



KJ's Educational Institute
Trinity Academy of Engineering, Pune



(Approved by AICTE New Delhi, DTE Mumbai & Affiliated to Savitribai Phule Pune University)

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

in association with



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Sri Lanka



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Editors

Dr. R. J Patil

Dr. K. B. Gavali

Dr. M. K. Chaudhary

Trinity Academy of Engineering, Pune

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3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Dignitaries

Messages from Chief Guest



Dr. Eknath B. Khedkar

Vice President,
Ajeenkya DY. Patil Group, Pune

It gives me immense pleasure to be a part of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

In today's rapidly evolving world, interdisciplinary research plays a vital role in addressing global challenges and fostering innovation. Platforms like ImCReTE provide an excellent opportunity for academicians, researchers, and industry professionals to exchange ideas, showcase their work, and collaborate for future advancements.

I congratulate the organizers for their dedicated efforts in hosting this conference and extend my best wishes for its grand success.

Messages from Guest of Honour



Dr. K. S. Charak

Pro-Chancellor,
Langbustech University, USA

It is a privilege to be a part of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

In the present era, the integration of multiple disciplines is essential for driving innovation and sustainable development. Conferences like ImCReTE provide an excellent platform for researchers and professionals to share knowledge, explore new ideas, and build meaningful collaborations.

I appreciate the efforts of the organizing committee in bringing together such a diverse academic community. I extend my best wishes for the success of the conference and hope it proves to be highly beneficial for all participants.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Guest of Honour



Dr. Suhas Deshmukh
Director,
NCVET, New Delhi

I am delighted to extend my greetings on the occasion of *ImCReTE-2026*, hosted by Trinity Academy of Engineering.

This conference represents a significant step towards promoting research excellence and technological advancement. It offers a valuable opportunity for students, academicians, and industry experts to engage in insightful discussions and contribute to the progress of society through innovation.

I congratulate the organizers for their commendable initiative and dedication. I wish the conference great success and all participants a rewarding and enriching experience.

Messages from Keynote Speaker



Dr. Ranjana. U.K. Piyadasa
University of Colombo, Sri Lanka

It is an honor to be a part of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

In an era driven by rapid technological advancements, interdisciplinary research has become essential for innovation and problem-solving. Conferences like ImCReTE provide a vibrant platform for sharing knowledge, exchanging ideas, and fostering collaboration among researchers and professionals.

I look forward to engaging with the participants and contributing to meaningful academic discussions. I extend my best wishes for the success of the conference.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Keynote Speaker



Dr. Dineshsingh. G. Thakur
Professor, DIAT, Pune

I am delighted to be associated with *ImCReTE-2026*, hosted by Trinity Academy of Engineering.

Such conferences play a crucial role in inspiring young minds, encouraging research culture, and bridging the gap between academia and industry. They provide an excellent opportunity to explore emerging trends and share innovative ideas that can shape the future.

I hope my keynote session adds value to the conference and inspires participants to pursue impactful research. I congratulate the organizing team and wish the event a grand success.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Chief Patron



Hon. Shri Kalyan Jadhav
Founder President,
KJ's Educational Institute, Pune

It gives me great pride to witness the organization of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* at Trinity Academy of Engineering.

Our institution is committed to fostering research, innovation, and academic excellence. This conference reflects our vision of creating a vibrant research culture and encouraging knowledge dissemination.

I extend my heartfelt congratulations to the organizing team and wish the conference great success.

Messages from Executive Directors



Maj. Gen. Sameer Kalla,
VSM (Retd.)
Executive Director,
KJ's Educational Institute, Pune

It gives me immense pride to extend my greetings on the occasion of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

In today's dynamic and rapidly evolving global environment, research and innovation are the cornerstones of progress. Multidisciplinary platforms such as ImCReTE encourage the exchange of ideas across diverse domains, fostering holistic development and practical solutions to real-world challenges.

I commend the organizing team for their dedication and vision in hosting this prestigious conference. I wish the event great success and hope it inspires participants to contribute meaningfully to society through research and innovation.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Technical Directors



Dr. Ajay Fulambarkar,
Technical Director,
KJ's Educational Institute, Pune

It is a matter of great pleasure to be associated with *ImCReTE-2026*, hosted by Trinity Academy of Engineering.

Technology continues to transform every aspect of our lives, and research serves as the driving force behind this transformation. Conferences like ImCReTE provide an excellent platform for academicians, researchers, and industry experts to share their knowledge, discuss emerging technologies, and explore innovative solutions.

I appreciate the efforts of all contributors and organizers in making this conference a reality. I extend my best wishes for a successful and impactful event.

Messages from Dean, Student Development & Welfare



Dr. Hemant Deshmukh,
Dean,
Student Development & Welfare,
KJ's Educational Institute, Pune

I am delighted to extend my best wishes for the successful hosting of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* at Trinity Academy of Engineering.

Such conferences play a vital role in nurturing young minds by providing them with opportunities to present their ideas, interact with experts, and gain exposure to the latest developments in research and technology. They significantly contribute to the overall academic and professional growth of students.

I congratulate the organizing committee for their commendable efforts and wish all participants a rewarding and enriching experience.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Principal



Dr. Rupesh J. Patil
Principal,
KJEI's Trinity Academy of
Engineering, Pune

It gives me immense pleasure to welcome you to the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

In today's rapidly evolving technological landscape, multidisciplinary research plays a crucial role in addressing complex global challenges. This conference provides an excellent platform for academicians, researchers, industry experts, and students to share knowledge, exchange ideas, and explore innovative solutions. At our institution, we are committed to fostering a culture of research, innovation, and academic excellence. I am confident that ImCReTE-2026 will inspire meaningful discussions and collaborations among participants.

I congratulate the organizing committee for their dedicated efforts and extend my best wishes for the grand success of the conference.

Messages from Convener



Dr. K. B. Gavali
Convener, ImCReTE-2026

It is my privilege to welcome you to the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* hosted by Trinity Academy of Engineering.

ImCReTE-2026 aims to provide a dynamic platform for researchers, academicians, and industry professionals to present their work and exchange innovative ideas across diverse domains. The enthusiastic response to this conference highlights the importance of interdisciplinary collaboration in today's world. We have curated insightful keynote sessions and technical presentations to enrich the experience of all participants. I sincerely thank all authors, speakers, reviewers, and organizing members for their valuable contributions.

I wish all participants a productive and enriching conference experience.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Co-Convener



Dr. Suvarna. S. Pawar
Co-Convener, ImCReTE-2026

It is a privilege to be a part of the *3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)* organized by Trinity Academy of Engineering.

This conference provides a valuable platform for researchers, academicians, and students to present their work and exchange innovative ideas. I appreciate the efforts of the organizing team and extend my best wishes for the success of the conference.



Mr. Sameer B. Kakade
Co-Convener, ImCReTE-2026

I am delighted to welcome all participants to *ImCReTE-2026* hosted by Trinity Academy of Engineering.

Such conferences encourage knowledge sharing and collaboration across disciplines. I congratulate the organizing committee for their dedication and wish all participants a fruitful and enriching experience.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Messages from Coordinator



Dr. Manoj K. Chaudhary
Coordinator, ImCReTE-2026

It gives me great pleasure to welcome you to the 3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026) organized by Trinity Academy of Engineering.

ImCReTE-2026 aims to create a collaborative platform for academicians, researchers, industry experts, and students to share knowledge and present innovative research across diverse domains. The conference reflects our commitment to fostering interdisciplinary learning and encouraging intellectual exchange.

The successful organization of this event is the result of the dedicated efforts of our organizing team, reviewers, and volunteers. I sincerely thank all authors and participants for their valuable contributions and enthusiastic participation.

I am confident that this conference will provide enriching insights and meaningful interactions. I wish all participants a productive and memorable experience.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

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3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

About KJEI

Kalyan Jadhav's Educational Institutes (KJEI), the East Coast mecca of engineering, management and sciences "is the ultimate place for information overload, endless possibilities and expanding your horizon." The Institute within Pune is spread across 110 acres of picturesque campus nestled in the green valley, with its near zero pollution and fresh air, creates a perfectly conducive low-stress climate for learning, research, innovation and character-building. With over 8000 students, KJEI has a strong sense of community born of its small size the goes hand-in-hand with an atmosphere that is charged with youthful vibrancy, experience and maturity

About TAE

Trinity Academy of Engineering (TAE), a flagship institute under KJ's Educational Institutes (KJEI), is one of Pune's most prestigious engineering colleges—where innovation meets integrity and passion meets purpose.

With AICTE approval, NAAC accreditation, and affiliation to Savitribai Phule Pune University, we are proud to be recognized as a Centre of Academic Excellence. At TAE, we go beyond traditional education by integrating future-ready technologies, industry partnerships, and personalized mentorship into every aspect of learning.

KJ's Educational Institutes, established in 2005, is committed to empowering youth by nurturing skills, creativity, ethical values, and experiential learning for national socio-economic development. Spread across a lush 125-acre green campus against the scenic Sahyadri Hills, the institute provides world-class infrastructure and quality academics.

KJ's Trinity Academy of Engineering, Pune founded in 2010, features state-of-the-art laboratories, libraries, hostels, sports facilities, and modern amenities that support excellence in academics and research. The academy is powered by highly qualified faculty delivering application-oriented teaching. Regular initiatives such as research & innovation activities, certification courses, and industry interactions enhance student employability.

With strong university results, excellent placements, dedicated faculty, and outstanding infrastructure, Trinity Academy continues to attract students from across India, fostering holistic professional development.





3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

About ImCReTE 2026:

The 3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026), organized by Trinity Academy of Engineering on 11th April 2026, aims to bring together innovative academicians, researchers, and industry experts on a common platform. The conference focuses on the rapid strides and technological advancements in the fields of Science, Engineering, and Technology. It provides an opportunity for knowledge exchange, discussion of emerging trends, and presentation of cutting-edge research. ImCReTE-2026 also aspires to showcase the technical excellence of budding technocrats, research scholars, and professionals from academia and industry.

By fostering interdisciplinary collaboration and innovation, the conference contributes to the advancement of research and encourages participants to address real-world challenges through technological solutions.

Tracks for conference ImCReTE 2026:

1. Computer Science, IT, AI/ML, Data Science, Computer Applications & Cyber Security.
2. Electronics, Communication & Instrumentation Engineering, VLSI Design, Embedded System.
3. Mechanical, Mechatronics, Robotics & Automation, Production, Automobile, Thermal.
4. Civil & Environmental, Geotechnical Engg.



3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Conference Papers

Paper ID :	CE-UG-3001
Title :	BIM-Based Optimum Design and Energy Performance Assessment of Residential Buildings.
Authors:	Aarti Nagargoje, Prof. Abhishek C. Shirle, Bhakti R. Bhoke, Priyanka M. Raghoji, Priyanka R.Kshirsagar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Rapid urbanization and the increasing demand for energy have made energy-efficient design a critical requirement in residential buildings. The building sector accounts for a significant share of global energy consumption, particularly during the operational phase of buildings. Therefore, evaluating energy performance during the early stages of design has become essential for sustainable development. Building Information Modeling (BIM) provides an integrated digital platform that enables effective design visualization, coordination, and accurate assessment of building energy performance. This study presents a review of BIM-integrated design optimization and energy performance assessment in residential buildings. A detailed Building Information Model of a residential building was developed using Autodesk Revit, where multiple conceptual building configurations were created and compared. Various energy-related parameters such as building orientation, envelope properties, glazing systems, material characteristics, lighting efficiency, and operational schedules were incorporated into the analysis. BIM-based energy simulation allowed the evaluation of different design alternatives and helped identify optimal parameters for improving overall energy performance. The results show that integrating BIM with energy analysis significantly supports decision-making during the design stage. The optimized design demonstrated potential energy cost savings of approximately 58% over a 30-year life-cycle period, along with improved energy efficiency and reduced operational energy consumption. <i>Keywords:</i> Building Information Modeling (BIM), Energy Performance Assessment, Residential Buildings

Paper ID :	CE-UG-3002
Title :	Smart Structured High-Rise Building: A Sustainable and Technologically Advanced DPR Approach
Authors:	Shabbir.A.Engineer, Dr. S.S.Deshmukh, Piyush.A.Kedari, Parshram.Bargukar, Rehan Jamadar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Rapid urbanization and limited land resources have intensified the need for vertical development through high-rise buildings. This project presents a Detailed Project Report (DPR) for a Smart Structured High-Rise Building, integrating architectural innovation, structural safety, sustainability, and smart technologies into a unified framework. The aim is to develop a modern high-rise structure that ensures efficiency, environmental responsibility, and long-term viability in the evolving urban landscape of 2025. The proposed building design adheres to Indian Standard Codes and employs advanced structural analysis tools like STAAD. Pro and ETABS to ensure stability under seismic and wind loads. Smart technologies such as IoT-enabled systems, automated energy management, and intelligent safety monitoring are incorporated to enhance operational efficiency and user comfort. Environmentally sustainable practices, including rainwater harvesting, solar panels, and waste management systems, are also integrated to reduce ecological impact and maintenance costs. The DPR includes detailed studies on site analysis, material selection, cost estimation, and construction scheduling, ensuring both technical accuracy and financial feasibility. Through the use of Building Information Modelling (BIM), the project achieves precise coordination between architectural, structural, and service components, minimizing errors during construction. This project stands as a future-ready model that bridges the gap between academic design and real- world application, emphasizing safety, sustainability, and smart functionality. It demonstrates how high-rise buildings can contribute to the development of smart, efficient, and environmentally conscious cities.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-UG-3003
Title :	Evaluation of Water Quality of the Bhima River Using Field Data and GIS-Based Spatial Analysis for Drinking and Irrigation Suitability
Authors:	Sakhare vinayak Suresh, Om Bhagwat, Nakul Raut, Sourabh Gaikwad, V.A. Augad <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This study evaluates the water quality of the Bhima River using field measurements and GIS-based spatial analysis to determine its suitability for drinking and irrigation purposes. Water samples were collected from eight locations along the Bhima River and analysed for important physicochemical parameters including pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness, calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), nitrate (NO_3^-), fluoride (F^-), sodium (Na^+), bicarbonate (HCO_3^-), and total coliform. The observed pH values ranged from 7.4 to 7.8, indicating slightly alkaline water conditions, while EC values varied between 830–890 $\mu\text{S}/\text{cm}$. TDS concentrations ranged from 430–480 mg/L, and total hardness varied between 315–350 mg/L. The measured values were compared with BIS drinking water standards to evaluate water suitability. Geographic Information System (GIS) techniques were used to integrate field data with spatial information and generate thematic maps showing the distribution of water quality parameters. The analysis revealed spatial variations in water quality along different river segments. The results indicate that the river water is generally suitable for irrigation, while certain locations require treatment before using it for drinking purposes. Keywords: Bhima River, Water Quality, GIS, Remote Sensing, Irrigation, Physicochemical Parameters

Paper ID :	CE-UG-3004
Title :	Feasibility Study and Planning of Reservoir near Yewlewadi, Pune
Authors:	Sujit Katrajkar, Prachit Mahadik, Shubham Jarad, Kartik Deshmukh, Prof. P. A. Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Water scarcity and increasing demand for water resources have made the development of sustainable water storage systems essential for urban and rural regions. This study focuses on the feasibility study and planning of a reservoir near Yewlewadi, Pune. The main objective of the project is to evaluate the technical, environmental, and economic feasibility of constructing a reservoir in the selected area. The study involves the analysis of topography, rainfall data, catchment characteristics, soil conditions, and water demand of the surrounding region. By analyzing these parameters, the potential storage capacity and suitability of the site for reservoir construction are assessed. The proposed reservoir aims to support water supply, irrigation, and groundwater recharge for nearby areas. It can also help in flood control during heavy rainfall and improve overall water management in the region. The planning process includes site selection, estimation of storage capacity, preliminary design considerations, and evaluation of environmental impacts. Proper planning ensures that the reservoir will be safe, cost-effective, and sustainable in the long term. The results of this study will help local authorities and planners make informed decisions regarding water resource development in the Yewlewadi area. This project highlights the importance of scientific planning and feasibility assessment before implementing large-scale water infrastructure projects. Keywords: Reservoir Planning, Feasibility Study, Water Resource Management Catchment Area Analysis, Water Storage, Irrigation, Yewlewadi Pune

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-PG-3005
Title :	Smart Pre-Construction Planning Using AI-Based Estimation and Scheduling Tools
Authors:	Rohit S More, Dr. Satish S. Deshmukh, Prof. K.H. Ghorpad , Prof. P. A. Manatkar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The pre-construction phase plays a critical role in determining the overall success of construction projects, particularly in cost estimation and scheduling accuracy. Traditional methods rely heavily on manual calculations, historical data, and expert judgment, which can be time-consuming and prone to inconsistencies. This research presents the development of an AI-based estimation and scheduling system designed to improve efficiency during the pre-construction phase. The proposed system integrates machine learning algorithms, computer vision techniques, and data analytics to automate quantity take-offs and predict project costs and schedules from construction drawings. A prototype interactive dashboard is developed using Python and Streamlit, enabling users to upload floor plan drawings and obtain cost estimations, scheduling insights, and graphical analysis. The system demonstrates improved accuracy and reduced processing time compared to conventional methods. <i>Keywords:</i> Artificial Intelligence; Cost Estimation; Machine Learning; Construction Management.

