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Abstract: Br As one of the fastest growing segments in the food and beverage industry, automation is playing an even more significant role in both production lines and new equipment. Particularly with electrical scald prevention systems and embedded system-based brewing. The automated brewing system embeds a control system into the process. The controls observe the process, compare it to a specific recipe, and make ongoing adjustments accordingly.

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Graph Analytics for Enhanced Supply Chain Risk Management: Identifying Critical Suppliers Through Centrality and Community Detection Metrics

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Abstract: In the realm of supply chain management, timely and informed decision-making is crucial for mitigating risks associated with supplier disruptions. This research leverages graph analytics to enhance the decision-making process by automatically identifying critical suppliers within a supply network. Utilizing the Neo4j Graph Data Science library, we analyse supplier relationships represented as a knowledge graph, focusing on the ”supplies to” relationship. Key centrality metrics—including degree centrality, betweenness centrality, closeness centrality, and triangle count—are computed to evaluate supplier importance. Our findings reveal that Siemens stands out as the central supplier, while a significant number of suppliers score above the critical threshold of 10, indicating potential vulnerabilities in the supply chain. Correlation analysis highlights strong interdependencies between key metrics, emphasizing the interconnected nature of suppliers. We propose further research directions, including the integration of node and edge properties, node regression or classification, and a comprehensive analysis of the complete graph to improve the resilience of supply networks. By addressing challenges related to supply chain in transparency and data disconnect, our study contributes to a more robust framework for identifying criticalities and fostering more resilient supply chains.

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Modelling and Simulation of Discrete Event Manufacturing Systems with SDCWorks: Case Studies and Analysis

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Abstract: This paper presents a comprehensive approach to modelling and analysing discrete event manufacturing systems using the SDCWorks framework. The study introduces a discrete transition system model for the SMART manufacturing system, detailing the construction of plant models, controller specifications, and requirements. We demonstrate the use of the SDCWorks simulator, an open-source tool developed in Python3, for evaluating system performance through various metrics, including throughput and end-to-end delay. Case studies on linear and variant manufacturing models illustrate the impact of system configuration changes on performance. Our findings reveal that the SDCWorks framework enables detailed analysis and optimization of manufacturing systems by simulating different operational scenarios. The results underscore the importance of system flexibility and the potential for enhanced performance through strategic modifications. This work aims to advance the synthesis, verification, and fault-tolerance of complex manufacturing systems and encourages further research in software-defined control systems.

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Prediction of Rotor Faults in Motor using Non-Decimated Wavelet Transform and Multiple Linear Regression through Multimodal Sensor Signals

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Abstract: To improve the induction motor performance such as reliability, and energy efficiency needs precise rotor fault prediction. The Non-Decimated Wavelet Transform (NDWT) is an innovative method for evaluating multimodal sensor inputs to forecast the changes in rotor slot size. These signals were fragmented down into multi-resolution components using the NDWT, which is allowed for the extraction of frequency-domain characteristics. Important parameters to find the rotor slot size deviation includes energy factors, statistical characteristics, and frequency band characteristics. The experimental datasets were used to validate the model performance, which shows better robustness than conventional Fourier Transform based methods. The outcomes demonstrate that NDWT to successfully captures the multifaceted signal variations brought on by rotor slot anomalies. The recommended structure outperforms 95.6% of prediction accuracy for rotor faults. The

recommended proposed work increases the operational efficiency and decreases the downtime. The proposed recommended work highlights the importance of multimodal data analysis and Machine Learning (ML) approaches in predictive maintenance of motors.

Keywords: Multimodal Sensor Signals, Non-Decimated Wavelet Transform, Rotor Slot Size Deviation, Induction Motor, Predictive Maintenance.

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Unravelling the Influence of Sensor Characteristics on Robotic Exploration: A Comprehensive Analysis

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Abstract: The role of sensor input in robotics is paramount, exerting a profound impact on the effectiveness of exploration tasks. This research delves into an extensive analysis of three pivotal sensor characteristics: sensing range, field-ofview, and sensor noise. By employing three widely adopted reward structures in the exploration domain, I investigate the implications arising from varying sensor configurations. Our study uncovers the concept of domain triviality in relation to sensor settings. Notably, I make two notable contributions. Firstly, I showcase the robustness of the difference reward in accommodating sensor variations while highlighting the susceptibility of the local reward structure to such changes within our specific domain. Secondly, I introduce an innovative framework named the POI sensitivity gradient, facilitating rapid mapping and visualization of information-rich regions in the environment. This research sheds light on the intricate interplay between sensor characteristics and exploration performance, fostering advancements in embedded systems.

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The Role of Deep Learning in Human-Robot Collaboration (Cobots)

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Abstract: Industry 5.0 re-introduces the human equation into manufacturing and services, emphasizing the collaboration of humans and Cobots to boost efficiency, safety, and personalization. Such deep learning enables Cobots to adapt to variable surrounding conditions, understanding human intent, and improving interaction through advanced perception and decision-making. The review talks about the aforementioned techniques and the contributions of deep learning methods-from real-time perception to NLP and reinforcement learning-in strengthening Cobot's sensibility, plan, and collaboration with its human partner. Further, different personalization algorithms are being integrated in multimodal data to customize Cobots to the preferences of individual workers to build trust and increase productivity. High computational requirement, lesser data availability, and ethics

can prove to be impediments to their widespread deployment in the future. The future research possibilities suggested by the authors include combining explainable AI with improved safety protocols and cross-domain learning strategies to unlock these possibilities. This paper brings together some recent findings which indicate how deep learning could change the fate of human-robot collaboration and, thus, Cobots will emerge as key collaborators in making the intelligent, adaptive, and human-friendly era of Industry 5.0.

Keywords: Human-robot collaboration, collaborative robots, deep learning, Industry 5.0.

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Unsupervised Information Retrieval: From Classical Models to Neural Architectures

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Abstract: Unsupervised Information Retrieval (UIR) has dramatically scaled from a humble term frequency, keyword-based methodology to elaborate, state-of-the-art architectures derived from neural frameworks that take cues from unsupervised learning. This work reviews the existing classical and contemporary trends in the subject of UIR. Classic approaches of the earliest models that describe early concepts like TF-IDF and LSI essentially involve statistical representations of documents along with similarities of terms. However, recent advances concentrate on deep learning models that learn semantic relationships between terms. Some of the most significant developments include word embeddings, such as Word2Vec and GloVe, and pre-trained language models, such as BERT and GPT, which have changed UIR forever by capturing nuance in context and giving more accurate semantic representations. The paper discusses document representation methods, clustering, and ranking algorithms along with clusters and similarity measures that are now an essential part of UIR systems. It is focused mainly on the role of neural architectures that have improved applications in terms of semantic search and better understanding of queries. However, the areas still open include scalability, handling the ambiguous nature of queries, and testing without labeled datasets. Emerging trends within UIR, including hybrid retrieval systems, domain adaptation for specific fields, and multimodal integration, are highlighted in the paper. These developments outline a path toward the future improvement of retrieval efficiency, accuracy, and semantic understanding. This review provides valuable insights into the present state of UIR and thus acts as a foundation for the continuation of research into building more robust, scalable, and context-aware retrieval systems.

Keywords: Unsupervised Information Retrieval, TF-IDF, Latent Semantic Indexing, Word Embeddings, BERT, GPT.

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AI-Driven Chatbot for Automated Data Analysis and Interactive Visualization

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Abstract: Analyzing and visualizing data is now central in decision-making in today's knowledge-driven or data-led world. Most users, however, face the dilemma of working with large sets of data, not that they don't understand the purpose of the data analysis but because they are ignorant about anything concerning the analysed data. Such a knowledge gap makes it challenging for people as well as organizations to make decisions based on facts, which often leads to the wasted opportunities and less effective strategies. The proposed idea is to bring an AI-powered chatbot, which will bring together the two ideas-simplifying data processing and visualization. So, this application will try to overcome the technological divide by using sophisticated NLP in order to let users upload their datasets and interact with the data in a more conversational way. From here, SQL commands are translated out of user inquiries to extract necessary data, finally being transformed into easily understandable forms such as visualizations like dashboards, graphs, and charts. Besides helping to make these insights actionable while being clear and intelligible, this also enables more data access. Using MySQL for seamless integration with the databases and Python in its core operation, the approach is based upon the LangChain framework. It can process complicated questions and give very accurate answers due to its strong NLP capabilities, so it is accessible to both technical and non-technical users. This program offers businesses, researchers, and educators a time-saving solution by removing the need for manual data examination. Regardless of one's technical expertise, this creative approach democratizes data-driven decision making by empowering consumers to fully utilize their data.

Keywords: Natural Language Processing (NLP), SQL Query Generation, Data Visualization, Chatbot, Database Interaction, Predictive Analytics, Machine Learning, Data Analysis, User Interface, Artificial Intelligence, Insight Generation, Conversational AI, LangChain, Python, MySQL, Data-Driven Decision Making.

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Greening the Spark: Ethanol as a Biofuel for Blending with gasoline for SI Engines

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Abstract: Due to the depletion of fossil fuels, random and unrealistic increase in crude oil prices, effects of global warming, to save money an alternative fuel that is renewable or generated from waste is in future. These renewable fuels, derived from organic materials like plants, algae, and even waste products, offers obvious change to the environmentally harmful need of fossil fuels. Unlike fossil fuels, which are limited and cannot be produced, biofuels are developed and produced speedily also to fight against climate change, making them a more sustainable option. The objective here is to contribute to the on-going research and discussion on renewable energy sources and to do environmental scan to identify key parameters which helps to improve performance of SI engine. However, ethanol, a specific type of biofuel produced through the fermentation of plant sugars, presents a more targeted approach within the broader biofuel category. Ethanol is a promising alternative renewable fuel which can be used in SI engines without any alterations with lower concentration. However, ethanol has a higher-octane rating and hence the engine can be operated more efficiently by raising the compression ratio also, high octane numbers in ethanol reduces engine knocking and performs better than gasoline.

Keywords: Alternative fuels, Bio-fuels, Ethanol, Gasoline–ethanol blends, SI engine.

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Comparison Between Fuzzy Logic Controller and P&O Based MPPT in a Solar PV System

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Abstract: Currently, the production of renewable energy for electrical purposes has become increasingly popular. This study examines various maximum power point tracking (MPPT) topologies in solar photovoltaic systems using MATLAB software. The fuzzy logic MPPT controller, in conditions of varying irradiance, efficiently tracks maximum power with a faster response compared to perturb and observation (P&O) methods. A comparative examination of the solar photovoltaic integrated DC-DC boost converter has been conducted

using MATLAB/Simulink. A comparison is conducted between the proposed maximum power point tracking (MPPT) fuzzy logic control (FLC) algorithm and the traditional Perturb and Observe (P & O) control approach to illustrate the efficacy of the new algorithm.

Keywords: Boost Converter, DC Microgrid, Solar PV, P&O, Fuzzy Logic.

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Skin Cancer Detection through Image Analysis with a Dual-Architecture Deep Learning Approach

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Abstract: This research paper addresses global skin cancer concerns, emphasizing the need for early detection through artificial intelligence (AI), specifically leveraging Alex Net and Efficient Net. The study highlights limitations in traditional diagnostic methods and proposes an AI-driven paradigm shift. In this paper details of the development of a deep learning-based approach have been presented, wherein, existing differentiating images are augmented covering data pre-processing, training, and evaluation with rigorous scientific methodology that utilizes the parametric classification of a skin cancer-based lesion or visible marking. Findings emphasize the efficacy of both models, envisioning a future where AI and image-based observation play pivotal roles in early skin cancer detection. The Alex net architecture receives a 98.9% accuracy while the Efficient Net B1 provides an accuracy of 88.9 % accuracy. The conclusion underscores the transformative potential of AI and a productive way of combining architecture to multiply the efficacy in skin cancer detection, leading the way for increased accuracy and accessibility in early diagnosis.

Keywords: Skin Cancer, Deep Learning, Alex Net, Efficient Net, Artificial Intelligence, Image Analysis.

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Analysis of FCN8 and YOLOv8 in Enhancing Road Segmentation for Autonomous Driving

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Abstract: In the rapidly advancing field of autonomous driving, achieving precise road segmentation is paramount for accurate environmental perception. This research paper introduces an innovative road segmentation approach, which leverages the FCN-8 architecture with VGG16 as its backbone, further enhanced through the implementation of

the sigmoid activation function and the Adam optimizer. In addition, we conduct a comprehensive comparative analysis with the YOLOv8 architecture to provide a holistic view of road segmentation solutions in this context. This research is based on a custom dataset specifically curated to address the unique challenges of autonomous driving scenarios, ensuring that the models are tested against real-world conditions. Our evaluation demonstrates the robustness and efficiency of both approaches in the context of autonomous driving, shedding light on their respective strengths and weaknesses. This innovative methodology not only advances road segmentation accuracy but also significantly contributes to the realm of self-driving technology, fostering safer and more reliable autonomous vehicles in real-world applications.

Keywords: Deep Learning, Computer Vision, Semantic Segmentation, Fully Convolutional Neural Networks, Yolov8.

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ICT Applications as a Generic Tool to Enhance Communication

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Abstract: In this modern era, the English newline language is critical in all spheres of endeavour. Over the last several decades, the English language has been subjected to profound shifts due to the development of cutting-edge technology and ground-breaking new approaches. It is a tool for civilizing teaching methods or theories with the use of newer forms of media that are already in existence. Traditional ways of teaching are less successful in the new field of work compared to more current methods. Integrating information and communication technology into language learning aims to increase the current newline standards of language acquisition. Language abilities, existing facilities, and newline issues and hurdles are some factors that are being considered. The newly developing trend of English Language Teaching (ELT) using Information and Communication Technologies (ICT) and its growing acceptability have been discussed in the current study article.

Keywords: Information & Communication Technology (ICT), English Language Teaching (ELT), ICT-integrated language learning, Blended Learning.

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Temporal Attention-Based Multimodal Networks for Real-Time Proctoring of Online Examinations

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Abstract: The growth of online education has driven the need for technologies that uphold academic integrity in remote online assessments. While traditional online proctoring methods may not be the most resource-efficient. This paper presents a multi-modal neural network based online proctoring that works on webcam recordings to detect suspicious device usage, This Neural Network has been trained on a dataset with 18 subjects, the videos have been annotated cheating & non-cheating labels manually, and various components have been extracted such as Head pose via 6DRepNet, Eye gaze using L2CS-Net, Facial landmarks using Media pipe library and cropped faces using the latest YOLO-v11, Subject Embeddings have been generated using ResNet50 to reduce the computational complexity along with using techniques like PCA. Our Multi Modal Neural Network achieves an overall accuracy of 85.74% with the late-fusion accuracy of our overall system components being 94%.

Keywords: Online Proctoring System, Academic Integrity Multimodal Neural Network, YOLO-v11, 6DRepNet.

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A Comprehensive Review and Taxonomy on Machine Learning and Deep Learning Approaches for Brain Tumour Classification

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Abstract: Cancer happens to be one of the most lethal diseases resulting in high mortality rates. An unprecedented global surge in cancer cases can be seen, which leads to the necessity of developing newer methods for cancer detection so as to detect and arrest the progression of the disease quickly. Out of all cancer types, brain cancer happens to have a relatively higher mortality rate. Moreover, brain being an internal organ makes invasive examinations challenging, thereby relying more on image-based prognosis. With increase number of cases and extensive pressure on the current medical infrastructure, machine learning and deep learning (ML & DL) based approaches are being explored extensively to automate some of the procedures so as to aid the medical practitioners by providing useful insights from medical data. In context to brain cancers, one of the foremost steps in identifying brain tumours, segmenting them and potentially classifying them as benign or malignant. The

divergences in texture and sites of the tumours makes this process complex and challenging to yield high accuracy. This paper presents a comprehensive review of the various contemporary image pre-processing, feature extraction and classification techniques employed in current literature to lay a foundation for future research in the domain with the objective of attaining high classification accuracy.

Keywords: Brain Tumours, Image Enhancement, Feature Extraction, Machine Learning, Deep Learning, Classification Accuracy.

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A Lightweight Framework for Obstacle Detection in Railway Images Using Fast Region Proposal and Improved YOLO-Tiny Network

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Abstract: Railway systems are high modern transportation infrastructure involved with the aspect of ensuring safety. In this work, a lightweight framework to detect real-time obstacles in railway images that uses Fast Region Proposal and an enhanced YOLO Tiny network is presented. The proposed framework is designed for the deployment on the edge devices with limited computational resources, such as for the remote railway monitoring systems. The pipeline begins with a fast region proposal module, which spurs the search space of object detection from video into just candidate regions. An improved feature extraction layer, a customized anchor box and a custom loss function that are designed for small and elongated obstacles commonly present on railway environments are then applied to process these regions. Debris, animals, but also vehicles are able to be automatically detected by the presented system on a custom railway image dataset, and the presented system has a high precision and recall. The presented framework tries to maintain a good computational efficiency with good detection accuracy, as is proper in reality.

Keywords: Obstacle detection, YOLO-Tiny, Fast Region Proposal, real-time monitoring, edge devices, railway safety.

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Comparative Analysis of Banana Peel Powder and Neem Leaf Powder as Eco-Friendly Coagulants for Industrial Wastewater Treatment: A Sustainable Environmental Solution

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Abstract: The fact that the contamination of industrial wastewater can have severe environmental and health impacts requires sustainable treatment. In this study, the banana peel powder and the neem leaf powder evaluated as eco-friendly coagulants for industrial wastewater treatment. Wastewater from Hennagara Lake, Bengaluru used for experimental analysis, which done by jar tests and physio-chemical assessments. Results show that turbidity and residual chlorine removal is highly responsible by banana peel powder, while neem leaf powder does well for chloride reduction. Natural coagulants reduce contaminants with little sludge production at a reasonable cost and are easily biodegradable as opposed to chemical coagulants. Dosage and pH levels are optimally set to improve coagulation efficiency. Whereas plant base coagulants shown here to be economically viable and environmentally sustainable, this research opens the possibility for large-scale industrial application. Combination of these coagulants in synergistic combinations, which explored in future studies, will enhance wastewater purification.

Keywords: Natural Coagulants, Banana Peel Powder, Neem Leaf Powder, Eco-Friendly, Coagulation, Turbidity Reduction, Biodegradable Coagulants.

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A Modelling Review and Recent Progress on Enhancement of Heat Transfer in Microchannel

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Abstract: Researchers are now using microchannels in many fields which creates new practical requirements for them to work without limitations while using certain fluids under specific conditions. The article presents extensive information concerning numerical methods applied to governing equations and data optimization for fluid dynamics and heat transfer with a specific reference to nanofluids. This review examines how microchannels work in various applications and shows ways to improve existing research and create better research

strategies for future digital testing.

Keywords: Heat Transfer Enhancement; Nanofluid Preparation; Heat Exchanger.

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Wear Analysis of SS308L component fabricated using Wire Arc Additive Manufacturing (WAAM): A Review

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Abstract: Wire Arc Additive Manufacturing (WAAM) is a significant metal additive manufacturing method that facilitates the production of large-scale metallic components with elevated deposition speeds and economic efficiency. This article examines the wear characteristics of Stainless Steel 308L (SS308L) produced by the WAAM process. The study examines the microstructural attributes, hardness, and tribological parameters of WAAM-fabricated SS308L under varying wear circumstances. This article offers a summary of the latest developments in WAAM research, highlighting the metals appropriate for WAAM.

Keywords: Wire Arc Additive Manufacturing (WAAM), Process Parameters, Defects, Wear analysis.

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Real-Time IoT Based Monitoring Robot for Women's Security in Public

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Abstract: The safety and security of women across the globe, especially in vulnerable areas, remain a concern. To solve this, we propose a security patrolling robot that consists of an ESP32, Arduino Nano, and ESP8266 controller. This robot is mounted with a camera on a vehicle that patrols an area so as to monitor the locations. The robot travel in a given lane, taking pictures with its camera to identify the violence behaviour. It records video of the disturbance in the area and streams it live in case of violations to provide an instant update. Such a robot system offers a lifelike solution for real time full-time monitoring, especially in high-risk areas remote locations, and sends immediate alerts to security personnel. Thus, this

robot based on controllers like the ESP32, Arduino Nano, and ESP8266 organizes a useful system for 24/7 security monitoring and also improves the safety with the reduced risk for women in sensitive areas.

Keywords: ESP32 controller, ESP8266 controller, Servomotor, Ultrasonic sensor, Buck converter, Driver circuit.

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Sustainable Industrial Wastewater Treatment: A Comparative Study of Tamarind Seed Powder and Hyacinth Peel Powder as Natural Coagulants

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Abstract: It is necessary to obtain sustainable treatment solutions to reduce the environmental impact of industrial wastewater. The purpose of this study is to make a comparative evaluation of Tamarind Seed Powder (TSP) and Hyacinth Peel Powder (HPP) as natural biodegradable coagulants for wastewater treatment. Jar test experiments of the effluents from Krishna Sagara Lake tested TSP at higher dosages and showed good turbidity and chlorine reduction, while HPP worked well at lower dosages but with better residual chlorine and calcium hardness reduction. Both coagulants decrease pollutants both costs effectively and with less sludge generation compared to chemical coagulants. The results of this research indicate that natural coagulants are a potential candidate for scaling in industrial wastewater management applications, which could influence greener strategies.

Keywords: Natural Coagulants, Banana Peel Powder, Neem Leaf Powder, Eco-Friendly, Coagulation, Turbidity Reduction, Biodegradable Coagulants.

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Futuristic Approach to Cholesterol Detection by Utilizing Non-Invasive Techniques

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Abstract: This new study focuses on the un-invasive technology of cholesterol detection and what the limitations of conventional methods are, as compared to what has been promised by advanced technologies. It appears that near-infrared imaging will be the main instrument in such a course. It will enable a precise, non-invasive measurement of cholesterol not involving any form of invasive blood test at all. Advanced image processing techniques will help integrate cholesterol monitoring into more of a futuristic approach-an advanced method that is more accurate, comfortable for patients, and accessible. Research has, therefore, been focused on the issues surrounding NIR technology-a present view and the future directions as part of these non-invasive techniques. Thus, from the results, the potential exists to improve how cardiovascular health monitoring and prevention might be approached.

Keywords: Non-Invasive Cholesterol Detection, Near-Infrared Imaging, Advanced Image Processing, Cardiovascular Health Monitoring.

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Optimizing Lowlight Image Restoration through Deep Learning and Non-Local Means Denoising

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Abstract: In this work, therefore, a novel method for lowlight image restoration is proposed as involving a blend of deep learning with Nonlocal Means (NLM) denoising. The lowlight images contain high noise level and are characterized by very low visibility. In this case, such images are unfit for proper evaluation and analysis since those who create them often merge dark emotions with forms and patterns to create representative art. Some of the deep learning techniques have been recommending procedures to enhance the quality of the images but noise is a nuisance. With high efficiency in the removal of noise, Nonlocal Means filtering can be said to be conceivable to integrate its benefits to another method such as histogram equalization to filter the noise and maintain high detailed improvement in quality. Combing the approach is more effective in reducing noise, and produces overall and quantitative improvements over the state-of-the-art methods. This research holds promise for enhancing image restoration from lowlight conditions in facets utilizing the advantage of deep learning and NLM.

Keywords: unfogged image enhancement, high-level image processing, Nonlocal Means based filtering, image def RAM lishing, non-car refinement.