Paper ID :	CE-PG-3006
Title :	Sustainable Urban Redevelopment Using IGBC Green Building Guidelines
Authors:	Aadesh N. Mavale, Dr. Satish S. Deshmukh, Prof. K.H. Ghorpade, Prof. P. A. Manatkar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Urban redevelopment is an important solution for the efficient use of land in densely populated cities. However, conventional redevelopment projects often neglect environmental sustainability, energy efficiency, and resource conservation. The Indian Green Building Council (IGBC) provides green building guidelines that promote sustainable construction practices in redevelopment projects. This study focuses on integrating sustainability into urban redevelopment projects using IGBC green building guidelines, particularly for redevelopment projects in Pune city. The research analyzes environmental, economic, and social benefits of green redevelopment and evaluates additional cost versus long-term benefits. A comparative analysis of conventional redevelopment and IGBC-certified redevelopment is presented. The study shows that although green redevelopment increases initial construction cost by 3–7%, it provides long-term benefits such as energy savings, water conservation, higher property value, faster approvals, and environmental sustainability. The study concludes that integrating IGBC guidelines into urban redevelopment projects improves project sustainability and long-term financial returns. <i>Keywords:</i> Sustainable Development, Urban Redevelopment, IGBC, Green Building, Construction Management.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-PG-3007
Title :	Risk Assessment Model Using FMEA for EPC Highway Projects
Authors:	Akshay Bharat Zadap, Dr.Satish.S.Deshmukh, Prof.K.H.Ghorpade, Prof.P.A.Manatkar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The construction of highway projects under Engineering, Procurement, and Construction (EPC) contracts involves complex coordination, high capital investment, and significant exposure to risks related to time, cost, quality, and safety. Traditional risk assessment methods in construction are often qualitative and lack systematic prioritization. This study proposes a structured Risk Assessment Model using Failure Mode and Effect Analysis (FMEA) tailored for EPC highway projects. The model identifies potential failure modes across design, procurement, and construction stages, and evaluates them using Severity (S), Occurrence (O), and Detection (D) parameters to compute the Risk Priority Number (RPN). Data is collected through expert surveys and site-based observations. The proposed methodology enables objective risk ranking and supports proactive decision-making. The study demonstrates that critical risks such as material delays, poor workmanship, and safety failures can be effectively prioritized and mitigated. The model enhances project performance by reducing delays, cost overruns, and safety incidents. <i>Keywords:</i> Risk Assessment, FMEA, Construction Management, Highway Upgradation, Project Planning

Paper ID :	CE-PG-3008
Title :	Implementation of Value Engineering of construction management in Industrial Building
Authors:	Shubham Vijay Shinde, Dr. Satish S. Deshmukh, Prof. K.H.Ghorpade, Prof. P.A.Manatkar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Value engineering plays an important role because it has a systematic approach used to improve project value by implementation of cost effective alternatives in design, materials and construction techniques. The main objectives of this research paper is to apply value engineering principles in the design and execution stages of the project, evaluate benefits of alternatives materials, techniques and measure the cost and time savings achieved. The research evaluates different components of industrial building construction such as structural system, wall materials, finishing works, shuttering works to determine opportunities for cost reduction and productivity improvement. Through comparative analysis and functional evaluation, it was observed that value engineering can optimize project resources, reduce construction costs and improve time efficiency. The study adopts a structured Value Engineering Job Plan to systematically evaluate functional requirements and identify cost effective alternatives for major components of industrial building construction. The findings demonstrate that the implementation of value engineering during planning and design stages can significantly enhance project value, support better decision making and contribute to sustainable construction practices in industrial building projects. <i>Keywords:</i> Value Engineering, Cost Reduction, Time savings, Improve productivity.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-PG-3009
Title :	Improving Efficiency in Running Account Billing for Government Infrastructure Projects through Automation
Authors:	Nilesh Ravindra Patil, Dr.Satish S. Deshmukh, Prof.K.H.Ghorpade, Prof.P.A.Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Running Account (RA) billing plays a vital role in the financial management of civil engineering projects, particularly in government infrastructure works where contractors are paid periodically based on the quantity of work completed. In many government departments, the RA billing process is still carried out manually using paper-based documentation and traditional calculation methods. This often leads to excessive paperwork, delays in approvals, calculation errors, and lack of transparency in financial transactions. This study analyses the existing RA billing procedures used in government civil engineering projects by examining measurement books, contractor bills, schedule of rates, deduction rules, and approval workflows. Data from selected public works projects were reviewed to understand the current billing cycle, documentation practices, and common challenges encountered during the preparation and verification of RA bills. Based on the findings, an automated RA billing framework is proposed using integrated digital tools and software modules. The system incorporates digital site measurements, automated quantity and rate calculations, automatic deductions such as taxes and security deposits, workflow-based approval mechanisms, and payment reconciliation features to improve efficiency and control. The proposed system significantly reduces manual effort, minimizes calculation errors, and accelerates the approval process. It also enhances transparency and real-time monitoring of billing status. Overall, automation of the RA billing process can improve efficiency, accuracy, and financial management in government civil engineering projects. <i>Keywords:</i> Running Account Billing, Process Automation, Construction Project Management, Digital Measurement

Paper ID :	CE-PG-3010
Title :	Application of Prefabricated Wall Panel Systems for Reducing Construction Time and Project Cost
Authors:	Rohit Moholkar, Dr. Satish S. Deshmukh, Prof. K.H. Ghorpade, Prof. P.A. Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The construction industry is continuously evolving with the adoption of innovative technologies to enhance efficiency, reduce construction time, and minimize project costs. This research focuses on the application of prefabricated wall panel systems based on cold-formed steel (CFS) framing as an effective alternative to conventional construction techniques. Prefabricated panels are manufactured in controlled factory environments and assembled on-site, ensuring improved construction speed, dimensional accuracy, and quality. This study examines different construction approaches including stick-built, panelized, and modular construction. A comparative analysis is presented to evaluate the cost and time performance of prefabricated systems against traditional reinforced concrete construction. Digital modeling using Revit and CNC-based fabrication techniques are incorporated to ensure precise production of wall panels. The findings demonstrate that prefabricated wall panel systems provide significant advantages in labor reduction, material efficiency, and faster project completion, making them a sustainable solution for modern construction. <i>Keywords:</i> Pre-Engineered Wall Panels, Cold-Formed Steel, Prefabricated Construction, Light Gauge Steel Framing, Cost-Effective Construction.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-PG-3011
Title :	Using Traffic Monitoring System in Civil Engineering For Clearing Hurdles on Highways
Authors:	Vijay Pratap Rai, Dr. Satish S. Deshmukh, Prof.K.H.Ghorpade, Prof.P.A.Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The construction of roads and flyovers in urban areas often causes traffic congestion, delays, and safety risks for commuters. A traffic monitoring system is an effective solution used in civil engineering to manage and control traffic flow during the construction phase. This system uses technologies such as surveillance cameras, sensors, and data processing tools to monitor real-time traffic conditions around construction zones. The collected data helps engineers and traffic authorities understand traffic patterns, vehicle density, and congestion levels. By analyzing this information, engineers can plan suitable traffic diversions, temporary road arrangements, and signal adjustments to reduce inconvenience to road users. Traffic monitoring systems also help in identifying accident-prone areas and ensuring the safety of both construction workers and drivers. In road and flyover construction projects, these systems support better coordination between construction teams and traffic management authorities, automated monitoring improves the accuracy and efficiency of traffic control. This leads to smoother traffic flow and minimizes delays during construction activities. Overall, the implementation of traffic monitoring systems in road and flyover construction helps maintain traffic efficiency, enhance safety, and support effective project management in rapidly developing urban infrastructure. <i>Keywords:</i> Traffic Congestion, Accidents, Sensors, Time savings, Safety.

Paper ID :	CE-PG-3012
Title :	BIM-Integrated Framework for the Design and Construction Management of Complex Tunnel Projects
Authors:	Anjali Katke, Dr. Satish S. Deshmukh, Prof.K.H.Ghorpade, Prof. P.A.Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In essence, research on BIM in tunnel construction is crucial for optimizing its application, addressing current limitations, and unlocking its full potential for safer, more efficient, and sustainable tunnel projects. By streamlining design, construction, and management processes, BIM can contribute to significant cost and time savings in tunnel projects. BIM can be extended to cover the entire tunnel lifecycle, including operation and maintenance, by providing a digital record of the tunnel's construction and performance. Tunnel projects often involve complex geometries, challenging geological conditions, and lengthy construction timelines, making them well-suited for BIMs 3D visualization and simulation capabilities. BIM facilitates better communication and collaboration among various stakeholders (designers, contractors, etc.) by providing a shared platform for information and data. BIM can help identify design clashes, optimize material quantities, and simulate construction sequences, leading to more efficient and accurate designs. The application of Building Information Modeling (BIM) in tunnel construction offers significant benefits, justifying ongoing research to further refine its use. Research is needed to optimize BIMs potential in enhancing design, construction, and lifecycle management, ultimately leading to safer, more efficient, and cost-effective tunnel projects. <i>Keywords:</i> BIM, Tunnel Construction, Application of Building Information Modeling

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-PG-3013
Title :	Application of Construction Management Practices for Leakage Control in Water Supply Infrastructure
Authors:	Mr. Ganesh Namdeorao Bhojane, Dr S S Deshmukh, Prof K H Ghorpade, Prof P A Manatkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Rapid urbanization and the deterioration of existing water infrastructure have resulted in significant water losses in service reservoirs and feeder mains, leading to financial strain and inefficient utilization of water resources. Persistent leakages not only cause economic losses but also pose health risks due to contamination and reduced water quality. Despite advancements in engineering practices, there remains a lack of systematic application of construction management strategies to effectively monitor, control, and mitigate leakages in water supply systems. This study aims to develop a comprehensive framework integrating technical and managerial approaches for leakage reduction in service reservoirs and feeder mains. The primary objectives include identifying the key causes of leakage, assessing existing management practices, and implementing construction management techniques to achieve cost-effective, timely, and sustainable solutions. The methodology involves literature review, site inspections, and data analysis using digital tools such as EPANET, AutoCAD, and Building Information Modelling (BIM). Project management software like MS Project or Primavera will be employed to optimize planning, scheduling, and resource allocation throughout the implementation process. The expected outcomes of this research include the identification of critical leakage points, formulation of a structured management framework, and recommendations for sustainable leakage control. By integrating engineering solutions—such as surface preparation, crack and joint treatment, and waterproofing coatings—with advanced project management techniques, the study anticipates achieving improved operational efficiency, reduced repair costs, and enhanced service life of water infrastructure. Ultimately, the proposed strategies aim to assist municipal authorities and engineers in developing resilient, eco-friendly, and cost-efficient water distribution systems for future urban demands. Keywords: Leakage Reduction, Construction Management, Service Reservoirs, Feeder Mains, Water Loss Control, Surface Preparation, Crack and Joint Treatment.

Paper ID :	CE-PG-3014
Title :	Seismic Behavior of Flat Slab Buildings with Lateral Resistance System
Authors:	Vaibhavi Mallikarjun Khanapure, Prof. P. A. Vedpathak, Dr. V. S. Rajamanya <i>MBE Society's College of Engineering, Ambajogai, India</i>
Abstract:	Flat slab structural systems are widely adopted in modern construction due to their architectural flexibility, reduced floor-to-floor height, and simplified formwork. However, their inherent lack of beams reduces lateral stiffness and ductility, making them vulnerable to seismic forces, particularly punching shear failures at slab-column connections. To address these limitations, lateral load resisting systems such as shear walls, perimeter beams, and braced frames are incorporated to enhance strength, stiffness, and energy dissipation. This study evaluates the nonlinear seismic performance of reinforced concrete flat slab structures with and without lateral resisting systems using pushover analysis in ETABS software. Key performance parameters including base shear, roof displacement, storey drift, capacity curves, and plastic hinge formation are assessed under increasing lateral loads. Comparative results demonstrate that the integration of shear walls and perimeter beams significantly improves structural performance by reducing displacements, enhancing ductility, and distributing plastic hinges uniformly. The findings provide valuable insights for performance-based seismic design, ensuring safer and more resilient flat slab buildings in earthquake-prone regions. Keywords: Flat slab, Pushover analysis, Lateral resisting systems, Seismic performance, Reinforced concrete.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-RS-3015
Title :	Computational Implementation of Applied Element Method for Static Linear Analysis of a Steel Cantilever Beam
Authors:	Prasad Baban Karad, Dr. Satish S. Deshmukh <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Computational techniques have become essential tools in structural engineering for predicting the response of structural members under applied loads. The Finite Element Method (FEM) has been widely adopted due to its reliability in modeling elastic and inelastic behavior. However, its ability to directly simulate discontinuities such as cracking and separation is limited without incorporating complex nonlinear formulations. The Applied Element Method (AEM) provides an alternative framework in which structures are represented as assemblies of rigid elements connected through distributed normal and shear springs. This discrete representation enables direct simulation of structural behavior from initial loading to failure. In this study, AEM is implemented for the linear static analysis of a two-dimensional steel cantilever beam using a six-degree-of-freedom stiffness formulation. A computational model developed in the C programming language is used to assemble the global stiffness matrix and evaluate nodal responses. A convergence study is performed by varying element size, and the results are compared with analytical and FEM solutions. The findings indicate that AEM produces results consistent with classical solutions while offering additional advantages in modeling structural damage and failure. <i>Keywords:</i> Applied Element Method (AEM); Finite Element Method (FEM); Cantilever Beam; Structural Analysis; Stiffness Matrix; Computational Modeling.