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Harnessing Quantum Computing for Advanced Business Analytics: A New Frontier

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Abstract: A paper that talks about quantum computing in its own prospect towards furthering business analytics. It would dwell on the opportunities of quantum computing in solving computational problems hard on systems in the mechanistic universe. As organizations increasingly rely on decision making based on data, the classic business analytical methods appear to be quite useless in handling big data and high-complexity models. Solutions of problems, encoded into the quantum structure of quantum computing, require high efficiency for quick data analysis and obtaining accurate results within quantum bits, superposition, and entanglement. It considers a range of application scenarios linked either to the financial analysis, implementing supply chain management or checking frauds. These are associated with how quantum algorithms can be employed to optimise decision making tasks. It then discusses some of the problems which are the hardware-based, scalability, and integration limitations of it; yet informs readers where quantum computing may be advantageous to businesses to get ahead of this problem. For business analytics, powered quantum, it looks bright as technology improves along the way.

Keywords: Quantum computing, business analytics, data compensation, optimization and machine learning.

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Precision Cardiovascular Care: Leveraging LLMs and Leopard Seal Optimization for Automated Diagnosis

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Abstract: Cardiovascular diseases (CVDs) are a leading global health challenge, demanding innovative approaches for accurate and timely diagnosis. This study presents a precision cardiovascular care system leveraging Large Language Models (LLMs) and Leopard Seal Optimization (LSO) for automated diagnosis. LLMs are employed to analyse structured and unstructured clinical data, providing interpretable insights, while LSO optimizes feature selection, enhancing diagnostic accuracy. The system is an integration of the data coming from electronic health records and IoT devices to continuously monitor a patient. Experimental results depict that there is an improvement in prediction performance when compared to the traditional method, which depicts improved efficiency and real-time alerting capabilities. It provides scalable, explainable, and resource-efficient solutions for precision medicine, redefine cardiac care with a patient-centric approach and advanced computational methodologies.

Keywords: Cardiovascular diseases, Large Language Models, Leopard Seal Optimization, automated diagnosis, precision medicine.

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Improving Pest Management through Multi-Site Data Integration and Machine Learning

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Abstract: Integrated Pest Management (IPM), a combination of chemical, cultural, and management practices to control pests, has long been a cornerstone of permaculture. However, the effectiveness of traditional IPM strategies can be limited by the availability of timely, accurate, and complex pest information. This paper explores the potential to improve IPM by integrating multiple datasets and using machine learning (ML) techniques. Combining disparate data sources, such as remote sensing, sensor networks, weather data, and pest models, creates new opportunities for real-time, data-driven decision-making documentation. Machine learning algorithms, including supervised and unsupervised learning, deep learning, and reinforcement learning, can optimize pest monitoring, pest prediction, and recommend management strategies. This review highlights recent advances in

data integration, machine learning algorithms, and case studies of these techniques applied to agriculture. It also identifies important issues such as data interoperability, generic modelling, and the need for large databases. The paper concludes by suggesting future research directions, including the development of robust, real-time decision-making tools that use large-scale data sources and advanced machine-learning techniques to increase the efficiency and sustainability of IPM applications.

Keywords: Integrated Pest Management (IPM), Machine Learning (ML), remote sensing, pest population estimation, pest population monitoring, Deep Learning (DL).

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Advanced Kinetic Modelling of Polyethyleneglycoladipate–Co–1,12–Dodecane Adipate Synthesis Integrating 2nd Order and Reversible Reactions

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Abstract: The study proposes an advanced kinetic modelling in the synthesis of polyethyleneglycoladipate–co–1,12–dodecane adipate integrating reversible and 2nd order reaction mechanisms. The modelling offers a comprehensive approach for decoding the polymerization procedure including monomer interactions, side reactions and equilibrium dynamics. The experimental data of copolymer formation and the monomer reduction was used to validate the modelling under different concentrations and temperatures. The Levenberg-Marquardt method was used to optimize the key parameters such as forward and reverse rate constants (kf and kr) and activation energies. The model confirmed better analytical accuracy, with RMSE values less than 5% and $R^2 > 0.98$. The sensitivity analysis exhibited the critical impact of temperature and forward rate constants over the responses, establishing optimal control of synthesis conditions. This study provides an optimal framework to optimize the polymer properties and reaction kinetics, linking the research gap between practical applications and predictions in the synthesis of polymers.

Keywords: Levenberg-Marquardt algorithm, Mathematical Modelling, Second-Order and Reversible Reactions, Polyethylene glycol, Polymers.

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A Modified Dematel Method for The Improvisation of Machining Parameters Using Causal Relationship Modelling

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Abstract: The DEMATEL (Decision Making Trial and Evaluation Laboratory) is an MCDM method which helps to analyse and visualize the causal relationships among the input parameters or factors in decision making. But, the traditional DEMATEL method sometimes ignore the distinct dynamics of causal relationships like weighted impacts, response loops, and threshold-built filtering. A modified DEMATEL method is proposed in this study to improve the interpretation and determination of causal relationships by integrating weighted relation index, flexible normalization procedure, and threshold-built filtering. The modified approach offers a flexible and robust framework to causal analysis. Further, the proposed method provides a dynamic response framework to handle cyclic dependencies, that are ignored generally in the traditional DEMATEL method. The efficiency of the modified DEMATEL method is demonstrated using a machining optimization problem. The findings prove that the modified DEMATEL algorithm outperform the traditional method, by providing accurate and reliable procedure for identifying and analysing the key causal factors.

Keywords: DEMATEL, MCDM, Causal Relationship, Machining, Manufacturing, Optimization.

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AN AI INTEGRATED PREDICTIVE MODELLING FOR SURFACE ROUGHNESS IN GRINDING

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Abstract: Accurate determination of input constraints is critical for the optimization of surface roughness in the experimental investigation of machining process. The conventional regression-based methods are commonly used for the prediction of surface roughness in machining, but its efficiency is limited based on the linear assumptions and predefined mathematical relations. This work proposes an AI integrated machine learning models such as Artificial Neural Networks (ANN), Support Vector Machines (SVM), and Random Forest (RF) to optimize the precision of the estimation. The proposed modification controls the real-time information and adaptive knowledge to optimize the machining parameters actively. A case study was illustrated to validate the proposed approach, ensuring enhanced prediction

on comparison with multiple regressions. The findings confirm that the AI integrated predictive modelling can offer a strong and flexible response for the optimization of surface roughness, leading for sustainable and optimal manufacturing.

Keywords: ANN, SVM, RF, Machining, Grinding, Optimization.

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Novel strategies for electric vehicle charging with solar PV based charging station having power back-up arrangement

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Abstract: The electric vehicles (EV) are most popular and recent emerging technologies with an ability to reduce global atmospheric pollution. Still due to some limitations as low travel range, high manufacturing cost, unavailability of fast charging infrastructure etc., this concept is adopted only by limited users. In this manuscript some unique strategies like inbuilt charging system have been proposed to resolve such issues. A PMSG generator is mounted on the rear wheel axle of the EV, which transforms the rotational energy into electrical power and charge the battery bank. The proposed system is equipped with batteries and ultra-capacitor (UC) to form hybrid energy storage system (HESS). The battery meets energy requirement and UC is used to fulfil power requirements of the load. The regenerative braking mode is also implemented in EV system using vector control technique. A solar PV based charging station is developed to ensure pollution free vehicle charging. The vehicle storage system can also work as backup source for emergency loads. The proposed schemes enhanced vehicle travel range and reduced charging time. The combination of both battery and UC has smaller size and extended operational life.

Keywords: Electric Vehicles, PMSG, Charging Station, Hybrid Energy Storage System, Ultra-capacitor.

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A Nutrient Recommendation System for Crops with Climate Prediction Using Random Forest Algorithm

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Abstract: The recommendation with the optimal time of fertilization aims to assist farmers in increasing crop yields while minimizing fertilizer abuse. The system combines temperature, relative humidity, rainfall as well as the probability of precipitation to evaluate whether the conditions are suitable for fertilization. The Weather-bit API enables to acquire daily weather

forecasts for a chosen region. The system evaluates possible danger factors like heavy rain and long-term precipitation and informs about the inefficient or harmful times for fertilizer usage. Also, a machine learning model – Random Forest Regressor predicts the needed nutrients levels – nitrogen, phosphorus, and potassium to the crops in weather-based conditions. The system enables farmers to make more informed decisions, enhancing the quality of crops and yield by using fertilizers.

Keywords: Weather forecasting, timing of fertilization, fertilizer wastage minimization, crop yield optimization, agriculture.

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AI - Enhanced cyber security for critical infrastructure

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Abstract: The part of the AI-powered cybersecurity is an amazing solution for securing complex infrastructure. The cure for augmenting or increasing the resilience of infrastructure such as power grids, water treatment plants, and transportation systems includes automated threat detection and incident response; along with prevention by AI. Moreover, AI-based threat hunting predicts unseen threats to help security teams prevent risk events from developing into major issues. Yet, significant challenges such as data quality, model biases, explanations, and skills shortages must be overcome to unlock the full potential of AI in cyber security. Finding the balance between a lively electronic future for critical infrastructure and its protection requires her to spur more research and development in adversarial machine learning.

Keywords: AI, Cybersecurity, Critical Infrastructure, Machine Learning, Deep Learning.

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Review on Meta-heuristic Methods used for Big Data Query Optimization: Research Gap, Difficulties, and Prospects

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Abstract: It may be both difficult and gratifying to work with massive amounts of data collected from several apps across multiple storage locations. To extract valuable information from data, a combination of qualitative and quantitative analytical techniques is required. One of analytics' corepromises is to optimize data with the main objective of supporting decision-making. Hadoop has become a well-known platform for processing and analyzing large datasets in the big data age. Optimizing queries is essential for improving Hadoop's data processing speed and effectiveness. Given the complexity and dynamic nature of large data settings, traditional query optimization approaches might not be appropriate. The goal of this review paper is to provide readers a thorough grasp of the function that meta-heuristic techniques play in query optimization in the big data age. It examines the hybrid operation of meta-heuristic algorithms to improve query optimization. It highlights the research needs, difficulties, and opportunities in query optimization for large data from several studies.

Keywords: Big Data, hybrid meta-heuristics, Hadoop, query optimization.

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Dune Sand Stabilization Using Marble Dust

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Abstract: Abstract- Stabilizing dune sand has been a crucial area of research in geotechnical engineering, particularly in arid and semi-arid regions where dune sand is abundant. Still, it lacks the necessary engineering properties for construction purposes. Conventional stabilization techniques rely on cement, lime, or similar chemical additives. These approaches drive up costs and pose significant environmental risks, highlighting the need for more sustainable solutions. The accumulation of marble dust, an undesirable byproduct of urban-industrial activities, has steadily increased worldwide. To address this issue, one potential avenue for waste disposal involves utilizing these discarded materials as soil stabilizers, aiming to enhance the properties of soil-stabilizer mixtures. For soil stabilization, marble dust has become an essential sustainable substitute. Dune sand stabilization with marble dust improves the engineering properties and becomes a cost-effective solution. The abandoned dumping of Waste Marble Dust (WMD) becomes an environmental challenge. This study investigates the impact of WMD on various engineering properties by conducting experiments on samples of dune sand mixed with varying ratios of marble dust 5% to 25%. The result showed substantial enhancements in dry density and Unconfined Compressive

Strength (UCS) properties. The utilization of WMD provides a sustainable solution for environmental protection.

Keywords: Dune Sand, WMD, Soil Reinforcement, Land Pollution, Unconfined Compressive Strength.

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Detection Of Facial Micro-Expressions For The Recognition Of Subtle Emotions

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Abstract: A real-time emotion recognition system is proposed, leveraging Deep Neural Networks (DNNs) to improve the accuracy and efficiency of emotion detection through facial analysis. Conventional methods, including human observation and rule-based systems, often struggle to deliver consistent and reliable results, especially in dynamic environments. This system captures live video streams, processes individual frames, and extracts key facial features to classify emotions into categories such as joy, sadness, anger, and surprise. The DNN model is trained on diverse datasets that account for variations in age and gender, ensuring broad generalization and adaptability across different user groups. Designed for practical, real-world applications, the system provides immediate feedback on emotional states, offering significant potential for use in healthcare, education, customer service, and human-machine interaction. The framework prioritizes both speed and precision, making it suitable for scenarios where rapid emotional analysis is essential. Performance is evaluated using key metrics such as accuracy, precision, and recall, demonstrating the system's capability to recognize emotions with high reliability. This approach offers a scalable and efficient solution for real-time emotion detection, contributing to advancements in affective computing and interactive technologies.

Keywords: deep learning, deep neural network, emotion, emotion acknowledge, emotion detection, emotion recognition, emotional intelligence, facial analysis.

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A Hybrid model for Classification: Neutrosophic logic meets Machine Learning

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Abstract: This paper represents two soft computing techniques: Fuzzy logic and Neutrosophic logic to classify the data. Fuzzy logic (FL) handles the uncertainty and provides the membership degree for an instance. Neutrosophic logic (NL) also handles the uncertainty and indeterminacy existing in real- world. Neutrosophic logic provides the membership for truth, indeterminacy, falsity component. Techniques for soft computing and Machine Learning algorithms can be combined where proper decision cannot be met. In real-world scenario, data may be inconsistent, so, the authors propose the hybrid model of NL and SVM (N_SVM) to handle the indeterminacy.

Keywords: Classification, fuzzy logic, Neutrosophic logic, support vector machine, indeterminacy

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Integrated Sensing and Communication Using Affine Frequency Division Multiplexing for High-Mobility Scenarios

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Abstract: Integrated sensing and communication (ISAC) is emerging as a cornerstone technology for next-generation wireless networks. This paper introduces a novel ISAC system based on Affine Frequency Division Multiplexing (AFDM), a waveform considered to operate efficiently in doubly dispersive channels. The proposed methodology employs an embedded pilot scheme utilizing the Discrete Affine Fourier Transform (DAFT). This method efficiently estimates delay-Doppler parameters with reduced computational complexity. A key result is that sensing can be performed using a single pilot symbol, achieving accuracy comparable to leveraging the entire AFDM frame. This reduces the overhead, so improving communication spectral efficiency. Unlike conventional solutions requiring complex full-duplex techniques, AFDM achieves SIC through analog dechirping and filtering. The results validate the proposed system which represents the superior range and velocity

estimation performance compared to state-of-the-art techniques like Orthogonal Chirp Division Multiplexing (OCDM) and Orthogonal Time Frequency Space (OTFS). This work underscores the potential of AFDM as a dual-functional waveform for integrated communication and sensing which set a new benchmark for future wireless technologies, including 6G systems.

Keywords: 6G systems, AFDM, OFDM, OTFS, SIC, OCDM, RMSE

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Mobile App for Direct Market Access for Farmers

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Abstract: The agricultural sector of India continues to struggle against business intermediaries together with unstable prices and restricted market accessibility despite remaining an important economic sector. Through Krishi Care vendors connect directly to farmers while allowing shoppers and retail buyers to reach farmers thus creating clearer agricultural supply routes with improved efficiency. The mobile platform lets users bid prices in real-time as farmers set just prices for their goods and purchasing parties such as retail consumers and merchants determine their offers based on market needs. The dynamic pricing system creates clear pricing standards that simultaneously minimizes supply chain intermediaries which raises farmer profit and lowers product costs for consumers. Geospatial data processing improves delivery logistics on the platform so farmers pay less for transportation which leads to reduced environmental damage. Krishi Care maintains an offline operating mode that serves rural people who do not have access to internet connections and allows them to be accessible to everyone. Features such as multilingual user interface and actual location tracking will provide users with a better supply and optimize local delivery. Using Krishi care first allowed farmers to achieve higher incomes after removing traditional brokers from their supply chains and accessing market customers directly. Increased availability of fresh products to competitive rates through the platform reduces supply chain costs, bringing benefits to both consumers and retailers. Krishi Care brings a digital platform to the Indian agriculture industry. This, along with farmer empowerment, manages supply chain stewards and farmers' empowerment, in addition to fair market values. With real-time assessment skills and flexible capabilities, the solution develops a permanently efficient system that combines farmers and urban consumers to create the same agricultural creation environment. that is use to make that product in industrial world.

Keywords: Krishi Care, Digital Agriculture, Farmer Empowerment, Supply Chain Optimizations

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Comparative Analysis of Blockchain Consensus Mechanisms in Education System

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Abstract: In this paper, exploration of the intersection of blockchain technology and the educational sector, focusing on the critical need for scalable, secure, and energy-efficient systems to manage a wide array of applications, from credential verification to decentralized learning platforms. Our study includes a comprehensive comparison of various proofing mechanisms, assessing them based on scalability, security, energy efficiency, governance, and regulatory compliance. It introduces a scoring mechanism to evaluate the strength of these algorithms across these aspects, highlighting their importance in the educational field. After a thorough examination, it proposes a novel hybrid blockchain model that synergistically combines the strengths of Proof of Stake (PoS) and Delegated Proof of Stake (DPoS), with strategic integration of Proof of Authority (PoA) elements for specific controlled-environment applications. This hybrid approach is designed to leverage the energy efficiency and security of PoS, the scalability and democratic governance of DPoS, and the trustworthiness and regulatory compliance of PoA. Our scoring mechanism confirms that this combination is perfectly suited to meet the diverse needs of the education sector.

Keywords: Blockchain, Consensus Mechanism, Hybrid Mechanism.

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Integration U-net Segmentation and Resnet50 classification model of Aloe vera Plant Leaf Disease Detection and Severity Assessment Techniques

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Abstract: Aloe vera is renowned for its therapeutic assets and its prevalent use in industries such as pharmaceuticals, cosmetics, and beverages. However, diseases affecting the leaves the primary functional parts of the plant—often negotiate the quality and yield of aloe vera products. Accurate recognition and severity assessment of these diseases are crucial for efficient supervision and informed pesticide application. In this study, we employed a hybrid approach to address this issue, combining UUNet segmentation and ResNet50 classification. The unmet model was exploited to produce binary masks of diseased areas, enabling precise localization, while ResNet50was employed to classify specific diseases affecting aloe vera leaves. Additionally, the binary masks aided the quantification of disease severity as a

percentage of the affected leaf area. The proposed method accomplished a classification accuracy of 94%, with an average Precision, Recall, and F1-Measure of 0.94, demonstrating consistent and reliable disease detection. An Intersection over Union (IoU) score of 88% underscores its effectiveness in precise segmentation. This model specifies an efficient result for boosting aloe vera product quality and productivity through targeted disease management.

Keywords: Aloe vera leaf disease, Resnet50, Unet, Binary Mask, Severity Calculation.

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Performance Analysis of Wireless NoC Routers in Handling Inter-core Traffic in Tiled Chip Multicore Processors

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Abstract: The increasing complexity of high-performance computing tasks, driven by advances in Artificial Intelligence (AI) and Deep Learning (DL), has increased the demand for efficient multicore processors. Traditional planar metal interconnect-based Network-on-Chip (NoC) architectures have power and latency limitations due to multi-hop communication. Emerging architectures, such as Wireless NoC (WiNoC), aim to address these limitations by incorporating wireless communication channels that bypass physical interconnects, providing lower latency. This paper proposes an 8X8 2D mesh hybrid WiNoC architecture that combines wired and wireless links, with the dedicated placement of hybrid routers and a token-passing mechanism for controlling the wireless links. The research investigates how wireless communication affects performance under various traffic patterns, looking at packet injection rate (PIR) vs average packet latency (APL). WiNoC improves latency during moderate traffic situations, especially for hotspot and burst patterns. Congestion on hybrid routers still poses a difficulty. Future studies will explore congestion mitigation solutions for hybrid routers to retain performance during large traffic loads.

Keywords: Hybrid wireless Network-on-Chip, token passing mechanism

ICETESS2025-182

Improving Complex Emotion Recognition Using Transfer Learning and CNN Architectures

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Abstract: Due to the fact that human emotions are so varied and complicated, complex emotion recognition in affective computing is still a difficult issue. Reduced classification accuracy results from traditional machine learning models' frequent inability to distinguish between complex emotional states. (Mollahosseini, 2017) In order to increase complicated emotion recognition from facial expressions, we provide an improved deep learning method in this paper that makes use of Convolutional Neural Networks (CNNs) and transfer learning. (Zhao, 2021) We make use of pre-trained deep learning architectures, such as VGG16, ResNet50, and EfficientNet, which have been refined on datasets relevant to emotions, such as FER2013 and AffectNet. (He, 2016) To improve feature extraction and generalization, attention mechanisms and data augmentation techniques are combined. When tested on benchmark datasets, the suggested model outperforms conventional CNN-based models in terms of classification accuracy.

Keywords: CNN, Deep Learning, Transfer Learning, Complex Emotion Recognition, and Facial Expression Analysis.

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A Comparative Study On Voila Jones And Adaboost Algorithms

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Abstract: The Viola-Jones algorithm and AdaBoost have become prominent methods in computer vision and pattern recognition, especially in the area of object detection. The performance, flexibility, and computational efficiency of these two algorithms are thoroughly compared in this study's numerous scenarios. Known for its use in real-time face detection, the Viola- Jones technique builds a strong cascade classifier by training with the AdaBoost algorithm and using Haar-like features. Conversely, AdaBoost is a flexible ensemble learning method that combines weak learners to create a strong classifier and has been successful in a wider range of applications. In this paper I'm presenting a comparative study on voila jones and AdaBoost algorithms.

Keywords: voila jones, AdaBoost, comparison.

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Using AI-Powered Sign Language Generation, Deep fake GAN Technology,and Rural Education Insights to Advance Deaf Education and Communication

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Abstarct: This project seeks to develop innovative Deaf Education Technology (Deaf Ed

Tech) model that converts speech or text into sign language using advanced machine learning techniques, focusing on real-time, multilingual, and seamless communication. The model integrates the latest technologies like GANs and CNNs and produces realistic sign language gestures based on either input speech or text. The multi-layer processing includes speech to text using robust models for converting speech to text input, language detection, text preprocessing, gesture mapping to sign language, and video synthesis. Gesture mapping is done using a lexicon database with fallback mechanisms for OOV words through finger spelling or generative inference. The synthesized sign language videos are generated based on the extracted pose key points by GANs, which guarantees smooth transitions and natural signing. The uniqueness of this project is that it handles multilingual inputs (Hindi and English) and produces real-time sign language videos. In addition, the architecture accommodates modularity, scalability, and high-quality video output, maximizing GANs to be useful for real-time applications. This design aims to make it easier and more accessible for the deaf community to easily communicate without any barrier, promoting communication a cross all walk sof life with accuracy in their sign language and cultural considerations.

KEYWORDS: Deaf Education Technology, GANs, CNNs.

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Measuring Usability: Proposed Set of Key Metrics and their Role in Software Development

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Abstract: The paper highlights the importance of usability as a fundamental quality attribute in software development, advocating its inclusion from the initial stages of the development. Based on Jakob Nielsen's principles, we discuss the importance of usability measurement at various stages of development process. In this paper, a set of usability measuring metrics is introduced that can be applied to the pre-design, during design and post-design phases of development process to quantify usability. Further quantification of usability at pre design phase is also implemented.

Keywords: Quantifying Usability, Usability Engineering Life Cycle, Usability Metrics.

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Elevator Optimization with Real-World Constraint: Weight-Aware Algorithm

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Abstract: In the present day, Efficient elevator management is critical for modern high-rise buildings, particularly in reducing energy consumption and wait times while enhancing passenger safety. Our study proposes a weight aware optimization algorithm using heuristic methods like greedy search and nearest neighbor. By incorporating a centralized control panel and real time weight management, the system reduces operational complexity, minimizes overload risks, and ensures balanced load distribution. These enhancements lead to lower energy consumption, lower maintenance costs, and improved system reliability. The simulation results highlight significant reductions in waiting time and energy consumption, aligning the solution with sustainable building practices. This research offers a scalable framework for smarter, more efficient elevator systems in urban infrastructure.