Paper ID :	CE-RS-3016
Title :	Sustainable Reservoir Management through Sediment Reuse
Authors:	Mr. Niteen madhukar survase, Dr. Satish S. Deshmukh <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Reservoir sedimentation poses a significant challenge to the long-term performance and sustainability of dams and water storage systems worldwide. Continuous sediment accumulation reduces reservoir storage capacity, affects flood control efficiency, alters downstream sediment transport and impacts aquatic ecosystems. Despite these impacts, sediments removed from reservoirs are often treated as waste and disposed of without considering their potential for reuse. This paper presents a review of current technologies, management practices and international experiences related to sediment removal and beneficial utilization in reservoir systems. Potential reuse options for dredged sediments are examined, including land reclamation, construction materials, habitat restoration, soil improvement and shoreline protection. The study also discusses regulatory frameworks, technical challenges and economic factors that influence the implementation of sediment reuse, particularly in developing countries. The review highlights the importance of integrated sediment management that treats sediments as a resource. Incorporating reuse strategies during reservoir planning, design and rehabilitation can enhance sustainability while providing environmental and socio-economic benefits. <i>Keywords:</i> Reservoir sedimentation, Sediment management, Beneficial reuse, Sustainable reservoir management, Dredged sediment utilization.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-RS-3017
Title :	Analytical Evaluation of Watershed Development and Sustainability in Semi-Arid Landscapes
Authors:	Shubhada Sharad Jamadade, Dr. Satish S. Deshmukh <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This paper will seek to establish a systems-based analytical framework to assess watershed development in semi-arid areas of India, and apply it to Maharashtra. The methodology is a synthesis of the literature, comparative analysis of pre-and post-intervention, and multi-dimensional assessment framework of technical, ecological, agricultural, and institutional indicators. To measure watershed performance, analytical methods are hydrological assessment, normalized scoring, and sustainability index (SI) modeling. Findings show that watershed interventions decrease runoff by 8-10%, decrease soil erosion by up to 70%, and raise groundwater levels by 0.3-1 m and enhance cropping intensity by 40-60% and farm incomes by up to 100%. Sustainability is however widely differentiated depending on the institutional strength with SI values above 0.75 in well managed systems. The conclusion of the study is that long term sustainability and resilience of watersheds can only be achieved by efficiency in hydrology coupled with institutional control. <i>Keywords:</i> Watershed Development; Ridge-to-Valley Approach; Hydrological Analysis; Sustainability Assessment; Semi-Arid Regions; Integrated Resource Management

Paper ID :	CE-RS-3018
Title :	A Comparative Study of MCDM Techniques for Effective Contractor Selection in E-Procurement
Authors:	Mr.Kiran Harish Ghorpade, Dr.Satish S Deshmukh, Dr.Rupesh J Patil <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In modern construction, E-Procurement has revolutionized the bidding process, yet the selection of the most suitable contractor remains a complex challenge characterized by conflicting criteria and inherent uncertainty. Traditional selection based solely on the "lowest bid" often leads to project delays, cost overruns, and quality compromises. This paper presents a rigorous comparative study of diverse Multi-Criteria Decision-Making (MCDM) techniques including AHP, ANP, TOPSIS, VIKOR, ELECTRE, GREY Theory, PROMETHEE, and the Best-Worst Method (BWM) etc.to determine their efficacy in the digital procurement process. Furthermore, this research evaluates the computational agility of these methods to ensure they can be seamlessly integrated into real-time automated E-Procurement platforms. The findings ultimately establish a decision-support roadmap that balances mathematical rigor with administrative efficiency, providing procurement officers with a strategic toolkit to optimize contractor performance in an increasingly volatile global market. The study demonstrates that hybridizing weighting methods like BWM with ranking techniques such as VIKOR or TOPSIS produces the most reliable outcomes when managing the multi-dimensional risks inherent in large-scale infrastructure projects. <i>Keywords:</i> MCDM; Contractor Selection; E-Procurement; Construction Management; Hybrid Decision-Making; Analytical Hierarchy Process (AHP); TOPSIS; VIKOR; PROMETHEE

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CE-FD-3019
Title :	Innovative Approaches in Agricultural Technology for Early Drought Detection Using Earth Observation Data
Authors:	W M Mevan Nishantha Kumar Bandara, R.U.K. Piyadasa <i>Department of Environmental Technology, Faculty of Technology, University of Colombo, Sri Lanka</i>
Abstract:	Drought is among the most severe climate-related hazards in Sri Lanka, where much of the population depends on rain-fed agriculture. Prolonged dry spells cause crop failures, economic instability, and rising food insecurity. Existing monitoring and early warning systems remain inadequate: they lack regional specificity, rely on fragmented datasets, and fail to provide timely alerts for farmers and decision makers. To address this gap, this study develops a region-specific drought early warning framework using freely available satellite data from MODIS TERRA/AQUA and CHIRPS rainfall estimates, combined with NDVI and Land Surface Temperature (LST). Through time-series analysis, the system enables vegetation stress monitoring, detecting precipitation anomalies and surface temperature variations that signal drought weeks before visible impacts. Validation against historical drought records from DesInventar.lk, with a focus on the Ampara district, demonstrates improved sensitivity across vulnerable agro-ecological zones. The framework emphasizes remote sensing applications for climate risk management and food security resilience. Keywords: Agro-ecological zones; Climate risk management; Vegetation stress monitoring; Remote sensing applications; Food security resilience

Paper ID :	CSIT-UG-3020
Title :	Resilient Architecture for Self-Healing Mechanism
Authors:	Mayur Bharat Pote, Sarthak Kulkarni , Sakshi Bhagwat,Saniya Bongane, Kalyani.K.Sukhdhan <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Artificial intelligence (AI) technologies are increasingly embedded in critical domains such as healthcare, finance, and smart automation, where even minor system failures can lead to significant operational impact. Traditional systems rely heavily on manual troubleshooting, resulting in delays, service downtime, and inconsistent performance. To address these challenges, this work proposes a resilient architecture equipped with a self-healing AI mechanism capable of continuous monitoring, intelligent fault detection, and automated recovery. The system identifies anomalies, diagnoses faults, and initiates corrective actions such as restarting failed services, reallocating resources, or adjusting model parameters without requiring human involvement. By integrating these capabilities, the architecture enhances adaptability, reduces maintenance effort, and improves overall system dependability. This approach contributes to more robust and autonomous computing environments suitable for modern large-scale and mission-critical applications. Keywords: Fault detection, Resilient architecture, Selfhealing systems, System recovery, Autonomous

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Paper ID :	CSIT-UG-3021
Title :	Automated Deep Learning-Based Plant Leaf Disease Detection
Authors:	Gayatri Shelkar, Gitanjali Jadhav, Darshana Chaudhari, Samiksha Bodkhe, Prof. Amol Gadewar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Plant diseases significantly impact agricultural productivity, causing major economic losses and reduced crop quality. Traditional disease detection methods rely on manual inspection, which is time-consuming, subjective, and requires expert knowledge. This paper presents DeepLeaf, an intelligent and automated system for plant leaf disease detection using deep learning techniques. The system utilizes Convolutional Neural Networks (CNNs) to analyze leaf images and identify disease symptoms such as discoloration, spots, and texture variations. The model is trained on large-scale datasets like PlantVillage and PlantDoc, achieving high accuracy in classification. Lightweight architectures such as MobileNetV3 ensure real-time performance and mobile compatibility. The proposed system enables early disease detection, reduces pesticide misuse, and supports precision agriculture. Experimental results demonstrate improved accuracy, scalability, and efficiency compared to traditional methods. <i>Keywords:</i> Plant disease detection; Deep learning; CNN; Image classification; Precision agriculture

Paper ID :	CSIT-UG-3022
Title :	A Blockchain-Based Decentralized Voting System with Fraud Detection
Authors:	Prof.Pallavi Khalde, Prajakta Kumbhare, Jay Kumawat <i>Vishwakarma Institute of Technology, Pune, India</i>
Abstract:	Fraudulent participation, identity substitution, and the inability to independently audit cast ballots have long undermined confidence in both manual and digital election processes. This paper presents a voting framework built on two coordinated pillars: an Ethereum-based smart contract layer that commits each ballot to an append-only distributed ledger, and a Dlib-powered facial encoding pipeline that gates every submission behind a verified biometric identity check. Once recorded on-chain, no administrative action can alter a vote, as the ledger is replicated across all participating nodes. A three-stage fraud screening engine consults local transaction logs, on-chain duplicate flags, and the live biometric embedding before permitting any ballot through. Evaluation on a locally deployed Ethereum instance demonstrated face-matching accuracy exceeding 80% and end-to-end vote confirmation within three seconds. Results confirm that immutable record-keeping and real-time identity assurance is complementary to achieve within a single coherent architecture. <i>Keywords:</i> Blockchain; Decentralized Voting; Smart Contracts; Fraud Detection; Biometric Authentication

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Paper ID :	CSIT-UG-3023
Title :	A Hybrid CNN–LSTM Framework for Plant Disease Detection and Crop Yield Prediction in Smart Agriculture
Authors:	Roshna J. Sapkal, Roshna Sapkal, Keya Kadkol, Sakshi Deshmukh, Akanksha Mule, Vaishnavi Mudhol <i>Bharati Vidyapeeth's College of engineering for womens, India</i>
Abstract:	Agroindustry serves as a key area aiding worldwide food supply and financial development. Agriculturalists often encounter difficulties such as plant pathologies, weather fluctuations, and inaccurate crop yield estimation, which have a major impact on output. This paper presents a conceptual hybrid framework integrating Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks for smart agriculture applications. The CNN model is intended for plant leaf image analysis to detect diseases by extracting visual features such as texture, colour patterns, and lesion structures. The LSTM model is designed for sequential agricultural data analysis, including weather trends, soil conditions, and historical crop yield. The hybrid architecture combines spatial and temporal analysis through a fusion layer, providing a comprehensive decision-support system for farmers. Although this work is conceptual, it is based on evidence from prior studies demonstrating that CNN models achieve high classification accuracy for disease detection [1–3] and LSTM models effectively predict crop yield trends [4–5]. The proposed framework is expected to enhance early disease diagnosis, yield prediction, and precision farming practices. <i>Keywords:</i> Smart agriculture, CNN, LSTM, plant disease detection, crop yield prediction

Paper ID :	CSIT-UG-3024
Title :	Smart Home Automation System
Authors:	Om Jalindar Barvekar, Vibhawari Kamble, Shital Pawar, Yogeshwari Shinde , Sneha Waghmare ,Prof.A.B.gadeware <i>PDEA's College of Engineering, Manjari (BK), Pune - 412307, India</i>
Abstract:	This paper describes the design and testing of a Smart Home Automation System that uses Internet of Things (IoT) technology to improve energy efficiency, security, and user convenience. The system combines sensors, microcontrollers, and wireless communication to automate household appliances like lighting, fans, and security systems. We built the system on a microcontroller platform and tested it in real-time conditions. The results showed that the system saved up to 25 to 30 percent of energy compared to traditional manual control. The automation system also reduced the response time to under 2 seconds for device control and monitoring. Users can access the system remotely via mobile apps, which gives them more flexibility and control. Overall, this model offers a cost-effective and efficient solution for modern smart homes. <i>Keywords:</i> Smart Home Automation; Internet of Things (IoT); Energy Efficiency; Sensors; Wireless Communication

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Paper ID :	CSIT-UG-3025
Title :	AI-Based Waste Segregation: A Survey of Methods, Technologies, and Challenges
Authors:	Niyati Vichare, Sumedha Patil, Siddhant Gokhale , Tanishka Gughane, Sanket Warghade <i>Terna Engineering College, Nerul, Navi Mumbai,, India</i>
Abstract:	The rapid rise in city living, population, and industrialization has significantly increased municipal solid waste (MSW), posing significant environmental concerns. Proper waste sorting plays a key role in managing waste efficiently, yet traditional methods are manual, require a lot of time and often lead to human mistakes. Recent improvements in artificial intelligence (AI) have enabled automated machine learning (ML) and deep learning (DL) algorithms to identify and classify waste items. This study reviews ten research works focusing on algorithms, datasets, and implementation platforms for intelligent waste segregation. Computer vision methods, especially CNNs, are widely used in many approaches and transfer learning, for classification tasks. Evaluation is generally done using measures like accuracy, precision, recall, and F1-score. Cost-effective edge devices such as Raspberry Pi and ESP32-CAM are commonly utilized for implementation. Despite advancements, issues such as dataset imbalance, diverse waste characteristics, and real-time constraints remain, indicating the need for scalable and efficient solutions. <i>Keywords:</i> Waste Segregation; Artificial Intelligence; Deep Learning; Computer Vision; Smart Cities

Paper ID :	CSIT-UG-3026
Title :	Deep Learning Driven Resume Screening and Skill Assessment
Authors:	Ishwari Kadam, Shraddha Kadam, Mansi Jagtap, Avadhut Jagtap, S.P.Gawade <i>Shivnagar vidya prasarak mandal college of Engineering malegaon(BK),Baramati, India</i>
Abstract:	The rapid growth of job applications in modern recruitment systems has created challenges in efficient and unbiased candidate evaluation. Traditional resume screening methods are time-consuming, inconsistent, and prone to human bias. To address these issues, this research proposes a deep learning-based framework for automated resume screening and skill assessment using Large Language Models (LLMs). The system follows a three-stage pipeline: sentence-level classification, unified grading and summarization, and intelligent decision-making. Initially, unstructured resumes are processed and segmented into structured components such as education, skills, and work experience. In the second phase, an AI-based HR agent evaluates resumes and assigns scores based on predefined criteria. Additionally, fairness mechanisms such as data anonymization and bias control are incorporated to ensure unbiased decision-making. Experimental results on real-world datasets demonstrate improved efficiency and accuracy compared to traditional methods. The proposed system achieves superior performance in classification and summarization tasks, as indicated by enhanced ROUGE and BLEU scores. This approach significantly optimizes recruitment processes and supports intelligent workforce management. <i>Keywords:</i> Deep Learning; LLMs; Resume Screening; Skill Assessment; NLP; Automated Recruitment

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-UG-3027
Title :	Federated Learning Using Automatized Recommendation for Social Media Text and Image
Authors:	Shifa Sayyad, Arpita Rikibe, Avimta Shahane, Jagpreet Singh Rahi, Prof. Rambhau. Lagdive <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	However, traditional centralized recommender systems are finding it harder and harder to deal with the two problems of complex multimodal data and rules about data privacy. This paper proposes a new framework called MultiFedNet for a federated recommender system that protects users' privacy. It uses text and image data from social media to make recommendations more accurate. MultiFedNet is different from other centralized systems because it uses a localized multimodal framework with frozen BERT and ResNet50 backbones and a dynamic Attention-Based mechanism to combine user diversity. To solve the statistical problem of non-IID data distributions, an Iterative Federated Clustering Algorithm (IFCA) with Similarity Weighted Aggregation is used to group users with similar interests into clusters. To stop information from getting stuck in clusters, a Knowledge Distillation phase is added so that clusters can share information. This is done by using temperature scaling logit softening to give "universal wisdom" to different groups. Keywords: Federated Learning; Multimodal Fusion; Knowledge Distillation; User Privacy; Clustered Federated Learning; Natural Language Processing; Privacy-Preserving AI; Recommender Systems.