Keywords: Elevator control systems, Real-time optimization, Heuristic algorithms, Passenger flow management, Energy efficiency, Load balancing.

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Enhanced Thermal Control in Space Radiators: An SQP-Based Optimization Approach

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Abstract: Under complex environmental conditions, the cooling process will be significantly enhanced if the detector is kept at an optimal level determined by the thermal index of control. The area and configuration of the detector area in the space ultraviolet imager used in conjunction with the methodology utilized to upgrade the cooling effectiveness of the radiation cooler design is further refined by using successive quadratic algorithms that are aimed towards iterative optimization of parameters associated with the design. Ultraviolet space imager associated with physical model and the thermal simulation model: a defined objective function was detector temperature. Example design variables are radiator width XW, height XH, and two inclination angles θ1, θ2 etc; the objective function was defined, stated in math framework and optimized using SQA. This method iteratively improves the design by quadratic approximations of objective function and constraints. Optimization Results: Optimization leads to optimum radiator design parameters. Optimization leads to optimum radiator design parameters XW = 165.58 mm, XH = 160.29 mm, θ1 = 7.28°, and θ2 = 5.87°. The radiator area would reduce by 18.18% and weight less by 48.78 g as against the original design. The optimized result analysis would show that at least down to 10°C, the design of the radiation cooler would be within the range of 20°C. Thus, the optimum design hence results in a lightweight but superior cooling device compared to the original design.

Keywords: Heat dissipation, Optimization, Radiation cooling, Spacecraft thermal control, Successive Quadratic Programming (SQP).

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Deep Learning-Based User Behavior Analysis: A Neural Network Approach for Predicting Purchasing Patterns

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Abstract: The extent of analysis into user behavior will concern purchase patterns, increase marketing returns, and foster better interaction with customers. The following research extends a deep learning framework predicated on an Artificial Neural Network (ANN) model for predicting user buying behavior through demographic and behavioral information. This methodology pre-processes the dataset containing various categorical and numerical features with encoding approaches as well as feature normalization. The experimental results validate that the suggested model attains an accuracy of 92% which is the testimony of strength of the model in detecting patterns of user behavior. The assessment includes precision, recall, F1 score, and confusion matrix analysis which emphasize the strength of the model in classification. The research indicates that deep learning models may largely contribute to predictive analytics for e-commerce and digital marketing solutions. Future work would include more behavioral signals; explain ability methods, and hybrid models to gain accuracy and interpretability.

Keywords: User Behavior Analysis, Deep Learning, Artificial Neural Network, Purchasing Patterns, Predictive Analytics, E-commerce.

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Legal and Managerial Challenges in Securing Civil Infrastructure Projects

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Abstract: The Internet of Things used in smart cities and civil infrastructure combines Artificial Intelligence, big data and integration to improve efficiency, sustainability and lifestyle. Nevertheless, while these advances provide solutions to limiting physical and cyber vulnerability, they also bring new critical physical and cyber vulnerabilities to the table. It looks at the effect of three kinds of factors on the security of the urban system: legal, managerial, and technological. The framework proposed in this thesis reduces response time by 35%, decreases cyber threat ratio by 40% and increases public confidence by 25%,

determined through case studies. The manuscript offers respective actionable recommendations for governments, organizational bodies as well as academia on synchronization of legal regulations, adoption of proactive risk management strategies and improvement of urban resilience. This research integrates cross disciplines approaches and promotes context specific solutions, which contribute to the global discussion about safeguarding the smart cities, providing a flexible, reproducible system to secure the smart cities globally.

Keywords: Smart Cities, Civil Infrastructure, Cybersecurity, Internet of Things (Internet of Things), Risk Management.

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Weapon Detection System using YOLO and Convolutional Neural Network

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Abstract: Weapon detection in public areas is an important responsibility for security assurance and prevention of threats. Increased violence using firearms emphasizes the need for real-time firearm detection using enhanced security and surveillance systems. To solve this challenge, we suggest an in-depth weapon identification research based on the state-of-the-art YOLOv10 algorithm. Weapon detection enhances public safety and security through effective detection of firearms in diverse environments. The research work employs the YOLOv10 model one of the newer and precise model, which can identify and locate objects in images and video streams. The approach is to train YOLO model on a set of labeled images of different types of weapons. The dataset provides a variety of environmental conditions to make the model strong. The trained model is used to examine live feeds and effectively detect potential threats. Also, the identified threats are recorded and passed to a web application for real-time monitoring and notification. The experiment results indicate that our system is very accurate in detection while involving minimal latency, and thus it is suitable for security use in surveillance systems.

Keywords: (AI) Artificial Intelligence, (CNN) Convolutional Neural Network, (IoU) Intersection over Union, (NMS) Non-Maximum Suppression, (YOLO) You Only Look Once.

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AI-Driven Innovations for Genetic Risk Prediction in Healthcare

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Abstract: This research focuses on the contribution of the new deep AI, ML and NLP technology to raise genetic risk estimation in healthcare. Through integrating genomics with information obtained from other unstructured clinical sources, the research proposes a mixed, relatively accurate genetic disorder risk prediction model. The methodology involves the use of sophisticated techniques owing to the utilization of advanced algorithms such as deep learning and Natural Language Processing that would analyze massive datasets to provide a wealth of valuable data that when analyzed would reduce chances of early diagnosis, development of appropriate treatment plans as well as anticipatory heath care processes. This approach yields even better results than previous models because of the ability to combine data and features from different sources – a new strengthening of the precision medicine paradigm. This work creates the foundation for using AI in the healthcare system to improve patient experiences, decrease diagnostic mistakes and improve treatment plans.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP), Genetic Risk Prediction, Precision Medicine, Genomics, Electronic Health Records (EHR), Personalized Healthcare.

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Conceptualizing Learned Helplessness in Higher Education: Investigating the Impact of Multiple Factors

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Abstract: Learned helplessness has been experienced by individuals since ages. It has been observed that learned helplessness is widely researched topic in the field of psychology and has become a major area in organizational behavior to be studied. Many studies have been conducted to analyze learned helplessness in various sectors which include primary & secondary schools (student performance), healthcare (caregiver and patient experiences) managerial & executive levels in IT industry, banking (work dynamics) and most prominently in depression studies. The current study attempts to examine nature and levels of learned helplessness experienced by educators in private higher education institutions across various demographic variables in Rajasthan, India. The sample consists of 391 educators working at the private higher education institutions. Stratified random sampling method for the selection of faculty has been used in the research. In order to achieve the objectives of the study, psychometric instrument, learned helplessness Scale by Pestonjee and Reddy (1988) was administered on the sample population. Significant differences in LH have been observed on the basis of different factors taken in the study.

Keywords: Learned Helplessness (LH), Educators, Private Higher Education, Abbreviations: External-specific-stable attributions –ESS.

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Optimizing Brain Tumour Classification Models through

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Advanced Image Segmentation Techniques

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Abstract: By defining the problem in terms of time and accuracy, there will be a positive impact on the patient, and this medical imaging problem is still very much open in brain tumor classification. This research has an advanced image segmentation algorithm to present an optimized framework for the classification of brain tumors. The method brings depth-learning segmentation models like U- Net and Fully Convolutional Networks (FCNs) into more classical techniques like thresholding and region growing algorithms to increase the segmentation precision. As a preparation for the dataset of MRI scans that have T1, T2, and FLAIR images, they are preprocessed and enhanced toward better robustness with changing imaging conditions. The segmented tumor regions will be analyzed with feature extraction considering the texture, shape, and intensity features to capture tumor heterogeneity. Convolutional neural networks (CNN) and support vector machines are well-known machine learning algorithms employed in classification and have potential applications that could be defined in a well-structured manner for various types of tumors. Examples of some tumor types include meningiomas, gliomas, and metastases. To optimize the performance of a model, the techniques for making ensembles and the tuning of hyper-parameters are utilized. The proposed methods have shown positive results through various evaluation metrics, such as accuracy, precision. It is expected that this will give rise to a substantial improvement in both the accuracy of segmentation and classification of tumor types, with automated brain tumor diagnosis and increased efficiency in clinical decision-making potential.

Keywords: Image segmentation, Brain Tumour, Medical Imaging, CNN, Feature Extraction.

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Medical Insurance Price Prediction Using Xai

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Abstract: The need for clear and precise medical insurance pricing has increased, which has

prompted research into sophisticated predictive modeling methods. This paper focuses on Medical Insurance Price Prediction using Explainable Artificial Intelligence (XAI) methods, aiming to provide interpretable insights into premium pricing. A dataset comprising ten critical factors, including age, medical history, chronic diseases, surgeries, and family cancer history, serves as the foundation for the model's training and evaluation. By utilizing machine learning models such as Support Vector Machines (SVM), Random Forest, and Extreme Gradient Boosting (XGB), we hope to accurately and interpretable forecast premium prices. The implementation of XAI techniques is central to this study. The main factors influencing premium pricing are identified by Shapley Additive explanations (SHAP), which quantifies the contribution of each feature to the model's predictions. Partial Dependency Plots (PDP) and Individual Conditional Expectations (ICE) are also used to visualize feature interactions and offer detailed, instance-specific interpretations. Through these techniques, interested parties can better understand the underlying trends in the data and the logic driving the model's projections. Our findings show how well the suggested models predict insurance premiums and provide useful information about the factors that influence premium prices. This study underscores the importance of XAI in fostering trust and accountability in machine learning applications. By combining predictive accuracy with interpretability, the proposed framework has the potential to aid insurers in fair decision-making and enhance customer satisfaction through transparency in pricing.

Keywords: Explainable Artificial Intelligence (XAI), SHAP Analysis, Random Forest.

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Gamification and Learning through Digital Platforms

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Abstract: A key feature of the era of digital transformation is gamification which has proven useful in education and learning processes. It is known that digital platforms tilize gamification to increase participants' engagement, motivational levels, and knowledge retention. The purpose of this paper is to study the phenomenon of gamification as related to learning through digital platforms and its effectiveness, challenges, and future scope. The research uses case studies, surveys, and data analytics to demonstrate how game elements like points, leaderboards and interactive challenges enhance learning. The findings of the study highlight that effective gamification strategies profoundly improve user engagement and knowledge attainment which make digital learning more efficient, effective, and enjoyable. The gamified learning environments provide sustained motivation, increased learner autonomy, and improved collaboration. The research also addresses implications of AI and personalized learning pathways in understanding how digital learning platforms may further improve. This study identifies best uses of the AI powered e-learning platforms to answer these questions.

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Keywords: Gamification, Digital Learning, Engagement, Motivation, E-learning, Game Mechanics, Personalized Learning.

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Geometric approach to calculate motion parameters by implementing inverse kinematics

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Abstract: This paper presents the design and implementation of a cost-effective, planar 2-degree-of-freedom (2-DOF) robotic arm for precise pick-and-place operations. The system integrates inverse kinematics for accurate end-effector positioning and servo easing algorithms to ensure smooth, stable motion. Built using an Arduino Uno microcontroller, MG995 servo motors, and a 3D-printed PLA structure, the arm demonstrates robust performance in lightweight industrial and educational applications. Experimental results validate the effectiveness of the inverse kinematics solver and motion control strategies, achieving sub-centimeter accuracy across diverse test cases. The project highlights the potential for scalable automation solutions using affordable hardware and open-source software.

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Development of Waste Heat Recovery Technologies – A comprehensive Review

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Abstract: Waste heat recovery technologies (WHR) are evolved globally to make systems more efficient. Rising environmental concerns and stringent government regulations have accelerated the adoption of Waste Heat recovery systems to reduce industrial carbon footprints. These technologies capture and repurpose waste heat from various industries, substituting conventional energy sources such as electricity and fuel. WHR systems improve overall thermal efficiency and are widely applicable in small- and medium-scale industries. This paper explores the fundamental principles of industrial waste heat, identifies key secondary thermal sources, and reviews advanced recovery technologies. The key findings highlight the role of WHR systems in energy conservation and sustainable industrial development, underscoring their importance in achieving global carbon neutrality goals.

Keywords: Sustainable Energy, Waste Heat Recovery Devices, Organic Rankine Cycle, Emissions, Green House gases, Organic fluids, Sustainable Technology, Thermodynamic cycle, Low Grade Energy.

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Assessment Of Milk Adulteration Using Sensor Based Spectro Photometer

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Abstract: A serious issue that compromises consumer health, safety, and quality is milk adulteration. This paper introduces a spectroscopic system based on photo diodes that uses light intensity measurements to identify milk adulteration. The system proposes a spectrophotometer sensor-based method to analyze the transmitted light, converting it into Analog-to-Digital Converter (ADC) values to relate with adulteration levels ranging between 10% to 100%. It requires 10 ml milk sample to show the results in 10 seconds response time and sensitivity of 10%. For this system total 20 random samples were tested. For ensuring the accuracy of detection of impurities like water and careful calibration process was followed to match ADC values with adulteration percentages. The suggested approach offers a quick, practical, and economical way to assess the purity of milk.

Keywords: Adulteration, Sensors, Spectrophotometer Analog to Digital Converter (ADC) , Luminosity Sensor, Laser Diode , Arduino Uno Milk Adulteration, Glucose

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An In-Depth Analysis of Security and Privacy Issues in Smart Home IoT Systems

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Abstract: Smart home IoT devices, which have brought convenience and connectivity like no other device in history, have radically transformed the modern living experience. However, this technological advancement does come with some serious issues of privacy and security and therefore calls for immediate attention to such problems. This study presents an all-comprehensive analysis of the various issues that are presented by issues of privacy and security related to IoT infrastructures in smart homes. Based on strict and careful analysis of all the literature and case studies in existence, we identify prevalent vulnerabilities, assess risks associated with them, and provide best mitigation strategies. The solutions provided such as block chain and standardized protocols can be very useful but cannot pin down the exact challenges that exist within the smart home IoT environments. To bridge this gap, customized solutions and recommendations are presented here for improving security and privacy in smart home IoT ecosystems. The proposed paper helps to arm stakeholders-manufacturers, consumers, and policymakers with an end-to-end understanding of threats and mitigation strategies as they navigate a constantly shifting landscape of smart

home IoT security and privacy.

Keywords: Linked devices, automation technologies, smart home, home automation, Internet of Things (IoT), data security, privacy, energy efficiency, user experience.

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ITAS: Intelligent Traffic Automation System

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Abstract: Urban traffic congestion is a critical problem due to inefficient traffic management systems that cause delays, fuel and time wastage and ultimately increases environmental damage. Conventional traffic light systems depend on fixed time schedules which do not adapt real time traffic conditions nor are they capable of prioritizing emergency vehicles. Addressing these issues requires a systematic and innovative approach. An intelligent, adaptive Traffic Management System could significantly reduce congestion and improve fuel efficiency that contributes to a sustainable development. This study proposes an ITAS Intelligent Traffic Automation System that automatically modifies the traffic signal duration based on real time traffic data. This system integrates Artificial Intelligence (AI) and Internet of Things (IoT) to optimize signal timings. IoT devices like sensors and cameras can easily be deployed at intersections to monitor real time traffic density as well as environmental conditions. AI and machine learning algorithms can be used for analyzing vehicular patterns and decision making.

Keywords: Artificial Intelligence , Internet of Things , Reinforcement Learning.

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Performance evaluation of Photovoltaic Thermal Systems Integrated with Fresnel Lens: A Comprehensive Review

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Abstract: This review paper explores the combination of Fresnel lenses with Photovoltaic Thermal (PVT) systems which is an innovative approach towards significantly enhancing the efficiency of solar energy conversion. This review paper focuses on the thermodynamic analysis of energy and exergy performance in this combination of Fresnel lens with PVT systems. The use of Fresnel lens ensures the improvement in heat collection capabilities by directing more solar radiation onto the photovoltaic panels which directly improves the electrical output by capturing excess heat which is not possible in conventional solar systems. As a result, the overall efficiency of the system is improved, offering a more balanced and optimized solution for solar energy production. This in-depth review paper examines the

enhancement in the efficiencies and the technical challenges which comes in the way by investigating this configuration. This paper aims to consolidate knowledge about their thermodynamic performance assess their potential in real world applications and identify areas for future research in this area as it comes out as an promising advancement in solar energy technology as it combines the enhanced and more efficient version of dual functions of generating electricity and capturing heat in a single system. Ultimately, this review on the approach of integrating of Fresnel lenses with PVT systems represents a promising path toward more sustainable and efficient solar energy solutions. By improving both electrical and thermal outputs, this technology has the potential to provide a higher yield from solar energy, reducing reliance on conventional energy sources and contributing to a more sustainable energy future.

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A Multi-Mode Transportation System: Integrating Land, Air and Water mode

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Abstract: The proposed invention is a revolutionary multi-modal vehicle capable of operating on land, water, and air using an advanced Vertical Take-Off and Landing (VTOL) system. This research explores its design, technological advancements, and potential applications in transportation, defense, and emergency services. The vehicle incorporates artificial intelligence (AI) for autonomous navigation, safety mechanisms, and adaptive control across different terrains. Additionally, the vehicle is powered by a hybrid energy system utilizing both battery and hydrogen fuel cells to overcome range limitations in fully electric systems. The study highlights how the invention addresses existing mobility limitations and enhances efficiency in modern transportation.

Keywords: VTOL, eVTOL, Hybrid Propulsion, Urban Air Mobility, AI Navigation, Autonomous Flight, Sustainable Aviation

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Anomaly detection in human behaviour using computer vision: A review

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Abstract: To improve the safety of the public, hundreds and hundreds of CCTV cameras are being installed in public spaces such as roads, shopping centers, parks, etc., but security

organizations capacity for monitoring cannot keep up. Monitoring relies on human judgment, which is affected by factors such as distraction and stress. Moreover, manual monitoring also comes with the added risk of missing an anomalous event or delay in reporting. All of this contributes to the need for automation in surveillance. A robust machine learning model that uses computer vision techniques, such as image and video data analysis, object detection, and motion tracking, can help mitigate these problems. Starting with introducing supervised learning methods like Convolutional Neural Networks (CNNs) to learn normal and anomalous data patterns and using Long-Short Term Memory (LSTMs) to capture and analyze time-related dependencies. Moving onto Auto encoders is an unsupervised learning approach that significantly improves anomaly detection by overcoming the need for a detailed labeled dataset. They learn to reconstruct the normal patterns during training, and during inference, any deviations are marked as an anomaly. Such an autonomous system will allow organizations to focus on tasks that require human attention and help minimize the response time of authorities in the event of anomalous events. This paper presents a comprehensive review of the research done on this topic.

Keywords: Real-time anomaly detection, supervised learning, unsupervised learning, computer vision

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Diabetes Prediction Based on Machine Learning Techniques: A Review

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Abstract: Early and precise diabetes diagnosis is vital for efficient disease regulation and complication prevention. The emerging role of Machine Learning (ML) in healthcare has given impetus to researchers who have explored various predictive models to enhance diagnostic precision. This review critically examines Tree Based Methods, Probabilistic and Distance-Based Approaches and Neural Networks Techniques, evaluating their performance based on various metrices. Our analysis indicates that ensemble learning approaches, particularly random forests with gradient boosting, along with Artificial Neural Network, consistently outperform traditional models, exhibiting superior predictive capabilities. These outcomes emphasize the potential of ML in the betterment of diabetes detection by identifying complex patterns in patient data. Integrating advanced predictive algorithms into diabetes screening can enhance early detection and enable timely medical interventions. With machine learning models continuing to evolve, their application in medical diagnostics holds significant promise for bettering diabetes detection and assisting healthcare professionals in selecting the most effective predictive models for clinical use.

Keywords: Artificial Intelligence, Diabetes Prediction, Deep Learning, Healthcare, Machine

Learning, Tree-Ensemble

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Role Of Six Sigma In Manufacturing: A Review

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Abstract: Tiny Machine Learning (TinyML) has emerged as a potential paradigm for deploying and training machine learning models on resource constrained systems like microcontroller units(MCUs) to en- able real-time and low power intelligent systems at the edge. This paper presents a comprehensive review on the current landscape of TinyML, focusing on architectural considerations of MCUs and machine learning models, model optimization techniques, deployment techniques, and potential application specific implementations of TinyML. Among the proposed models and frameworks are MCUNet, EfficientNet, TinyFL, TinyOL, TinyOPs and many more, which explore approaches to enhancing the efficacy, model training, and optimization techniques for deploying deep neural networks on MCUs. We explore the different trade-offs in training and compression methodologies, techniques used for optimizing inference for efficient execution of models and focus on exploring the feasibility of on-device training on MCUs so that the model can adapt to real-time sensing and collation of data. Furthermore, we examine the possibilities of real-world applications spanning healthcare, industrial automation and smart environments while focusing on the potential and limitations of TinyML in different domains. By reviewing the current situation of the various aforementioned factors in TinyML, this paper aims to provide a foundational insight into the future directions of study in this field.

Keywords: Six MCUs, TinyML, Inference Resource, constraints On-device learning, Federated Learning.

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Multi-Agent Traffic Management System For Smart Cities – A Review

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Abstract: Traffic management is a major issue, particularly in places that are urbanizing rapidly and where customary arrangements like manual interventions and inactive flag timings cannot fulfill the requirements of modern urban transportation. This paper presents an

in-depth investigation of considerations to advance traffic control using multi-agent systems and reinforcement learning (RL) technology. RL-based strategies, such as Actor- Critic models and Deep QLearning, offer adaptable and efficient solutions for advancing flag control and traffic flow. In this field, the STMARL (Spatio-Temporal Multi-Agent Reinforcement Learning) system stands out as a game-changing approach. Deep QNetworks (DQN), Advantage Actor-Critic (A2C),and Multi-Agent Actor-Critic (MA2C) systems are among the few strategies utilized in several papers. The viability of these approaches in dealing with complex and decentralized traffic systems is examined. One pivotal component, vehicle identification, employs computer vision models such as YOLOv4 and DeepSORT to precisely track and classify objects. Versatile flag control procedures are trained by real-time traffic density data provided by this capability. To supply versatile and agreeable control over intersections, this paper analyses advancements in intelligent traffic management systems, highlighting the work of independent street observation systems and multi-agent reinforcement learning systems. This research also explores the possibility of utilizing connected car information and dynamic flag control procedures to reduce traffic lights in instant time, reducing wait times and enhancing urban mobility.

Keywords: (Traffic Management, Reinforcement Learning (RL), Multi-Agent Systems, Deep Q-Learning (DQL), Actor-Critic Models, Spatio-Temporal Multi-Agent Reinforcement Learning (STMARL), Deep Q-Networks (DQN), Advantage Actor-Critic (A2C), YOLO (You Only Look Once).

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DE-FAKE: Counterfeit currency detection

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Abstract: To protect global markets against possible harm, forgery detection mechanisms need to be improved as the problem of forgery is getting worse. This paper describes a mobile application that utilizes the fact that modern mobile devices are equipped with several sensors, such as and LIDAR, ultraviolet (UV), infrared (IR), Time-of-Flight (ToF) as well as spectral imaging to avoid or enhance currency forgery detection and prevention tools. The mobile application intends to authenticate bank notes on a real time basis by making use of Oriented FAST and Rotated BRIEF (ORB), color histogram analysis, anomaly detection, and size and dimension measurements which are more precise. This research uncovers a theoretical basis and practical issues related to merging these technologies as a step toward resolving the overarching problem of building efficient mobile applications for currency forgery detection.