Paper ID :	CSIT-UG-3028
Title :	Decoding Human Emotions and Stress Through Brainwave Analysis
Authors:	Yash Kunjir, Nikhil Chaudhari, Pooja Chavhan, Vaibhavi Kulkarni, Dr. Deepthi Kulkarni <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Emotion and stress analysis has major significance for the comprehension of human behavior and decision-making activities. The precise measurement of emotion and stress has various applications such as healthcare monitoring systems, human-computer interaction systems, and stress analysis systems. The conventional techniques for emotion and stress measurement use facial expressions, speech patterns, or biological parameters. The above-mentioned techniques might be affected by controlled emotions or external conditions. To mitigate the limitations of the conventional technique, emotion and stress measurement by using EEG has been proposed as a precise and unbiased technique. Electroencephalography (EEG) is used for analyzing the brain's electrical signals using non-invasive electrodes placed upon the surface of the scalp. Variations in the frequency bands of the EEG signals, comprising delta, theta, alpha, beta, and gamma waves, are directly related to different emotional and stress conditions. For instance, a calm brain corresponds to high alpha waves, while stress/anxiety corresponds to high beta waves. The entire process for an EEG system comprises signal acquisition, noise elimination, feature extraction, and classification using ML techniques. Keywords: Emotion Analysis, Stress Analysis, Electroencephalography (EEG), Brain Electrical Signals, EEG Frequency Bands, Feature Extraction, Signal Acquisition, Machine Learning Techniques, Human-Computer Interaction, Healthcare Monitoring Systems

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Paper ID :	CSIT-UG-3029
Title :	Academic Automatic Time Table Generator - Using Genetic Algorithm and Constraint Satisfaction
Authors:	Gaikwad Rushikesh Ramdas, Kumkar Manasi Narendra, Kamble Manasi Sachin, Bhakre Sayali <i>Pune District Education Association College of Engineering Manjri, India</i>
Abstract:	The Academic Time Table Generator is an intelligent system developed to automate the complex and error-prone process of timetable scheduling in educational institutions. The generation of an optimal timetable requires the satisfaction of multiple hard and soft constraints such as non-overlapping classes, teacher availability, classroom capacity, subject distribution, and time slot preferences. Traditional manual scheduling methods are time-consuming, inefficient, and fail to scale with increasing institutional complexity. This project adopts an algorithmic approach to automatically generate conflict-free and optimized academic timetables. The system utilizes Constraint Satisfaction Problem (CSP) techniques to ensure that essential hard constraints are fulfilled, while Genetic Algorithms (GA) are employed to refine the schedule for improved distribution and fairness among resources. The system is built using a modular architecture with a user-friendly interface that enables administrators to input data, define constraints, and regenerate timetables dynamically based on changing requirements. By automating the timetable creation process, this system significantly reduces manual effort, eliminates scheduling conflicts, and enhances institutional efficiency. The outcome is a flexible, scalable, and intelligent scheduling solution suitable for schools, colleges, and universities. <i>Keywords:</i> Automatic Time Table Generator, Scheduling, Optimization, Constraint Satisfaction, Genetic Algorithms

Paper ID :	CSIT-UG-3030
Title :	AURA: An Intelligent Autonomous Women Safety System Using Agentic AI and Probabilistic Risk Modeling
Authors:	Nakshatra Deshmukh, Vaibhavi Bhise, Preshal Sharma, Saher Shaikh, Prof. Rambhau Lagdive <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Ensuring women's safety in unpredictable environments requires systems that can operate without constant user interaction. Most existing safety applications depend on manual activation, which may not be feasible during critical situations. This paper presents AURA, an intelligent safety application designed to detect potential threats and respond autonomously. The system utilizes a probabilistic decision model that evaluates multiple inputs, including voice signals, device interactions, motion patterns, and location anomalies, to estimate the likelihood of danger in real time. AURA is capable of functioning in both connected and disconnected environments, allowing it to maintain protection even in areas with limited network availability. It incorporates features such as discreet voice triggers, hardware-based activation, and automated alert transmission to trusted contacts. Experimental analysis indicates improved response speed and reliability compared to conventional solutions. The proposed system offers a practical and scalable approach for enhancing personal safety through intelligent automation. <i>Keywords:</i> Women Safety; Agentic AI; Emergency Detection; Probabilistic Model; Offline Safety;

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Paper ID :	CSIT-UG-3031
Title :	Decentralized Traffic Control and Incident Response Vehicle Priority System
Authors:	Omkar Dattu Istalkar, Sameer Babu Shaikh, Rahul Ramesh Shedge, Anuj Atul Zende, Prof. Shikha S. Sharma <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Traffic congestion in many cities creates serious problems for emergency and incident response vehicles such as ambulances, fire trucks, and police vehicles. These vehicles often get delayed at busy intersections or traffic signals, which slows their arrival at the emergency location. In critical situations, even a small delay can affect rescue operations and public safety. Most current traffic management systems use centralized control and fixed signal timings, which makes it difficult to give immediate priority to incident response vehicles when required. This paper presents a Decentralized Traffic Control and Incident Response Vehicle Priority System that helps these vehicles move more easily through traffic. The proposed system allows communication between incident response vehicles and nearby traffic signals through a distributed network. When an incident response vehicle approaches an intersection, the system adjusts the signal timing along its route so the vehicle can pass with fewer interruptions. The system aims to reduce response time during emergencies, improve traffic movement, and support the development of smarter and more efficient city transportation systems. <i>Keywords:</i> Decentralized Traffic Control, Emergency Vehicle Priority, Intelligent Transportation Systems, Smart Traffic Signals, Smart City Transportation

Paper ID :	CSIT-UG-3032
Title :	Engineering a Scalable AI-Driven Interview and Assessment System: EvalPro
Authors:	Prathamesh Bharsakale, Sumaira A. Shaikh, Pratima Patil, Danish Bhat, Ayush Bhagwat <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	EvalPro is a scalable AI-driven mock recruitment system designed to simulate real- world hiring workflows. The system integrates resume parsing, adaptive question genera- tion, multimodal evaluation, and sandboxed code execution within a modular architecture. Unlike purely research-focused approaches, EvalPro emphasizes reliability, scalability, and controlled AI integration through template-driven generation and runtime validation. The platform enables structured, consistent, and realistic interview simulations for both candi- dates and recruiters.

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Paper ID :	CSIT-UG-3033
Title :	Meetverse: A Smart Meeting Management System Using Real-Time Technologies
Authors:	Nikita somnath lohar, Shubhangi Gajalwad, Aditya Khopkar, Shivkanya Latke, Shraddha Fulsunder <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid growth of remote communication has increased the demand for scalable and reliable video conferencing systems. However, many existing platforms lack customization, scalability, and developer-friendly integration. This paper presents MeetVerse, an enterprise-grade smart meeting management system built using modern web technologies such as Next.js, TypeScript, HTML, and Tailwind CSS. The system integrates third-party services including Clerk for secure authentication and Stream for robust video and audio communication. MeetVerse provides features such as secure login, meeting scheduling, real-time video/audio calls, participant management, and recording support. The architecture is designed to be scalable to millions of users while maintaining low latency and high reliability. The results demonstrate that leveraging modern frameworks and cloud-based APIs significantly improves development efficiency and system performance. <i>Keywords:</i> MeetVerse, Video Conferencing, Next.js, Real Time Systems, Authentication, Cloud APIs

Paper ID :	CSIT-UG-3034
Title :	AI Based Microclimate Prediction System for Rooftop Farming
Authors:	Yash Kudale, Pratik Kumbhar, Krushna Malanganer, Aditya Kumbhar, Prof. Gulnaz Thakur <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This article describes a microclimate prediction system that utilizes AI technology to improve crop yield through sustainable urban agriculture on rooftops. The prediction system employs IoT sensors to gather real-time environment data (temperature, humidity, soil moisture, and light). Following the data collection, machine learning algorithms such as Random Forest and LSTM are used to determine the short-range microclimate conditions. Once the system has predicted the short-range microclimate conditions, it will recommend the right type of crop to grow and recommended best practices for irrigation use. The detailed climatic information can be accessed via a convenient user interface. The proposed prediction system will increase the accuracy of predictions, thus improve the decision-making process, and maximize the effective use of resources for smart rooftop farms. <i>Keywords:</i> Artificial Intelligence, Microclimate Prediction, Rooftop Farming, IoT, Machine Learning, Smart Agriculture

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Paper ID :	CSIT-UG-3035
Title :	A Generative Framework for Bitcoin Market Trend Analysis
Authors:	Gourav Mahajan, Dnyaneshwari Nigade, Samruddhi Bendre, Supriya. S. Gadekar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This study presents a web-based Bitcoin forecasting dashboard that analyzes historical cryptocurrency market data and predicts future price trends using an ensemble deep learning approach. The proposed framework integrates data preprocessing, predictive modeling, and interactive visualization into a single platform to help users better understand Bitcoin market behavior. Historical Bitcoin price data is used to train two time-series deep learning models Gated Recurrent Units (GRU) and Long Short-Term Memory (LSTM) networks which are effective in capturing temporal dependencies and long-term patterns in financial data. Instead of relying on a single model, the system applies ensemble learning, where predictions from GRU and LSTM models are combined to improve forecasting robustness, reduce model bias, and enhance prediction stability. The generated forecasts allow users to view expected Bitcoin price movements over a selected future time horizon. In addition to future predictions, the dashboard provides visualization of historical trends and comparison between actual prices and predicted values to evaluate model behavior over past data. The system is implemented as an interactive web dashboard that enables users to explore market trends, analyze prediction performance, switch currency views, and access related Bitcoin news updates. By integrating ensemble deep learning with an intuitive visualization interface, the proposed framework offers a unified platform for cryptocurrency trend analysis and data-driven decision support. Keywords: Bitcoin Price Prediction, Ensemble Learning, GRU (Gated Recurrent Unit), LSTM (Long Short-Term Memory), Time Series Forecasting.

Paper ID :	CSIT-UG-3036
Title :	Automatic Water Surface Cleaner: An IoT-Enabled Autonomous Robotic System for Intelligent Water Pollution Management
Authors:	Utkarsha Kolapkar, Pranav Jitendra Kore, Dhananjay Prabhakar Gawari, Lakhani Sagale <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Rapid urbanization and improper waste management have resulted in severe pollution of rivers, lakes, and reservoirs due to floating solid waste such as plastics, bottles, and organic debris. Manual cleaning methods are inefficient, hazardous, and economically unsustainable. This paper presents an Automatic Water Surface Cleaner, an IoT-enabled autonomous robotic system designed for efficient collection of floating waste with minimal human intervention. The proposed system integrates a microcontroller-based control unit, motor-driven propulsion, a conveyor-based waste collection mechanism, ultrasonic sensors for obstacle detection, and wireless communication for real-time monitoring. A mathematical model governing system dynamics—including thrust force, conveyor belt mechanics, and power consumption—is developed and validated through experiments. Renewable energy integration using solar panels enhances sustainability and operational duration. Experimental evaluation demonstrates improved cleaning efficiency of up to 87%, reduced manpower requirements, and enhanced operational safety. The system provides a scalable, low-cost, and eco-friendly solution for intelligent water pollution management. Keywords: Automatic water surface cleaner, autonomous robot, IoT, environmental monitoring, conveyor mechanism, water pollution control, renewable energy, mathematical modelling

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Paper ID :	CSIT-UG-3037
Title :	Build Forge:A Flutter-Based Mobile Application with AI Chatbot for Streamlined Residential Construction
Authors:	Vivekanad Gaikwad, Ruturaj Kenjale, Kunal Jagtap, Nikhil Suryavanshi, Lakhan Sagale <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Homeowners, contractors, and on-site workers engaged in residential construction rarely share a common operational picture, and this absence of a unified information space is a leading driver of project delays, budget exceedances, and outcomes that fall short of what clients originally envisioned. BuildForge is introduced as a purpose-built Flutter mobile application — operable on Android, iOS, the web as a Progressive Web Application, and Windows desktop — that draws all three participant groups onto one synchronized platform. The application is built on two foundational pillars: an AI chatbot powered by the Google Gemini API that enables intelligent design communication between clients and contractors, and an intelligent operations layer that tracks construction material inventory and workforce activity as events occur. Google Cloud Firestore propagates every project update — whether a completed task, a low-stock warning, or a newly approved design to all relevant parties without delay. Role-based access enforced through Firebase Authentication maintains strict permission boundaries across client, contractor, and worker interfaces throughout the project lifecycle. A local SQLite database managed by the sqflite package ensures continued usability on active construction sites where network connectivity is unreliable. Verification through functional and performance testing confirmed that all key workflows operate within accepted benchmarks. <i>Keywords:</i> AI Chatbot; Flutter Mobile Application; Residential Construction Management; Google Cloud Firestore; Real-Time Synchronization;

Paper ID :	CSIT-UG-3038
Title :	Real Time Automatized Sign Language Translator
Authors:	Khyati Yadav, Sakshi Shelar , Akshada Shirke, Dr. Sushadevi Adagale <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In a world where communication is a core need for human interaction, individuals with hearing and speech impairments generally face significant challenges due to the limited understanding of sign language among the general peoples. Despite being a powerful and expressive language, sign language is not universally known, which creates barriers in education, healthcare, workplaces, and daily life. This project plans the development of a Real Time Automatized Sign Language Translator system to address this communication issue by using deep learning models. The system uses a standard inbuilt laptops webcam to capture static and dynamic hand gestures and uses Convolutional Neural Network and Bidirectional Long Short Term Memory models trained on different static and dynamic sign language gestures datasets for accurate classification of hand gestures. Once gestures are recognized through webcam, this system translates the gestures into readable text and audible speech, which is then displayed on the screen, enabling seamless communication between peoples with disability and other normal peoples. This Real Time Automatized Sign Language Translator system works in real time, with minimal delay, ensuring smooth interaction that seems like natural conversation. This Real Time Automatized Sign Language Translator system is more cost effective and available, making it suitable for use in public service areas, educational institutions, hospitals, and many other places. Its architecture allows easy translation for static and dynamic gestures, integration with text-to-speech (TTS) modules, and multilingual support for sign languages from various regions. By reducing dependency on human interpreters and breaking down communication barriers, this project supports independence, and empowerment for the hearing and speech impaired peoples. Therefore, it represents a meaningful step toward creating a more approachable and fair society especially for speech and hearing impaired peoples.

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Paper ID :	CSIT-UG-3039
Title :	AI-Based Automated Cloud Pentesting Framework for Detecting Cloud Misconfigurations and Security Vulnerabilities
Authors:	Mohsin Ali Hazrat Ali Khan, Sumedha Patil , Ashish Tiwari , Anurag Tiwari <i>Terna Engineering College, India</i>
Abstract:	As the swift uptake of cloud computing continues in recent years, concerns regarding misconfigurations and security vulnerabilities have grown significantly. Conventional penetration testing practices often require substantial manual effort and may not always effectively identify critical threats. This paper presents an AI-based Cloud Penetration Testing Framework developed to improve vulnerability analysis and simulate real-world attacks on cloud infrastructure. The proposed framework implements a controlled Amazon Web Services (AWS) environment, where a deliberately vulnerable EC2-hosted web application is exploited using attacks such as Server-Side Request Forgery (SSRF) to obtain IAM credentials via the instance metadata service. The post-exploitation phases include privilege escalation, data exfiltration and cloud resource enumeration. To further improve the analysis of the cloud environment, a machine learning model based on Random Forest is being implemented with the tools to classify the risk levels and detected activities based on multiple factors like access privileges and exposure. A key feature of the system is the generation of clear, human-readable reports that includes recommendations to additionally secure the cloud environment. While the model accomplishes near perfect results on a noiseless clean dataset, it highlights the significance of performance evaluation under realistic noisy conditions. Overall, the framework provides an intelligent approach towards the improvement of the cloud security assessment. <i>Keywords:</i> Cloud Security · Penetration Testing · Amazon Web Services (AWS) · Machine Learning · Server-Side Request Forgery (SSRF) · Cloud Misconfiguration.