Keywords: Counterfeit currency detection, Image Analysis, Anti-counterfeiting technology, Security, Economy

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Analyzing Software Defect Prediction Using AI Approaches

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Abstract: Defect Prediction in software serves a unique function in verifying the high-caliber development of software by identifying potential defects before they are revealed in production. As software systems become more sophisticated, traditional defect-predicting approaches sometimes fail to produce reliable results. The article analyzes the adoption of various Expert Approaches to forecast software imperfections to develop accurate and efficient applications. The paper reviews multiple artificial intelligence approaches used in software prediction. The studies confirm that AI techniques give better results than traditional statistical techniques, achieving higher precision and recall. In addition, the implications of the results for practitioners, providing guidelines for integrating AI-based defect predicting into existing software development workflows, will also be discussed. The various work done in the related field, Expert Approaches, adoption of SDP, economic benefits, and research gaps will be covered in the paper. The emphasis will be on how the expert approaches can improve the efficiency and precision of the SDP process. Keywords: Software Defect Prediction (SDP), Software Testing (ST), Machine Learning (ML), Deep Learning (DL), Expert Approaches, Artificial Intelligence (AI).

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An AI Driven Approach for Bird Species Conservation

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Abstract: Birds have a significant impact on ecosystem management and are useful markers of biodiversity and habitat health. Pollination, seed dispersal, and pest control are just a few of the environmental functions that suffer when bird populations drop. To identify species of concern and assess the efficacy of conservation, reliable long-term ecologists should monitor birds. We created BirdRaksha, an AI-powered 525 bird species that are automatically detected and classified by a computerized system that provides real-time identification capabilities along with comprehensive information on habitat conditions, environmental problems, and conservation status. The project combines a strong development stack with cutting-edge machine learning models such as YOLO MODEL to offer a highly accurate and scalable ecological monitoring and conservation solution. The approach offers a detailed examination of bird populations and their ecosystems by combining environmental data with species taxonomy. Beyond its technical capabilities, BirdRaksha fosters biodiversity awareness by educating users on the ecological importance of birds and empowering community-driven conservation initiatives. BirdRaksha achieved an accuracy of 96.4% and mean average precision of 95.8% with YOLOv5 model and 95.1% and 94.7% with YOLOv4 model respectively. This work explores the system's technical framework, its contribution to

environmental surveillance, and its potential to advance real-time species monitoring and ecological preservation.

Keywords: Bird Detection, Bird Classification, YOLO MODEL, Species Identification, Bird conservation.

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Dynamic Spectrum and Security in Cognitive Radio Networks with Unlicensed Bands

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Abstract: Cognitive Radio Networks (CRNs) permit spectrum opportunities in adynamic way thereby improving spectrum efficiency. However, because CRNs are open and dynamic,rogue nodes can impair network operations by violating spectrum utilization regulations. The misbehaving node detection and prevention for CRNs are studied in NS2 in this paper. We outline a converged solution that combine the use of machine learning methods for detecting possible maliciousactions with game-theoretic approaches for preventing the occurrence of these actions before they can manifest into an actual cause of harm. Detection mechanism uses anomaly-based and signature-based strategies to monitor the patterns of spectrum access. The system includes a reputation system that assigns trust scores to nodes according to their behaviour and can automatically isolate nodes that are behaving suspiciously. It also includes the cooperative game theory for the prevention strategy to reward the legitimate behavior and punish misbehavior. The effectiveness of the suggested system in terms of detection efficiency, network throughput, and spectrum efficiency is then assessed through simulation under the NS2. Results show that the system can accurately identify misbehaving nodes while maintaining high levels of network performance and fairness. This method ensures the trustworthiness of CRNs through active and passive mechanisms. As dynamic spectrum access is a growing area of active research, this work helps advance the security and reliability of CRNs in the face of these challenges. Detected local attacks, but finding more that will have little effective adaptation to be able to extend to is a part of future work, so the way is open for further improvements in the detection algorithms and the system against more complex attacks and changes high in the network conditions to be adapted and more complex regions possible for adding new simple conditions to be able to observe less.

Keywords: Cognitive Radio Networks (CRNs); Dynamic Spectrum Access; Misbehaving Nodes; Anomaly Detection; Trust Based System; GameTheory; Spectrum Efficiency; Network Security.

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MICROSTRUCTURAL PROPERTIES OF STEEL TOOL: A review

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Abstract: The point of study is to show the impact of various info boundaries, for example, welding current, curve voltage and root hole which influence the microstructure properties during the Metal Inert Gas Welding (MIG) of hardware steel. The microstructure, hardness and elasticity of weld example are explored in this review. This review manages test result of rapid hard of solidified AISI S1 cold work instrument steel utilizing artistic and CBN cutting apparatuses. Pieces made M2, T1, A2 went through crack strength test and S1 apparatus steel were given different hotness medicines so the necessities for most extreme sturdiness without unnecessary loss of hardness might be set up.

Keywords: Tensile strength and Hardness, ceramic and CBN cutting tools, Deep cryogenic treatment

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Design And Fabrication of Fuel Monitoring System

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Abstract: Fuel theft is a rising problem that causes operational inefficiencies and financial losses for petrol stations, company fleets and automobile owners. As a solution to this issue, the smart fuelling system incorporates cutting edge sensors and Internet of Things (IoT) technology for theft detection and real-time fuel monitoring. The device, which has high-precision sensors, continually video displays gasoline levels and sends records via a web of factors network to a centralized platform. Fuel float is exactly measured by way of a Hall Effect sensor, and the ESP8266 microcontroller interprets the facts before sending it to a smart phone app and an on-display screen display for convenient monitoring, through this connectivity, customers can also hold a thorough record of their gasoline use, remotely reveal their fuel usage, and get notifications for uncommon fuel usage styles. The gadget affords a scalable and inexpensive solution and is made to be without difficulty established on a form of automobile types. The clever fuelling machine transforms fuel management with functions like cellular smartphone connectivity and real-time anomaly detection, offering a dependable and powerful defense in opposition to fuel-associated losses.

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Keywords: Internet of things (IOT), OLED(natural light Emitting Diode), MQTT protocol (Message Queuing Telemetry delivery) , MCU (Microcontroller)

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Real Time Carbon Footprint Monitoring in Manufacturing Industries using IOT and ML

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Abstract: Real-time carbon emission tracking is critical for sustainability, specifically in industries. Conventional tracking techniques lack accuracy, necessitating modern technologies. IoT, AI, and records analytics allow precise actual-time records series and evaluation. The possible development of a Smart Carbon Emissions Monitoring System that works by making use of IoT-embedded sensors and analytics driven by AI to deliver the real-time data on industrial carbon footprints, is explored in this study. The system largely uses sensors that are responsible for assessing air quality, usage of energy and carbon emissions, which is then sent to cloud-based platforms to process sophisticatedly. To forecast emissions patterns machine learning algorithms are employed. This real-time monitoring framework assists in cohering to the environmental norms, supporting sustainability efforts, and promoting proactive decision-making for effective emission reductions. The proposed system advances environmental accountability by aiding industries in achieving carbon neutrality without compromising productivity. IoT and AI enhance emissions tracking, fostering a sustainable future. However, challenges include data security risks, power constraints, and infrastructure gaps.

Keywords: Real-Time Carbon Emissions Monitoring, Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), Data Analytics.

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Sustainability Analysis of Hydrogen Fuel Cell and Battery Electric Vehicles: Integrating Life Cycle Assessment with Predictive Modeling

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Abstract: The globe is shifting towards a green economy and renewable energy and electric vehicles are an alternative to current internal combustion engine vehicles. Internal combustion engine vehicle emissions such as carbon and other emissions have caused extensive load on environment and harmful climate change, necessitating the use of cleaner and more sustainable transport options. Electric vehicles are classified as electric vehicles that uses battery, or a combination of plug-in hybrid electric vehicles, hybrid electric vehicles and electric vehicles that uses fuel cell technology. The current research includes the Life Cycle Assessment approach to evaluate the environmental impact of the hydrogen fuel cell and the battery-electric vehicles at each phase ranging from the extraction of raw material to end of life recycling. By forecasting the fuel cell and battery-electric vehicle sustainability implications through cradle to grave life cycle analysis as well as evaluating the determinants of electric vehicle adoption in India through machine learning algorithms, the research provides a data-driven solution towards emissions reduction as well as to inform policy on sustainable transport options.

Keywords: Hydrogen Fuel Cell Electric Vehicle, Battery Electric Vehicle, Sustainability, Life Cycle Assessment, Machine Learning.

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Context-Aware Adaptive Wheelchair: AI-Driven Terrain Detection for Mobility Assistance

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Abstract: The lack of economical assistive devices limits people with lower limb disabilities in terms of mobility, autonomy, and overall life satisfaction. Powered wheelchairs do offer advanced wheelchair functions for users but are very expensive and rely on sophisticated technologies to supplement their usage. Due to this many use manual wheelchairs which require a significant amount of effort to self-propel, especially on uneven surfaces. This paper presents an augmentation of a standard manual wheelchair with context-aware assistance that helps in difficult terrains. The system consists of a Raspberry Pi with a Raspberry Pi Camera which takes real-time pictures of the above surface to be traversed, and uses Efficient Net, a lightweight and accurate deep learning model for classification which improves the accuracy of classification by up to 2.5% compared to single scaling methods. To try out our method, we test Efficient Net against ResNet50 and MobileNetV3 to compare accuracy, inference speed, and computational efficiency. Depending on the classified terrain, which includes ramps, side slopes, or rough pavements, the system suggests whether powered assistance to help with the rotation of the wheelchair wheels should be provided or not, thus reducing physical exertion while allowing the user to use their arms. This method meets the user's needs by providing an optimum combination of ease of use, efficiency, and reasonable cost.

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Keywords: Affordable Wheelchair, Real-Time Image Processing, Deep Learning, Edge AI.

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AI-Driven Object Recognition for Sustainable Agriculture: Enhancing Precision with Bounding Box Identification

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Abstract: Object recognition using bounding boxes has become one of the key techniques for the accurate identification and location of objects in images. This study considers deep learning methods for objects detection and classification performed with the use of bounding box annotations, intended for use in accurate areas such as agriculture or medical imaging. Through a pre- trained model, the Convolution Neural Network (CNN) achieves classification and localization through multi-output learning at once. Numerous experiments illustrate the performance of the proposed algorithm in terms of accuracy and detection of some objects with very small false positive rates and high localization accuracy. This work emphasizes the promise of automation in visual recognition tasks focused with the help of bounding box identification.

Keywords: Object Recognition and CNN.

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Deep Fuzzy Hypersphere Neural Network model for Anomaly Detection in Edge Computing

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Abstract: Edge computing emerged as a potential model to mitigate the boundaries of cloud computing, especially latency and bandwidth constraints. However, the increasing complexity and heterogeneity of edge devices due to their limitations generate a variety of irregularities in data generation. An essential role in the edge computing system is anomaly detection, where the identification of unusual or deviant data patterns is vital for ensuring system reliability and security. This paper proposes a novel Deep Fuzzy Hypersphere neural network learning model for robust anomaly detection in edge computing applications. The model leverages the expressive power of deep neural network'fuzzy logic to learn the hierarchical feature representation from the input data, while the fuzzy hypersphere decision boundary provides a flexible and adaptive means of detecting anomalies. The proposed approach is validated using real-world edge computing datasets and performs better than the existing anomaly detection techniques. Experimental outcomes indicate that the Deep Fuzzy Hyper Neural Network performs better compared to traditional machine learning and deep learning methods in anomaly detection with improvements in evaluation metrics.

Keywords: Deep Neural Network, Fuzzy logic, Edge Computing, Anomaly detection, Internet of Things.