Paper ID :	CSIT-UG-3040
Title :	Enhancing Quotation and Customer Relationship Management (CRM) through Desktop Applications
Authors:	Omkar Patil, Atharva Deshpande, Aryan Dhuke, Rushikesh Gawande, Gulnaaz Thakur <i>KJEE's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Customer Relationship Management (CRM) and quotation management systems are essential in modern business operations, enabling efficient customer interaction, streamlined sales processes, and improved decision-making. While cloud-based CRM platforms are widely used, desktop-based systems offer benefits such as offline access, better performance, and secure integration with internal infrastructure. This study analyzes CRM and quotation management systems developed between 2013 and 2025, focusing on the impact of emerging technologies such as artificial intelligence (AI), Industrial Internet of Things (IIoT), microservices architecture, and automation frameworks. It evaluates system architectures, development approaches, and real-world implementation challenges, and proposes a desktop-based CRM architecture to demonstrate modern technology integration. The findings highlight opportunities to enhance scalability, usability, and intelligent automation in CRM platforms. <i>Keywords:</i> CRM; Quotation Management; Desktop Applications; Artificial Intelligence; Automation

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Paper ID :	CSIT-UG-3041
Title :	Smart Cradle System Using IoT
Authors:	Shruti Salke, Adarsh Pokharkar , Kiran Patole, Sahil Khatavkar, R. B. Lagdive <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The Smart Cradle System using IoT is an innovative application of intelligent automation designed to improve infant safety, comfort, and parental convenience. The system continuously monitors the baby's environment and activity inside the cradle to ensure a safe and comfortable sleeping condition. It includes features that can detect baby crying through sound analysis and automatically activate a gentle rocking mechanism to soothe the infant. The system also observes environmental conditions and baby presence to maintain suitable surroundings and ensure safety. In addition, it can detect nearby movement around the cradle and provide alerts if any unusual activity is identified. All collected information is transmitted to a mobile application, enabling parents to monitor cradle activity and environmental conditions remotely and receive notifications when necessary. This smart monitoring system helps parents supervise their baby even when they are not physically present. By combining monitoring, automation, and remote connectivity, the Smart Cradle System provides a reliable and energy-efficient solution for modern childcare. It enhances infant safety, improves comfort, and reduces the workload on parents while offering better insights into the baby's sleep and activity patterns. <i>Keywords:</i> Internet of Things (IoT), Smart Cradle System, Infant Monitoring, Automated Rocking Mechanism, Remote Monitoring.

Paper ID :	CSIT-UG-3042
Title :	IoT-Based Crop Recommendation System Using Machine Learning
Authors:	Kshitija Rameshwar Potdukhe, Prachi V. Dhore, Saloni S. Vasu, Pranjal V. Patil, Jayshree P. Dhoran <i>Mauli Group of Institution's College of Engineering and Technology, Shegaon, India</i>
Abstract:	This paper presents an IoT-based Crop Recommendation System that assists farmers in making data-driven decisions for optimal crop selection under dynamic soil and environmental conditions. The system integrates IoT devices, Cloud Computing, and Machine Learning to create a real-time decision-making support system for the agriculture sector. An ESP32 microcontroller, at the hardware level, continuously collects data from the soil temperature and moisture sensors to be integrated with the system. To keep costs down, the system utilizes synthetically generated NPK values for prototype validation (Nitrogen, Phosphorus, and Potassium - NPK). The microcontroller facilitates secure data transmission to a cloud-based database (Firebase Realtime Database), which serves as the central database. The data is retrieved by a Python-based machine learning model, using a Random Forest Classifier to determine the optimal crop selection for optimal returns. The results of the model predictions are displayed on a web dashboard built using the technologies HTML5, CSS3, JavaScript, and Chart.js, with low latency to provide farmers with reliable real time decision-making support. <i>Keywords:</i> IoT Based Agriculture; Crop Recommendation System; Machine Learning; Random Forest Algorithm; Firebase Realtime Database;

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Paper ID :	CSIT-UG-3043
Title :	NextSign: A CNN–LSTM Based Real-Time Sign Language Recognition and Translation Framework
Authors:	Vikrant Ramchandra Gawade, Dr. Babaso Shinde, Shraddhesh Deshmukh, Yash Darode <i>GH Raisonni College of Engineering and Management, Wagholi, Pune - 412207, India</i>
Abstract:	Real-time sign language recognition systems play a crucial role in reducing communication barriers between Deaf and Hard-of-Hearing (DHH) individuals and non-signers. This work presents a CNN–LSTM based real-time Indian Sign Language (ISL) recognition and translation framework that interprets hand gestures from live webcam video streams. The proposed system combines convolutional neural networks for spatial feature extraction with LSTM-based temporal modelling to capture dynamic gesture patterns. MediaPipe-based hand landmark features are incorporated as an additional modality to improve robustness and reduce background dependency. To enhance communication efficiency, the framework integrates next word prediction and word completion mechanisms to accelerate sentence formation and reduce gesture ambiguity. The recognized ISL signs are converted into intermediate English gloss text and further translated into multiple Indian languages, including Hindi, Marathi with optional text-to-speech output support. The system is designed with a lightweight and modular architecture to ensure low-latency inference and reliable real time performance on desktop platforms. The proposed approach extends existing CNN based sign recognition work and demonstrates practical usability for assistive multilingual communication. <i>Keywords:</i> Indian Sign Language, CNN–LSTM, Real-time Gesture Recognition, MediaPipe Hand, Landmarks, Translation System.

Paper ID :	CSIT-UG-3044
Title :	OCR and Translation System for Ancient Greek Scripts
Authors:	Shravani Balasaheb Taywade, Ankita Mirgane, Vaibhav Palve, Sanika Hole, Prof. Anandkumar Rao <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Ancient Greek script degradation, complex ligatures, uncommon letters, and a dearth of linguistic resources make it very challenging to digitize and translate them. Even while they provide promising alternatives, modern OCR and neural translation techniques are still not the best for handling old documents. This study examines ten current efforts on OCR upgrades, multilingual character recognition, semantic-aware translation, and integrated OCR-to-translation pipelines. The results indicate that deep learning-based OCR combined with transformer translation models yields the highest accuracy; nonetheless, domain adaptation and error propagation remain major issues. The survey shows that, despite significant advancements, context-aware translation frameworks for ancient Greek characters and specific OCR models are required to provide reliable end-to-end performance. <i>Keywords:</i> Optical Character Recognition, Image Pre-processing, Deep Learning, Text Post-processing, Ancient Greek Manuscripts.

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Paper ID :	CSIT-UG-3045
Title :	Evolve: An Automated Fog-Assisted Evolutionary Model for Training and Placement
Authors:	Pradnesh Chetan Patil, Ashish Dadasaheb Jadhav, Pratik Machindra Kadam, Anush Suresh Daivat, U.N. Yadav <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The growing scale of university Training and Placement (TNP) activities requires a system capable of handling large user traffic, delivering real-time information, and maintaining stable performance during peak placement periods. Conventional cloud-based TNP platforms often experience higher latency, network congestion, and slower response times when many students and recruiters access the system simultaneously. To address these challenges, this project introduces eVolve, an automated fog assisted evolutionary framework that integrates distributed fog nodes with a centralized cloud infrastructure. In the proposed architecture, the fog layer performs localized computation, temporary data storage, and efficient request management. Load balancing is achieved through algorithms such as Minimum Load Fog Selection, which directs user requests to the fog server with the lowest current workload. Data consistency between layers is maintained using a Fog-to-Cloud Synchronization mechanism, while the Cloud-to-Fog Broadcasting algorithm ensures rapid distribution of job postings, placement announcements, and notifications to connected users. The cloud layer is responsible for long-term data storage, advanced analytics, centralized monitoring, and system security. By combining fog computing with cloud services, the eVolve system reduces latency, increases scalability, and improves responsiveness during high-traffic placement activities. This hybrid architecture supports faster information delivery, enhanced user experience, and a more efficient approach to automating university placement processes. <i>Keywords:</i> Fog Computing, Cloud Computing, Training and Placement System, Load Balancing, Real-time Notifications, Distributed Architecture, Placement Automation.

Paper ID :	CSIT-UG-3046
Title :	Experimental Investigation of a Smart Solar Tracker with Automated Spray Cleaning System for Enhanced Photovoltaic Efficiency
Authors:	Dhage Abhishek Yuvraj, Giri Aniket Atresh , Prof. Urmila Burde <i>Ajeenkya D.Y. Patil School Of Engineering, Pune, India</i>
Abstract:	Electric vehicles are highly dependent on critical electronic systems, and failures in these systems may cause unexpected breakdowns. The critical systems in an electric vehicle are the battery packs, motor drives, and controllers. These systems are prone to electrical and thermal stress. The traditional systems for monitoring these critical systems either detect faults when they occur or when the system is connected to the cloud. This paper proposes an innovative real-time predictive health monitoring system for electric vehicles. The system utilizes the CAN communication protocol and edge-based artificial intelligence. The microcontroller sends the parameters, such as voltage, current, temperature, and motor speed, to the Raspberry Pi through the CAN communication protocol. The Raspberry Pi then processes the data and detects faults such as overheating, voltage drop, and overcurrent within one second. <i>Keywords:</i> Electric Vehicles, CAN Bus, Edge AI, Predictive Maintenance, Anomaly Detection.

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Paper ID :	CSIT-UG-3047
Title :	Design and Implementation of PhysioCloud: AI-Based Physiotherapy Assistance System
Authors:	Utkarsh Mishra, Harshali Shinde, Ramesh Shahabade, Sumedha Patil <i>Terna Engineering College, Mumbai University, India</i>
Abstract:	PhysioCloud is an advanced web-based physiotherapy assistance system designed to improve rehabilitation outcomes by providing interactive and intelligent exercise guidance. Traditional physiotherapy methods rely heavily on in-person sessions or pre-recorded video demonstrations, which often lack personalization, real-time feedback, and interactivity. This can lead to improper exercise execution, slower recovery, and reduced patient motivation. The proposed system addresses these challenges by integrating a 3D human model for exercise visualization and an AI-based chatbot for user assistance. The platform is developed using modern web technologies such as Next.js for the frontend and Three.js for rendering 3D models. The system enables users to visualize exercises from multiple angles and interact with a chatbot to clarify doubts instantly. Experimental evaluation based on usability and engagement shows that users find the system more intuitive and effective compared to traditional video-based solutions. PhysioCloud demonstrates strong potential for remote healthcare applications and future scalability with features such as motion tracking and personalized exercise recommendations. <i>Keywords:</i> Physiotherapy; 3D Visualization; AI Chatbot; Web Application; Rehabilitation

Paper ID :	CSIT-UG-3048
Title :	Machine Learning Based Smart Disease Diagnosis System for Healthcare Betterment
Authors:	Aniket Arun Chavan, Prathamesh Birajdar, Alok Pimpare, Swapnil Vhonmane, Dr. K. Khandait <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The increasing demand for accessible and accurate healthcare solutions has driven the need for intelligent systems capable of assisting in early disease detection and diagnosis. Traditional healthcare systems often face challenges such as delayed diagnosis, limited medical resources, and lack of accessibility in remote areas. To address these issues, this project introduces a Machine Learning Based Smart Disease Diagnosis System for healthcare betterment. In the proposed system, machine learning algorithms are utilized to analyze patient data, including symptoms, medical history, and diagnostic reports, to predict potential diseases with high accuracy. The system employs classification techniques such as Decision Trees, Random Forest, and Support Vector Machines to enhance prediction reliability. Data preprocessing and feature selection methods are used to improve model performance and ensure accurate outcomes. The system provides real-time diagnostic suggestions and risk assessments, enabling users and healthcare professionals to make informed decisions. Additionally, the integration of a user-friendly interface ensures easy accessibility for patients, while maintaining data privacy and security. The model continuously improves through training on updated datasets, enhancing its predictive capabilities over time. By leveraging machine learning in healthcare, the proposed system reduces diagnosis time, improves accuracy, and supports early detection of diseases. This intelligent approach contributes to better healthcare services, optimized resource utilization, and improved patient outcomes, making it a valuable solution for modern healthcare challenges. <i>Keywords:</i> Fog Computing, Cloud Computing, Training and Placement System, Load Balancing, Real-time Notifications, Distributed Architecture, Placement Automation.

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Paper ID :	CSIT-UG-3049
Title :	Real-Time Indian Sign Language (ISL) Interpreter for Multilingual Approach
Authors:	Jyoti Sanjay Gupta, Vidhi Kushal Mittal, Purva Rajendra Pujari , Akanksha Ravindra Jedhe,, Umabharti Yadav <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Sign language is a vital mode of communication for individuals who are deaf or mute; however, it remains difficult for non-signers to understand, creating barriers to inclusive interaction. This project presents a real-time sign language recognition system focused on Indian Sign Language (ISL). The system utilizes computer vision and deep learning techniques through a hybrid CNN–LSTM architecture, where convolutional neural networks extract spatial features from video frames and long short-term memory networks capture temporal patterns in gesture sequences. A custom dataset of ISL gestures, including both static and dynamic signs, is collected and used to train the model for reliable recognition. The system converts recognized gestures into text and further translates them into multiple languages using translation tools, enabling broader communication. Designed for real-time usage, the system aims to assist interactions in domains such as healthcare, education, and public services, thereby promoting accessibility and digital inclusivity. <i>Keywords:</i> Real-Time Recognition; Gesture Detection; Multilingual Translation; Text Conversion; Custom Dataset.

Paper ID :	CSIT-UG-3050
Title :	Edumate AI: Smart Academic Assistant
Authors:	Srushti Sanjay Sathe, Prajakta Shinde, Komal Waghamare, Samrudhi Zadbuke, Prof. Shalu Saraswat <i>PDEA's College of Engineering, Manjari, India</i>
Abstract:	India has a huge number of students, and it is difficult to monitor and predict their performance properly. Each institution has its own method of evaluation, and there is no standard way to analyze the performance of students. Also, many existing models do not take into account the important external factors that influence performance. The proposed project aims to analyze the performance of students taking into account not only their academic performance but also other factors such as geographical location, education of parents, health conditions, and stress levels. Machine learning algorithms such as XGBoost are used for performance analysis and stress analysis. XGBoost is primarily used for improving the accuracy of predictions. The outcome of the project reveals that the combination of academic and personal factors provides better and more accurate results for performance analysis. <i>Keywords:</i> Artificial Intelligence (AI), Machine Learning (ML), Student Performance Prediction, XGBoost, Stress Detection

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Paper ID :	CSIT-UG-3051
Title :	Real-Time Sign to Text and Speech Converter for Marathi Language
Authors:	Parth Ravindra Lande, Kshitij Jadhao, Ninad Kuralkar, Ashish Pal, Prof. Sunita Chanav <i>KJ Somaiya Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The advancement of artificial intelligence and computer vision has created new opportunities for improving inclusivity, especially for the deaf and hard-of-hearing community. While traditional sign language translation systems are beneficial, they frequently lack real-time adaptability, multilingual versatility, and personalization. This research suggests the creation of an AI powered Real-time sign-to-text and speech converter, specifically focusing on Marathi Sign Language (MSL) to bridge the communication divide in India's diverse linguistic landscape. By employing YOLO and OpenCV for real-time gesture detection, along with LSTM-based deep learning models for precise classification, the system will convert sign gestures into comprehensible text and natural-sounding speech. A significant innovation of this initiative is the incorporation of a feed back driven adaptive loop, which allows the system to learn from user corrections and enhance accuracy over time, thus providing a tailored experience. Additionally, multilingual support will facilitate the immediate translation of recognized signs into regional languages, ensuring broader accessibility. By merging computer vision, deep learning, and natural language technologies, the project aims to create an interactive, adaptive, and inclusive communication tool, establishing a new benchmark for sign language recognition and accessibility in India. Keywords: Sign Language Recognition, Real-Time Conversion, Gesture Recognition, Marathi Speech, Computer Vision (YOLO, MediaPipe).

Paper ID :	CSIT-UG-3052
Title :	Hybrid AI-Powered Navigation and Voice-Based Q&A Assistant for The Visually Impaired
Authors:	Sohail Hawari, Affan Quraishi, Siddique Shaikh, Sumaira Shaikh, Pratima Patil <i>KJ Somaiya Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Artificial intelligence is slowly changing how assistive technology works for people who are blind or have low vision. Earlier, tools like white canes and guide dogs were helpful but could only provide limited awareness of the surroundings, especially in busy city spaces. Now, newer systems combine computer vision, sensors, and voice interaction to give better real-time support. Devices such as smart canes, mobile apps, and wearable gadgets can identify objects, understand the environment, and guide users more effectively. Models like CNN, YOLO, and transformers help in accurate detection, while edge computing reduces delays by processing data on the device itself. Voice-based interaction also makes communication easier and more natural. Overall, the focus is moving towards systems that feel more supportive and improve independence and confidence. Keywords: Computer Vision, Deep Learning, Edge Computing, Object Detection, Voice Interaction.

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Paper ID :	CSIT-UG-3053
Title :	A Comprehensive Survey on AI-Driven Large Language Models for Mental Health Support: Comparative Analysis of Deployment Frameworks, Chatbots, and Inference Engines
Authors:	Vignesh Anil Thandessary, Prof. Pramila Mate, Tulasi Desai, Kartik Shukla, Dashrath Parekar <i>Terna Engineering College, India</i>
Abstract:	This survey presents a comparative analysis of five representative AI frameworks for mental health support: WebLLM, F-One, Psy-LLM, Anxiety Management, and JAVIS Chat. We examine their deployment designs, core methods (e.g., fine-tuning, prompt engineering, RAG, and containerized orchestration), and reported outcomes. The reviewed evidence highlights key trade-offs between privacy, scalability, and therapeutic quality—including WebLLM’s strong in-browser efficiency (about 80% native performance), JAVIS’s institutional scalability (up to 150 concurrent users), and chatbot-based interventions reporting anxiety reduction of about 20–21%. Beyond performance, we analyze ethical risks related to data sovereignty, bias, empathy limitations, and safety in clinical use. Overall, the findings support a hybrid human-in-the-loop direction in which AI improves accessibility while professional oversight, fairness, and transparent governance remain central. <i>Keywords:</i> Large language models (LLMs), mental health chatbots, ethical AI, anxiety management, privacy compliance;

Paper ID :	CSIT-UG-3054
Title :	AI Powered Early Detection of Chronic Skin Issues Using Machine Learning
Authors:	Sejal Sandeep Pusate, Tanvi Hande, Suhani Ghuge, Aditya Haridas <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Chronic skin disorders impact millions of individuals worldwide, making early and precise detection essential to avert serious complications. Traditional diagnostic methods depend on dermatologists conducting manual visual examinations, which can be labor-intensive and often lack accessibility, especially in remote areas. This research introduces an AI-based framework for the early identification of chronic skin conditions utilizing Convolutional Neural Networks (CNNs). In contrast to conventional image-only models, the proposed system combines dermoscopic image analysis with user-submitted textual symptom descriptions to improve diagnostic accuracy. The model is trained on publicly accessible dermatological datasets and fine-tuned for multi-class classification of prevalent skin conditions. A web-based platform allows users to upload images of their skin and enter symptoms, offering real-time preliminary insights. Experimental findings indicate enhanced prediction accuracy when compared to unimodal methods. The system is designed to promote early awareness, enable timely medical consultations, and enhance access to dermatological evaluations through advanced digital healthcare solutions. <i>Keywords:</i> Artificial Intelligence; Skin Cancer Detection; Convolutional Neural Networks; Medical Image Analysis; Multi-modal Learning

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Paper ID :	CSIT-UG-3055
Title :	Gen AI conversational back combining lang-chain with on demand voice response system
Authors:	Shreyas Vanarse, Vedant Yadawar, Siddhartha Shriwastav, Shiva Tummod, Vaishali Joshi <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Recent developments in speech processing and generative AI have made conversational systems more interactive and accessible. However, building a system that can respond in real time while maintaining contextual understanding remains a challenge. This work presents a conversational AI backend that integrates speech-to-text conversion, large language model processing, and text-to-speech synthesis within a unified framework. It uses a Lang-Chain based approach to manage conversation flow and maintain context across multiple interactions. To improve usability, the architecture also supports text-level multilingual responses and is integrated with a WhatsApp interface, allowing users to interact through a familiar messaging platform. A streaming-based design is adopted to reduce response latency and enable smooth voice interaction. The proposed system demonstrates how different AI components can be combined effectively to develop a scalable and practical conversational agent suitable for applications such as customer support and automated assistance. <i>Keywords:</i> Conversational AI; Speech-to-Text; Text-to-Speech; Large Language Models; Real-Time.

Paper ID :	CSIT-UG-3056
Title :	Interactive AI Portal For Alumni-Student Networking
Authors:	Janhavi Shirshetti, Shreya Shinde, Shruti Mahadik, Vansh Patel, Prof. Priyanka Kendre <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Higher education institutions are increasingly focusing on strengthening alumni relationships to enhance student career outcomes and institutional development. However, traditional alumni engagement methods remain limited in scalability, accessibility, and continuity. This paper proposes an Interactive AI Portal for Alumni-Student Networking that leverages artificial intelligence techniques to enable intelligent mentor matching, personalized recommendations, and real-time communication. The system integrates machine learning-based recommendation algorithms, natural language processing for query handling, and cloud-based infrastructure for scalability. A survey conducted among 108 undergraduate students highlights the strong demand for structured alumni mentorship and professional networking opportunities. The proposed system addresses the gap between academic learning and industry expectations by facilitating continuous engagement between students and alumni. The results demonstrate that AI-driven alumni platforms significantly improve accessibility to mentorship, enhance knowledge sharing, and support career development. The system also incorporates data privacy and security mechanisms to ensure safe user interaction. This research contributes to the development of intelligent educational networking platforms and provides a scalable solution for strengthening industry-academia collaboration. <i>Keywords:</i> Alumni Networking, Artificial Intelligence, Machine Learning, Recommendation Systems, Natural Language Processing, Mentorship, Higher Education, Industry-Academia Collaboration, Career Development, Cloud Computing.

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Paper ID :	CSIT-UG-3057
Title :	Symptom Prediction For HealthCare
Authors:	Seema Narvekar, Sumedha Patil, Shriya Mishra, Purva Dalvi <i>Terna Engineering College, India</i>
Abstract:	With the expansion of digital healthcare technologies, access to reliable preliminary health information has become increasingly critical. Many individuals experience symptoms without fully understanding their causes or knowing whether professional consultation is necessary. This review presents the development of a web-based symptom checker application aimed at assisting users in recognizing potential health conditions associated with their reported symptoms. The platform provides an intuitive, interactive interface for symptom input and, upon submission, analyzes the data to suggest possible related health conditions while offering general guidance. The primary objective of this application is to serve as a straightforward and accessible tool that improves users' awareness of potential health issues, while clearly emphasizing that it cannot replace professional medical evaluation. Symptom and condition data are systematically organized to deliver timely and relevant suggestions. By enabling rapid online symptom assessment, the application enhances health literacy and encourages individuals to seek appropriate medical attention when needed. This review highlights the role of digital healthcare expansion and interactive web-based technologies in broadening access to essential health information. Keywords: Digital Healthcare Expansion, Web-Based Symptom Checker, Online Health Assessment, Symptom Analysis Tool, Preliminary Health Information, Health Condition Prediction, Interactive Health Technology

Paper ID :	CSIT-UG-3058
Title :	AI-Based Insider Threat Detection System: Securing Digital Assets
Authors:	Saniya Ghagarum, Kunal Tayde, Piyush Yadav, Shweta Joshi <i>KJ Somaiya's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Insider threats constitute one of the most perilous and elusive cybersecurity risks, as malicious or negligent individuals exploit legitimate credentials and trusted network positions to bypass ineffective perimeter defenses. This paper introduces an AI-Based Insider Threat Detection System (AI-ITDS) that integrates machine learning classification, deep learning sequence analysis, and behavioral analytics to detect anomalous user activities signaling data exfiltration, privilege abuse, sabotage, or accidental policy breaches. During a profiling phase, the system ingests multi-source telemetry—including system access logs, network traffic metadata, file operation records, email communication patterns, and USB device events—to construct per-user behavioral baselines via unsupervised clustering. An ensemble of models, including an Isolation Forest for statistical anomaly detection, a Long Short-Term Memory network for temporal sequence modeling, and a Random Forest classifier for categorical feature-based risk scoring, is used to score deviations from established baselines. The ensemble-generated alerts are enhanced with contextual metadata and directed to a human-analyst dashboard that facilitates case investigation, evidence gathering, and feedback-driven retraining. Testing on the CERT Insider Threat Dataset v6. 2 and a synthetic organizational log corpus yielded a detection accuracy of 94. 7%, a false-positive rate of 3. 1%, and a mean time-to-alert of 2. 3 minutes from the ingestion of anomalous events. The modular system architecture supports on-premises or hybrid cloud deployment and is engineered for seamless integration with existing Security Information and Event Management platforms. Keywords: Insider Threat Detection; Machine Learning; Behavioral Analytics; Anomaly Detection; Isolation Forest; SIEM Integration; Cybersecurity; User Entity Behavior Analytics

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Paper ID :	CSIT-UG-3059
Title :	Aural Sight: Enhancing Independent Mobility Through Smart Vision Assistance
Authors:	Akshay Appasaheb Patil, Ajay Navghare, Vedant Dhebe, Mohit Surwade, Shweta Joshi <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Visually impaired individuals often face difficulties in understanding their surroundings and navigating safely in dynamic environments. Traditional assistive tools such as white canes provide only limited physical feedback and lack environmental awareness. This paper presents AuralSight, an intelligent vision-based assistive system that enhances navigation through real-time object detection and audio feedback. The system utilizes a deep learning model based on YOLOv8 to detect objects from live camera input and provide meaningful audio descriptions using a Text-to-Speech engine. It also integrates voice interaction, enabling users to control the system using commands such as navigation mode, silent mode, and query-based requests. A context-aware mechanism ensures that only relevant information is conveyed, reducing cognitive overload. The proposed solution aims to provide a low-cost, efficient, and user-friendly assistive system to improve independence and safety. <i>Keywords:</i> Real-Time Object Detection, Visually Impaired Assistance, Computer Vision, Deep Learning, YOLOv8, TensorFlow Lite, Voice Interaction, Text-to-Speech, Context-Aware System, Mobile Application.

Paper ID :	CSIT-UG-3060
Title :	Development of an Intelligent Gesture Recognition System for Real-Time Patient Assistance
Authors:	Santosh Choudhary, Kesar Mahato, Sharvari Auti <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This paper presents the development of an intelligent gesture recognition system for real-time patient assistance. The proposed system enables patients who are unable to speak or move freely to communicate with caregivers using predefined hand gestures such as CALL NURSE, EMERGENCY, FOOD, TOILET, and WATER. A custom dataset of 1000 images (200 images per class) was created, and MediaPipe was used to extract 21 hand landmarks from each image, generating a 63-feature vector. These features were used to train a feedforward Artificial Neural Network (ANN) using TensorFlow. The trained model is integrated with a Flask-based backend for real-time gesture detection. When a gesture is recognized with confidence greater than 80%, the system automatically sends push notifications to caregivers using Firebase Cloud Messaging (FCM). The proposed system provides accurate real-time gesture recognition with low computational cost and improves communication between patients and medical staff. <i>Keywords:</i> Gesture Recognition, Patient Assistance, Computer Vision, Machine Learning, Real-Time Detection, Healthcare System

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Paper ID :	CSIT-UG-3061
Title :	Comprehensive Survey on Deep Learning Techniques for Skin Burn Severity Classification
Authors:	Snehal Bothe, Nikita Gaikwad, Sai Chaskar, Vaibhavi Navgire <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Burn injuries represent a critical healthcare challenge, requiring accurate and timely assessment of severity to guide treatment decisions. Traditional diagnostic approaches rely on visual inspection by clinicians, which is often subjective and prone to inconsistency. In recent years, artificial intelligence (AI) and deep learning techniques have emerged as promising solutions for automated burn severity classification. This paper presents a comprehensive survey of machine learning and deep learning approaches used for skin burn analysis. The study systematically reviews traditional methods based on handcrafted features, as well as advanced techniques such as convolutional neural networks (CNNs), transfer learning models, and object detection frameworks like YOLO. A detailed comparative analysis is performed based on accuracy, computational complexity, and real-time applicability. Furthermore, key challenges such as limited dataset availability, class imbalance, and variability in imaging conditions are discussed. The paper also identifies research gaps and highlights future directions, including the development of lightweight models and explainable AI systems. This survey provides a structured overview of current advancements and serves as a reference for future research in AI-based burn severity classification. <i>Keywords:</i> Burn Severity Classification, Deep Learning, Convolutional Neural Networks, Transfer Learning, YOLO, Medical Image Analysis, Artificial Intelligence

Paper ID :	CSIT-UG-3062
Title :	Towards Intelligent News Understanding: A Survey of Taxonomy Generation, Text Summarisation and Entity-Centric Information Extraction Techniques using AI
Authors:	Aatmaj Deshpande, Vishal Dhotre, Akanksha Darekar, Ankita Kolage <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	An enormous amount of information is available on the web, print media etc as news content. Along with it comes the rapid growth of such content which has created a need for automated systems capable of extracting meaningful insights from such unstructured texts. This paper presents a comprehensive survey of intelligent news understanding techniques, focusing on text summarisation, entity-centric information extraction and taxonomy generation. Key components such as Named Entity Recognition, relation extraction, and entity normalisation are examined as fundamental steps in transforming raw text to structured knowledge. The survey categorises existing approaches and analyses their strengths and limitations in the context of news data. Finally emerging trends and future research are discussed to guide further advancements in automated news analysis. Furthermore, this paper acts as a base for a development of an AI system for Intelligent News Article analysis. <i>Keywords:</i> News Article analysis, Named Entity Recognition, Relationship Extraction, Taxonomy generation, Text summarisation

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Paper ID :	CSIT-UG-3063
Title :	Hybrid Approach For Health-care System Using Edge Computing
Authors:	Ankit Sandip Sawant, Ayush Howale , Rohit Adhav, Mayur Dhumal, Prof. Shikha S.Sharma <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Healthcare systems in India still operate in fragmented and partially digitized environments, resulting in poor connectivity between hospitals, delayed emergency response, and limited interaction between patients and doctors. While many sectors have adopted digital technologies, healthcare services often remain dependent on traditional workflows. In addition, existing platforms fail to integrate India's traditional medicine systems such as Ayurveda, Siddha, Unani, and Homeopathy with global medical standards like ICD-11. This creates difficulties for doctors in maintaining unified medical records and diagnosis codes. To address these challenges, this project proposes MediNexus, an intelligent healthcare platform that connects patients, doctors, and hospitals through a unified digital ecosystem. The system incorporates AI-based symptom guidance, real-time emergency alerts, appointment management, telemedicine services, and a NAMASTE–ICD mapping mechanism to ensure standardized and interoperable health records across modern and traditional medical systems. <i>Keywords:</i> Digital Healthcare Platform, NAMASTE–ICD Integration, Edge Computing in Healthcare, AI-based Symptom Analysis, Telemedicine System.