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Time-Responsive Manufacturing: A Extensive Review of 4DP Applications in IoT and Mechatronic Systems

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Abstract: 4DP, an evolution of additive manufacturing, integrates intelligent materials with digital fabrication to create objects that can change shape or function in response to environmental stimuli. This study focused on finding the emergence and development of 4D printing in the Internet of Things (IoT) and mechatronics. This paper discovers the historical background of adaptive manufacturing technologies and key concepts and theories underlying 4D printing, and summarizes current research trends . In addition, we highlight specific applications in sensors, actuators, and robotics and discuss prospective future directions and open challenges. The aim of the review to provide a comprehensive analysis of intelligent materials utilized in different 4D printing techniques. Every intelligent material, including polymers, alloys, and composites, has a unique collection of physical, chemical, mechanical, and thermal properties. These characteristics are the foundation of the application of the intelligent material for 4D printing techniques to enhance IoT applications and mechatronic devices.

Keywords: 4D printing, sensors, actuators, robotics, IoT applications

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Malware Detection Using Anomaly Detection Techniques: A Performance-Driven Approach

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Abstract: With evolving cyber threats, traditional malware detection struggles to adapt to emerging variants. This study explores anomaly detection as an innovative approach to identifying malware by detecting deviations from normal system behaviour. Using a publicly available dataset, we evaluated models such as K-Means, Gaussian Mixture Models, Autoencoders, and Generative Adversarial Networks (GANs). The results show that deep

learning models, especially GANs and Transformer-based models, achieve high accuracy in detecting zero-day attacks and obfuscated malware. Our approach reduces false positives while ensuring computational efficiency for real-time deployment on resource-constrained devices. This research presents a scalable and adaptive framework capable of identifying known and novel threats, offering a robust alternative to traditional malware detection methods.

Keywords: Anomaly Detection, Deep Learning, Cybersecurity, Malware Detection, Generative Adversarial Networks (GANs), Transformer Networks, Convolutional Neural Networks (CNNs).

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Presentation Attack Detection in Facial Recognition: A Survey into Facial Spoofing Countermeasures

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Abstract: Biometric systems are a great way to authenticate people but these systems are susceptible to presentation attacks. Facial Presentation Attack is an attack in which an unauthorized individual tries to impersonate a genuine user, using artifacts like printed images, 3D masks, etc. This is a major security concern as attackers would be able to access the data of the genuine person easily and cause potential harm. In recent years, a significant amount of work has been done in this field. The aim of this review is to highlight some of the methods proposed to detect presentation attacks or spoofing attacks. This review is primarily focusing on the existing research aimed at software based approaches, some of which includes the texture analysis, luminance and image quality based and facial actions based approaches and so on. Additionally, some other approaches focus on the effects of different factors such as environmental cues like brightness, user behaviour and some obstacles like mask, or sunglasses, etc., on the detection processes.

Keywords: Biometric System, Facial Presentation Attack, Facial Presentation Attack Detection, Spoofing, Texture Analysis, Luminance, Chrominance, Facial Actions.

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Efficient Circular Fractal Antennas for UWB Applications in Wireless Networks

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Abstract: In this manuscript cylinder with initial shape as circle is taken. Two fractal iterations are done on the patch and defects are introduced in the ground to make it applicable for ultra wideband communication systems. To make patch simple in design microstrip feed system is taken. The aerial operates from 3.1-10.6 GHz covering ultra wide band. Maximum gain obtained is 5.3dB. The design has an comprehensive electrical size of 30 × 44 mm 2 and is made on a ordinarily accessible FR4 substrate.

Keywords: Microstrip antenna, circular patch, fractal resonant frequency, returns loss, radiation pattern, VSWR, antenna gain.

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Quality Assessment of Students Project in Outcome-Based Education

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Abstract. The modern engineering education system uses a well-established process of teaching and learning through outcome-based education (OBE). Continual quality improvement is the key indicator for the assessment of learning outcomes in OBE. Academicians use this key indicator to study the different ways that help to improve the overall performance of graduating students in technical education. This paper discusses the quality assessment and evaluation of students' projects in accordance with OBE. The process includes the identification of the project, allotment to students, and continuous monitoring along with its evaluation. This paper also discusses the impact analysis of the proposed methodology on students' academic performance with respect to the Program Outcome (POs) of the institute.

Keywords: OBE, PO, learning outcomes, project assessment, quality improvement.

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Development of an Electronic System for Tinnitus Frequency Detection and Management

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Abstract: Ringing in the ears, or tinnitus, is a disease in which a constant sound is heard in the ears even in the absence of an external source of sound, which, in severe form, is a critical problem in millions of people throughout the world. Tinnitus requires accurate identification of the frequencies involved and the subsequent development of the appropriate treatment modalities. This work presents a new innovative electronic system used for tinnitus frequencies identification and tailored sound intervention. The system uses the technology in digital signal processing in evaluation of audible stimulus to determine clear tinnitus tones quickly. An intuitive control simplifies the use and the bioacoustics mechanisms allow for precise treatment through masking and desensitization procedures. Hence, accuracy and precision of the system with 50 participants showed that the system was highly accurate in the frequency detection ranging from 250 Hz up to 12 kHz, with 95 % precision in frequency range. Remission reported on loudness of tinnitus and other quality of life measures at post-treatment, after eight weeks of therapy. In light of these outcomes, the utility of the proposed system as a practical solution that responds to users' needs for the control of tinnitus is underlined – the perspective for further advancements of the auditory healthcare technologies is opened.

Keywords: Tinnitus, Frequency Detection, Personalized Sound Therapy.

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Machine Learning for Early Diagnosis and Prognosis of Prostate Cancer: A Comparative Analysis of Predictive Models

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Abstract: The enhancement of operational capabilities of machine learning has enhanced accurate classification systems for cancer diseases. This work develops a new methodology for the classification of prostate cancer based on genomic data from TCGA. Subsequently, employing feature selection methodologies, key biomarkers were detected While, the later pre-processing techniques involved standardisation, PCA, polynomial features extraction. The classifiers used in the current study included Random Forest, Support Vector Machine (SVM), Logistic Regression, XG Boost, and K-Nearest Neighbours (KNN). The performance of the models was assessed in terms of the true positive rate, precision, recall, F1-score and confusion matrices, which proved that the architectural features of cancerous prostate tissue can be effectively distinguished from surroundings non-cancerous tissue. From the findings of this study, it can be inferred that high performance of machine learning classifiers can play a key role in aiding precision oncology; to capture recondite patterns in disease diagnoses with greater accuracy improving the patient's prognosis and assisting in the construction of personalized treatment plans. Some of these models include: genomic models that can help in the early diagnosis; predictive models in aiding with treatment decisions; and biomolecular models providing the molecular basis of prostate cancer. This work contributes to the development of machine learning for clinical cancer genomics, with special emphasis on biomarkers for diagnosis and therapeutic approaches to the prostate carcinoma.

Keywords: Prostate cancer, machine learning, Genome, biomarkers, classification, Random Forest, SVM, XG Boost, precision medicine, feature selection, cancer diagnosis.

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Evaluation of Outcome of resources utilized for Library Science

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Abstract

The services offered by Colleges Central Library of Jaipur were assessed. Data was collected through a questionnaire given to library users, and an evaluation of the services was carried out. The outcomes of the study designate that the central Library in Colleges contributes to the provision. Variety of library services, including the RFID (Radio Frequency Identification) software, OPAC (Online Public Access Catalog), to the user's .Recent state of libraries give opportunities of self-learning to the beneficiaries. Respondents recommended that the library provide training programs to assist users in making better use of its resources.

Keywords: Academic Library, library services, Central Library, user study, user feedback, and user satisfaction (RFID).

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Comparative EEG Analysis of Neural Dynamics in Gamers and Non-Gamers

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Abstract— Eeg signals of gamers were compared for an attempt to identify neural substrates of gamers' performance in the present study. The study was carried out through a critical analysis of literature in the subject with an emphasis on five research papers, upon which the comparative analysis was established. In the present study, it was attempted to examine the differences in EEG signals between the skilled and less skilled gamers during gameplay. The study showed that experienced gamers had alpha and beta wave amplitudes in the frontal and

parietal areas of the brain that where significantly greater than that of the non-experienced gamers. These results imply that elevated alpha and beta oscillation in selected areas of the brain could be connected to expertise in gaming. The present research advances knowledge in neurological gaming efficiency and offers recommendations about future EEG application to quantify gaming competency.

Keywords: *EEG electrode, EEG amplifier, Data Acquisition (DAQ), MATLAB*

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5G-Enabled Intelligent Warehouse Management System with RFID Technology

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Abstract. At present, the smart warehousing and logistics solution faces challenges related to high energy consumption and low operational efficiency. To tackle these issues, a novel design incorporating RFID is introduced to tweak the performance of the hardware framework of the overall system. The warehouse management system's network architecture is structured into four distinct layers: physical, network, data, and application, each contributing to its overall functionality and organization. By leveraging RFID technology, the system enhances its capabilities to transport materials, track their location within the warehouse during outbound processes, and gather data on dispatched items via an RFID scanner. Retrieved items are further transported using automated tools. Additionally, the system includes a user management module that handles login and administrative functions, while inventory management ensures the efficient clearing and counting of goods. This approach lays the groundwork for advancing research in the domain of intelligent logistics and warehousing.

Keywords: Warehouse Management, RFID, Intelligent Logistics, IoT

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Performance Analysis of IEEE 33-Bus and IEEE 69-Bus Radial Distribution Systems Using Backward-Forward Sweep Load Flow

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Abstract: The reliability and efficient functioning of power distribution networks are essential for the stable supply of electricity. Radial distribution systems, including the IEEE 33-bus and IEEE 69-bus test systems, are widely employed for power flow studies because of their extensive usage in actual distribution networks. This study deals with the performance analysis of IEEE 33-bus and IEEE 69-bus radial distribution systems employing the Backward-Forward Sweep (BFS) load flow method. The BFS algorithm is a standard iterative method particularly suited to radial systems, providing computational savings and strong convergence characteristics. The simulation using MATLAB is designed to execute the BFS algorithm to solve the power flow equations in the given test systems. The technique consists of a backward sweep for the computation of branch currents from the load buses towards the substation, followed by a forward sweep to refresh bus voltages from the source node towards the end buses. The system impedances and the load requirements are transformed to per-unit quantities in terms of base values of 100 MVA and 12.66 kV, with the result of precise numerical computations. The simulation outcome yields a careful evaluation of the bus voltage profiles, line currents distributions, as well as aggregate active and reactive power losses within the two IEEE test systems. The voltage profiles clearly show departures from their respective nominal voltages, from which buses of severe voltage sagging can be detected. In addition, active and reactive power loss calculations delineate high-loss elements in the networks, such as areas in need of network loss minimization and reinforcement intervention. The IEEE 69-bus system, as a larger and more complex system than the IEEE 33-bus system, poses special challenges of power losses and voltage regulation, which are examined and compared in detail. In addition, graphical plots, such as voltage magnitude plots and bar charts for active and reactive power loads, are employed to graphically display the performance of the distribution system. The research validates that the BFS approach efficiently manages radial distribution networks with high computational efficiency and accuracy. The results of the work would be used in power distribution planning, voltage stability study, and loss minimization planning. Future research directions would be using distributed generation (DG) units, capacitor planning, and optimization methods for improving network performance. The present paper is a new contribution to research on analysis of distribution systems as it develops an exhaustive analysis of performance of IEEE radial test systems by employing a computationally intensive method. The outcomes of this research are applicable for use by power engineers and scholars to design power distribution networks that are optimized and stable.

Keywords: IEEE 33-bus system, IEEE 69-bus system, radial distribution system, load flow analysis, Backward-Forward Sweep method, voltage profile, power loss estimation, MATLAB simulation, distribution network optimization, voltage stability.

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