Paper ID :	CSIT-UG-3064
Title :	Enhanced Diabetic Retinopathy Diagnosis using CNN
Authors:	Swaraj Patil, Tarun Singh Mathur, Shubhada Tarapurkar, Neha More, Prof. Ram Lagdive <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Diabetic Retinopathy (DR) is one of the leading causes of vision loss among diabetic patients, making early detection essential for effective treatment. This project proposes an enhanced automated diagnosis system using Convolutional Neural Networks (CNN) to identify DR from retinal fundus images. The model applies preprocessing techniques such as image enhancement and normalization to improve data quality, followed by feature extraction and classification through a deep CNN architecture. The system classifies images into different stages of Diabetic Retinopathy, helping in accurate and timely diagnosis. The proposed method achieves improved accuracy compared to traditional techniques while reducing the need for manual examination. This approach can assist healthcare professionals in faster screening and is especially useful in remote areas with limited access to specialists. <i>Keywords:</i> Fault detection, Resilient architecture, Self-healing systems, System recovery, Autonomous maintenance, Artificial intelligence, IoT, Adaptive automation

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-UG-3065
Title :	AGROCONNECT: Bridging Gaps in Agriculture by Connecting Farmers with Labourers and Tools
Authors:	Praharsh Sargar, Ayush Kunwar, Saipadma Sankar, Prof. Snehal R. Shinde <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Efficient coordination of agricultural labor and access to farming tools remains a major challenge, particularly in regions with scattered resources and time-sensitive operations. This paper presents AGROCONNECT, a digital platform that enables real-time interaction between farmers, laborers, and tool providers through a unified mobile-based system. Unlike traditional methods dependent on manual communication and intermediaries, the platform simplifies service discovery and coordination. Built with a modular architecture, it supports user registration, role-based functionalities, and location-based service matching. Farmers can request labor or tools as needed, while laborers and providers respond based on availability. Experimental results indicate improved response time, enhanced transparency, and better resource utilization compared to conventional practices. Overall, AGROCONNECT demonstrates strong potential to reduce delays and enhance agricultural productivity. <i>Keywords:</i> Agricultural Platform; Labour Coordination; Tool Sharing; Mobile Application; Smart Farming

Paper ID :	CSIT-UG-3066
Title :	A Survey on Digital Railway Concession Systems with a Proposed Agentic AIBased Priority Framework
Authors:	Gayatri Mahajan , Ritik Mehta , Rashmi Andhale , Sumedha Patil <i>Terna Engineering College, Nerul, India</i>
Abstract:	The railway concession system facilitates student mobility, especially in crowded urban environments. However, many universities and colleges have their concession processes heavily relying on manual work, hence creating inefficiencies in their processes. In this paper, a comprehensive survey of the existing railway concession and its administration processes, as well as Artificial Intelligence in general workflow automation and decision-making processes, has been presented. The limitations of a manual system, however, extend beyond the inconvenience to include the possibility of error based on the repetitive entry of data during application cycles, and the lack of a processing system to deal with such requests in an equitable manner. For instance, students who have a longer commute, and thus could be considered to have a greater need for a system, are handled in exactly the same way as students with a shorter commute. This again reflects a lack in the system, as a sense of urgency and necessity is not considered in a framework of decision-making. In order to bridge this gap, a conceptual framework for a smart railway concession system, named SmartRailCon, which takes into account verified institutional data, an agential AI-based priority scoring system, and a privacy-focused generative AI system for communications, is proposed. A new scoring system has been developed to prioritize railway concession applications based on different parameters such as travel distance, etc. The paper further examines challenges in implementation, ethical issues, and future research directions in the application of AI-based administrative systems. This paper contributes to the existing literature by bridging the gap between existing technology in digital administration and intelligent and ethical workflow management in education. <i>Keywords:</i> Railway Concession Systems; Survey; Agentic AI; Priority Queue; Generative AI; Workflow Automation; Student Management Systems

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-UG-3067
Title :	Share-A-Meal: Leveraging a Smart Food Donation Digital Platform for reducing Urban Food Wastage
Authors:	Devika Rankhambe, Prajakta Bangar, Pratiksha Gund, Anuradha Badakh, Aparna Pawar <i>Anantrao Pawar College Of Engineering and Research Parvathi, Pune, India</i>
Abstract:	Food wastage is a widespread phenomenon in densely populated nations, including India. The evidence was everywhere in the pavements, dumpsters, and dumping site. Ceremonies, cafeterias, restaurants, social events with friends and relatives, and other functions take away such a thousand meals. Food wastage is often an indication of other money issues, hunger, or ecological degradation. Sometimes, high living standards have led to foods, clothing, and other types of trash as a result of rapid changes in lifestyle. Rather than allowing them to go to waste, we generally succeed in utilizing them to our advantage by donating them to groups such as shelters, retirement homes, etc. The device in question is an entirely web-based program that primarily seeks to raise funds through the mode of donations. As mentioned before, there are many examples of food wastage that take place every day in cafes and restaurants. Rather than being thrown away like trash, it will be utilized to feed the poor. To circumvent this issue, we have embarked to develop a Web Application that will donate surplus food to the needy or the poorly situated, hence curbing food wastage. The Web Application is advanced to solve this problem by curbing food wastage by offering surplus food to the needy. aims to bridge the gap between food donors and charitable organizations by developing a simple yet efficient system for charitable donations of food. This application helps in updating information in real-time, creating accessible geographical connections between donors and charitable organizations, as well as facilitating easy communication to deliver excess food to those in need before they actually go to waste. This is not only favorable for social causes by helping to eradicate hunger in the world; it also supports social responsibilities by promoting sustainable practices for a healthier environment. <i>Keywords:</i> Donor, Food waste management, Rider, Firebase, Geo-Location, and Needy Persons

Paper ID :	CSIT-UG-3068
Title :	Campus Care - Development of a Digital Mental Health and Psychological Support System for Students in Higher Education.
Authors:	Amar Yempalle , Sumedha Patil , Aditi Shanbhag , Swaroop Kapte <i>Terna Engineering College , Nerul, India</i>
Abstract:	Students in higher education increasingly encounter mental health challenges, including stress, anxiety, and academic pressure, yet often hesitate to seek help due to social stigma, overburdened counselling services, and the lack of a centralized digital support system. Existing solutions, while effective in isolation, lack institution-specific integration, professional escalation pathways, and campus-level administrative insights, resulting in a critical gap in accessible student mental health support. To address this, Campus Care introduces a comprehensive web-based platform that integrates AI-powered first-level emotional guidance, confidential counselling appointment booking, mood logging and screening tools, a moderated peer support forum, and a multilingual resource hub within a single secure ecosystem. The system is developed using a React and Node.js stack with MongoDB, leverages the Gemini API for intelligent chatbot interactions, and enforces data privacy through role-based access control and end-to-end encryption. The platform facilitates early mood-based intervention, seamless escalation from AI assistance to professional counsellors, and generates anonymized administrative analytics to inform institutional decision-making. By bridging the gap between digital AI assistance and professional mental health care, Campus Care provides a scalable, privacy-focused hybrid support system that reduces social stigma, promotes early intervention, and enhances student well-being across higher education institutions. <i>Keywords:</i> Artificial Intelligence; AI Mood Tracking; Professional Mental Healthcare; AI Chat Bot

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Paper ID :	CSIT-UG-3069
Title :	AI-Based Exam Proctoring System
Authors:	Samruddhi Koparde , Shreya Kumbharkar , Aavishkar Gawai , Ramesh Lavhe , Amit Kadam <i>ABMSP's Anantrao Pawar College of Engineering and Research, Pune, India</i>
Abstract:	Academic integrity is a core factor in maintaining fair student assessment, particularly within online education. Conventional exam supervision depends on human invigilators, whose effectiveness may be constrained by fatigue, potential bias, and limited ability to observe all candidates continuously. This paper outlines an AI-enabled exam proctoring system that applies computer vision and deep learning to automate exam supervision. The system combines face detection, gaze tracking, pose estimation, and object detection, leveraging models including YOLOv8 and MediaPipe. It uses an edge-computing architecture to lower latency while strengthening privacy. The system monitors candidates in real time, identifies potentially suspicious behavior, and issues alerts to support subsequent review. This approach is intended to enhance scalability, improve accuracy, and support fairness in exam monitoring systems. <i>Keywords:</i> AI Proctoring; Computer Vision; Deep Learning; Pose Estimation; Exam Monitoring

Paper ID :	CSIT-UG-3070
Title :	AN INTELLIGENT WEB-BASED PLATFORM FOR MOCK INTERVIEW SIMULATION AND CANDIDATE PERFORMANCE FEEDBACK
Authors:	Chirag Thakkar , Rutwik Tuplondhe , Aryan Dumale , Kisan Todkar , Dr. Sushadevi Adagale <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid shift toward digital recruitment has exposed critical limitations in traditional interview preparation approaches, particularly the absence of automated feedback and objective performance assessment. This paper proposes a web-based platform that leverages artificial intelligence to provide candidates with a structured and interactive interview practice environment. The system supports dynamic question generation based on user-defined parameters and enables automated evaluation of candidate responses. A backend processing pipeline extracts relevant features from user responses and maps them to quantitative performance metrics. The platform employs a learning-based evaluation model developed through a multi-stage training methodology to ensure reliable and consistent assessment outcomes. Results from system evaluation indicate that the proposed approach is capable of generating meaningful performance estimates across varied candidate inputs. The platform architecture ensures secure access management, structured data handling, and an interactive feedback interface for tracking candidate progress over time. The proposed system demonstrates strong potential as a scalable and accessible tool for interview readiness improvement among students and early-career professionals. Future work will focus on extending the evaluation capabilities of the system to incorporate additional input modalities, enabling a more holistic and comprehensive assessment of overall candidate performance. <i>Keywords:</i> Interview Preparation, AI-Based Evaluation, Deep Learning, Speech Analysis, MERN Stack, CNN, BiLSTM

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-UG-3071
Title :	Customizable LLM-as-a-Service for Enterprise Knowledge Management
Authors:	Aayaan Shaikh, Moizul Chowdhary, Ayaan Khan <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid adoption of artificial intelligence across industries has highlighted the limitations of general purpose Large Language Models (LLMs) when applied to domain-specific knowledge environments. Most existing systems lack the ability to securely integrate proprietary organizational data, maintain contextual accuracy, and provide explainable responses tailored to enterprise requirements. This project proposes a modular LLM-as-a-Service framework that enables organizations to develop customized language models trained on their internal documentation, policies, and procedural knowledge. The system employs a structured pipeline consisting of data ingestion, semantic embedding generation, vector-based knowledge storage, and retrieval-augmented generation (RAG) to ensure that responses remain contextually grounded and accurate. Additionally, the architecture incorporates parameter-efficient fine-tuning techniques and a human-in-the-loop feedback mechanism to continuously improve model performance. By combining scalable infrastructure with adaptive learning capabilities, the proposed system aims to bridge the gap between research advancements in natural language processing and practical enterprise applications, enabling organizations to deploy secure, intelligent, and domain-aware conversational assistants. <i>Keywords:</i> LLM-as-a-Service, retrieval-augmented generation (RAG), parameter-efficient fine tuning, human-in-the-loop.

Paper ID :	CSIT-UG-3072
Title :	A Survey on Privacy-Preserving Local AI Systems for Digital Memory Retrieval
Authors:	Ajinkya Mandlik , Atul Dongare , Atharva Deshmukh , Shreyash Sule <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid proliferation of digital technologies has resulted in individuals continuously generating vast volumes of personal data through browsing, document editing, communication, and application usage. Existing systems such as cloud-based virtual assistants, recommender engines, and personal knowledge management tools fail to address the combined requirements of long-term memory preservation, semantic retrieval, and user privacy. This survey examines foundational research across recommender systems, trust modeling, semantic embeddings, and privacy-preserving AI to identify principles informing local-first digital memory system design. Based on this analysis, EchoSphere is introduced as a privacy-first, offline AI memory assistant. Initial evaluations demonstrate a retrieval F1 score of 0.86, average query latency of 247 ms, and 5.9:1 storage compression on consumer-grade hardware (Intel i5-10400, 16 GB RAM), with verified 100% data locality and zero external data transmission. <i>Keywords:</i> digital memory systems; privacy-preserving AI; local-first architecture; vector databases; semantic retrieval

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-UG-3073
Title :	Hybrid Blockchain-AI Framework for Verifiable, Licensed, and Decentralized Model Access
Authors:	Om Khodake, Prof. Susha Adagale <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Large-scale machine learning model development and sharing have been made possible by the quick development of artificial intelligence; nevertheless, the majority of current distribution methods rely on centralized platforms that lack ownership protection, transparency, and verifiable authenticity. In order to provide safe, decentralized, and licensed access to AI models, this study suggests a hybrid blockchain-AI framework. The proposed system uses IPFS to hold huge model files off-chain for scalability, while model metadata, ownership details, pricing, and licensing terms and dataset usage information provided by the model developer are stored on blockchain. Smart contracts handle payments without middlemen, automate model registration, and impose access restrictions. AI models are run using an off-chain inference engine, and to guarantee result legitimacy and auditability, cryptographic hashes of outputs are maintained on-chain. Improved transparency, secure access control, and trustworthy verification are demonstrated via experimental implementation, which qualifies the system for high-trust applications like healthcare and banking. <i>Keywords:</i> Blockchain, Artificial Intelligence, Smart Contracts, IPFS, Verifiable Inference.

Paper ID :	CSIT-UG-3074
Title :	Curamind: Web-Based HealthCare Services
Authors:	Tanmay Bajaj, Sujal Surve , Aditya Karmalkar, Aditya Mathpati , Prof.Priyanka Kendre <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	AI, conversational computing, and digital health tools have together changed how healthcare is delivered and accessed. This paper presents CuraMind, a web-based medical assistant that combines an AI chatbot, a personal health dash board, and electronic health record management in one platform. Key features include QR code based record portability and voice-enabled interaction through a Retrieval Augmented Generation (RAG) pipeline. We tested the system on 150 queries across health, symptom, and emergency scenarios. Results show a chatbot response accuracy of 82%, a mean response time of 1.6 seconds, and a user satisfaction score of 4.2 out of 5, indicating that the system is practical and reliable for everyday medical assistance. <i>Keywords:</i> Artificial Intelligence, Health Chatbot, Digital Assistant, Health Monitoring, Smart Dashboard, Medical Record Portability, RAG, Ollama.

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Paper ID :	CSIT-UG-3075
Title :	LifeBeacon: Design and Implementation of a QR-Code Based Personal Health Record and Emergency Medical Information System
Authors:	Saniya Mankar ¹ , Sumedha Patil ² , Harshali Dhindale ³ , Mansi Shinde ⁴ <i>Terna Engineering College Navi Mumbai, India</i>
Abstract:	Timely access to accurate medical information is a critical determinant of patient outcomes in emergency care. In trauma and acute medical scenarios, patients are frequently incapacitated and unable to communicate vital health details — including blood type, allergies, chronic conditions, or active medications — creating diagnostic delays that can directly compromise patient safety. This paper presents LifeBeacon, a web-based Personal Health Record and Emergency Medical Information System integrating real-time health monitoring with QR-code-based emergency data retrieval. The system encompasses user registration, structured medical data entry, health logging for blood pressure and blood sugar with trend visualization, and unique QR code generation. Upon scanning, medical personnel instantly retrieve critical patient data, eliminating dependence on paper records. The prototype was deployed locally and validated through controlled testing, confirming successful end-to-end system execution. Results demonstrate the technical feasibility of LifeBeacon as an integrated solution for emergency medical response and routine health self-management. Keywords: Emergency Medical Information System; QR Code-Based Health Records; Personal Health Monitoring; Web-Based Healthcare Application; Patient Safety and Emergency Response

Paper ID :	CSIT-UG-3076
Title :	FlashFeed - An AI-Based Authentic News Aggregator
Authors:	Sayali Kulkarni, Pratap Majge, Aditya Mane, Meet More, Khushbu Khandait <i>KJ Somaiya Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's digital age, the rapid dissemination of information through online platforms has made news more accessible than ever, but it has also led to the rampant spread of misinformation and fake news. This project aims to develop an AI-based authentic news aggregator that operates in realtime, providing users with credible and verified news updates from multiple trusted sources. The system leverages advanced technologies such as Natural Language Processing (NLP), Machine Learning (ML), and real-time data streaming to collect news articles from a variety of online media outlets, analyze their content, and determine their authenticity. By incorporating fact-checking mechanisms, source reliability scoring, sentiment analysis, and cross-verification with reputable databases and APIs, the system can effectively distinguish between genuine news and potentially misleading or false information. The aggregator is designed to categorize news by topics such as politics, technology, sports, and health, while also providing filters for region, language, and relevance. Users are presented with a clean, user-friendly interface where they can view real-time headlines, summaries, and source credibility indicators. The ultimate goal of this project is to reduce the impact of misinformation by ensuring that users have access to timely, reliable, and unbiased news, while also promoting digital awareness and responsible media consumption. This solution has the potential to serve journalists, researchers, policymakers, and the general public by becoming a trustworthy source of information in an increasingly complex media landscape.

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Paper ID :	CSIT-UG-3077
Title :	Experimental Investigation of “SkinIntel”: An AI-Based Skin Analysis and Skincare Recommendation Platform for User Awareness
Authors:	a Tanishka Gaikwad, Sumedha Patil b , Rudraksh Nawale c , Sanika Patil d <i>Terna Engineering College, Nerul, India</i>
Abstract:	SkinIntel is an AI-based skincare assistance system designed to help users identify common skin concerns and receive suitable skincare product suggestions. The system allows users to upload a skin image or provide an image URL that closely represents their skin condition. After submitting the image, users can also select their country or region and specify a preferred price range to receive more relevant product recommendations. The uploaded image is analyzed using a Convolutional Neural Network (CNN) model to detect common skin concerns such as acne, dark circles, pigmentation, and related issues. Based on the detected condition, the system provides suitable skincare product suggestions along with precautionary care tips. To further assist users in making informed decisions, the recommended products include buying links from popular online platforms, enabling users to easily view or purchase the suggested items available in their selected region and within their chosen budget range. The main purpose of this project is to create a simple and accessible platform that helps individuals better understand their skin concerns and explore suitable skincare products without confusion caused by the large number of products available in the market. SkinIntel provides AI-based skincare awareness and product suitability guidance for informational and academic purposes only. It does not offer medical diagnosis or replace professional dermatological advice. For serious or persistent skin concerns, users are advised to consult a licensed dermatologist. <i>Keywords:</i> Artificial Intelligence, Skin Analysis, CNN, Skincare Recommendation System

Paper ID :	CSIT-UG-3078
Title :	ScrapBridge: A B2B Mediator Platform for Efficient Scrap Management Using Android and Cloud Technologies
Authors:	Vaibhav Sanvatsarkar a , Sumedha Patil b , Harshad Salunke c , Aadesh Rathod d <i>Terna Engineering College, Navi Mumbai, Maharashtra, India.</i>
Abstract:	ScrapBridge is a smart platform designed to connect people with nearby scrap collectors in an easy and efficient way. In many areas, people have recyclable waste such as plastic, paper, metal, or e-waste, but they do not know where to sell it or how to dispose of it properly. Traditional methods of selling scrap are not organized and often depend on local vendors, which makes the process inconvenient and time-consuming. To solve this problem, ScrapBridge provides a digital solution where users can request scrap pickup from their homes. The platform allows users to select the type of waste, enter their location, and schedule a pickup. Scrap collectors receive these requests and can accept them based on availability. The system also helps in providing estimated prices and ensures a smooth communication process between users and collectors. In addition, ScrapBridge promotes environmental awareness by encouraging proper waste management and recycling. It helps reduce pollution and supports sustainable living. The platform can also include features like user tracking, history of transactions, and basic analytics to monitor usage. Overall, ScrapBridge aims to make scrap collection simple, organized, and accessible for everyone while supporting eco-friendly practices and improving the recycling system in society. <i>Keywords:</i> Scrap Management, Waste Recycling, Scrap Collection, Digital Platform, Pickup Scheduling, Environmental Sustainability, Waste Management System, Urban Recycling, Smart Waste Solution

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Paper ID :	CSIT-UG-3079
Title :	MEDIBRIEF: A Scalable, Privacy-Preserving and Lightweight Medical Report Summarization
Authors:	Prof. Devika Rankhambe, Zaid Maniyar, Adeeba Sayyed, Mateen Momin <i>Anantrao Pawar College of Engineering and Research, Pune, India</i>
Abstract:	The rapid digitization of healthcare has led to an exponential increase in Electronic Health Records (EHRs), comprising complex diagnostic reports, clinical notes, and discharge summaries. While essential for continuity of care, the sheer volume and terminological density of these documents often lead to cognitive overload for clinicians and significant confusion for patients. Existing automated summarization solutions relying on commercial Large Language Models (LLMs) like GPT-4, while powerful, often demand prohibitive computational resources, suffer from hallucinations, and pose severe data privacy concerns due to cloud dependencies. This paper presents Medi-Brief, a lightweight, privacy-preserving Python-centric medical summarization system. Leveraging the power of a well-optimized FLAN-T5 Large transformer model, Medi-Brief is designed to be optimized for mid-range hardware, ensuring deployability in resource-limited clinical settings. We formally define the medical summarization problem, analyze the current transformer-based state-of-the-art, and demonstrate how our holistic approach integrates Optical Character Recognition (OCR), Natural Language Processing (NLP), and secure database management. Furthermore, we introduce a novel pipeline for patient-friendly output generation that converts medical jargon to commoner language. Extensive evaluation on ROUGE, BLEU, and BERT Score metrics demonstrate that Medi-Brief is capable of achieving domain accuracy on par with billion-parameter models while reducing inference latency by 60. Keywords: Terms—Medical Text Summarization, Natural Language Processing (NLP), FLAN-T5, Transformer Architecture, Health-care AI, Clinical Decision Support, Privacy-Preserving AI.

Paper ID :	MCA-PG-3080
Title :	AI and IoT-Based Crop Prediction and Farmer Assistance Framework
Authors:	Ambika Rajendra Dunge ¹ , Nayana Shivaji Ghule ² , Keshav Pralhad Golande ³ <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) has the potential to revolutionize traditional agricultural practices by transitioning them into data-driven, precision-based paradigms. While IoT devices facilitate real-time environmental monitoring, the heterogeneous nature of the collected data and the frequent lack of transparent decision-making algorithms limit practical adoption among end-users. This paper proposes a comprehensive, multi-layered framework that amalgamates standard-based IoT sensor networks with Explainable AI (xAI) to enable accurate crop prediction and reliable farmer assistance. By addressing the critical challenges of semantic interoperability in harsh rural environments and mitigating algorithmic opacity, the proposed architecture seeks to empower smallholder and commercial farmers alike. A hypothetical evaluation plan is outlined to benchmark the system's predictive accuracy, latency, and user trust, demonstrating the viability of combining edge computing with transparent machine learning models. Ultimately, this work provides a scalable blueprint for deploying trustworthy, intelligent agricultural systems that maintain meaningful human control.

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Paper ID :	MCA-PG-3081
Title :	SmartServe: A Time-Based Food Redistribution Framework for Waste Reduction.
Authors:	Prathamesh Gopale, Aniket Dubhashe, Atish Yedke. <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Food waste is a major issue in today's society, where a significant amount of surplus food is discarded daily while many people continue to suffer from hunger. The primary challenge lies in the lack of proper coordination and timely redistribution systems between food donors and beneficiaries. This research proposes SmartServe, a time-based food redistribution framework designed to efficiently manage surplus food and reduce wastage. The system connects food donors such as restaurants, hotels, and event organizers with NGOs and volunteers through a centralized platform. It uses a time-based priority mechanism that gives higher importance to food items with less remaining expiry time, ensuring quick pickup and delivery. Additionally, a distance-based allocation approach assigns the nearest available NGO or volunteer to minimize delays and improve efficiency. Unlike complex AI-based systems, SmartServe uses a rule-based scheduling approach, making it simple, cost-effective, and practical for real-world implementation. The proposed system aims to improve coordination, reduce food spoilage, and ensure that surplus food reaches needy individuals on time, contributing to sustainable food management. <i>Keywords:</i> Food Waste; Food Redistribution; Time-Based Scheduling; SmartServe; Sustainability

Paper ID :	MCA-PG-3082
Title :	Hybrid CNN–Transformer Based Handwritten Digit Recognition System Using MNIST Dataset
Authors:	Bhaves R. Sonawane, Akash V. Lad , Abhishek S. Rokade <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Handwritten digit recognition plays a crucial role in computer vision and machine learning, with applications in banking, postal automation, document digitization, and license plate recognition systems. Traditional Convolutional Neural Network (CNN) models have demonstrated strong performance in extracting spatial features from images; however, they are limited in capturing global dependencies within the data. To address this limitation, this paper proposes a hybrid deep learning architecture combining CNN and Transformer models. The CNN component extracts local spatial features, while the Transformer utilizes a self-attention mechanism to capture global contextual relationships. The proposed model is trained and evaluated using the MNIST dataset consisting of 70,000 grayscale images. Performance is evaluated using accuracy, precision, recall, and F1-score. Experimental results indicate that the hybrid CNN–Transformer model achieves improved classification accuracy compared to traditional models. <i>Keywords:</i> Handwritten Digit Recognition; CNN; Transformer; MNIST; Deep Learning

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3083
Title :	A Comparative Study of Transformer-Based and Traditional Machine Learning Models for Fake News Detection
Authors:	Afiya Mahemood Shaikh, Nisha Sanjay Sharma, Pramod Jadhao <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In this paper, we present a comparative performance analysis of traditional machine learning models and a transformer-based model for detecting fake news. We focus on Logistic Regression and Naive Bayes as traditional models, and Bidirectional Encoder Representations from Transformers (BERT) as the transformer-based model. We evaluate performance in terms of accuracy, precision, recall, and F1-score to ensure a fair comparison. Based on a benchmark dataset for fake news detection and common preprocessing methods, we compare the classification performance of the models under the same experimental setup. The results show that, although traditional machine learning models provide computational efficiency and faster training times, transformer-based models achieve better contextual understanding and higher classification accuracy. <i>Keywords:</i> Fake News Detection; BERT; Machine Learning; Natural Language Processing; Text Classification

Paper ID :	MCA-PG-3084
Title :	AI-Based Phishing Detection Using Machine Learning
Authors:	Muddasar Shaikh, Mohammad Kais Shaikh, Pramod Jadhao . <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Phishing attacks are still one of the most common types of cybersecurity attacks, which target individuals as well as organizations using deceptive emails and websites. Conventional rulebased phishing detection systems are not effective in coping with the ever-changing nature of phishing attacks. This research work presents an AI-powered phishing detection system based on machine learning algorithms to identify URLs and email bodies as phishing or genuine. Several supervised machine learning algorithms, such as Logistic Regression, Random Forest, and Support Vector Machine, are compared using publicly available phishing datasets. The performance of the algorithms is evaluated using accuracy, precision, recall, and F1-score. The experimental outcome shows that ensemble methods perform better than conventional classifiers in identifying phishing attacks with high accuracy. <i>Keywords:</i> Phishing Detection:Machine Learning:Cybersecurity:URL Analysis:Classification

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3085
Title :	Performance Evaluation of IAAS, PASS & SAAS in Cloud Computing
Authors:	Talika Ramrao Rathod, Nikita Shelake, Pramod Jadhao <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Cloud computing has transformed the way organizations store data, run applications, and manage computing resources. Instead of relying on traditional physical infrastructure, businesses can now access scalable and flexible services through the internet. This paper presents a comparative performance evaluation of three widely used cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). The aim of this study is to analyze how these service models perform under different operational conditions and workloads. To conduct the evaluation, several key performance metrics are considered, including latency, throughput, scalability, and cost efficiency. Benchmark workloads and representative deployment environments are used to simulate real-world scenarios and observe system behavior under varying demands. The analysis highlights that each cloud service model offers unique benefits depending on user requirements and the level of control needed over computing resources. IaaS provides the highest degree of flexibility and control, allowing organizations to manage infrastructure components such as virtual machines and storage. PaaS simplifies the development process by offering a managed platform for building and deploying applications. SaaS delivers ready-to-use software through the internet, ensuring convenience and consistent performance for end users. <i>Keywords:</i> Cloud Computing, Benchmarking, Performance Metrics, Scalability, Resource Utilization.

Paper ID :	MCA-PG-3086
Title :	Experimental Investigation of a Space Tourism and the Future of Commercial Space Travel
Authors:	Mahek Iqbal Sayyed, Afzal Patel <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In this essay, the idea of a space travel plan with commercial and tourism elements is presented. Only the astronauts chosen by the individual space agencies have been able to journey to space thus far. After the Apollo Moon landings, NASA shifted its attention to the Space Shuttle program, which projected the idea of affordable access to space. This caused a generation of Apollo enthusiasts to think that, despite the expense, space travel would eventually become a viable option for the general population. The Soyuz-Apollo missions, the MIR Space station, and the Freedom International Space station all seemed to support the notion that commercial space travel and space tourism would become a reality by the turn of the 21st century. With the current state of technological advancement, it is conceivable to design and create spacecraft that can launch and land in orbit flawlessly on autopilot, regardless of the time of day or night or the state of the weather. Future spacecraft should guarantee far higher levels of safety during launch, re-entry, and landing. The technical challenge will be to combine the relative simplicity of disposable rockets with the dependability and safety of airplanes to create a reliable, affordable launch mechanism. From an economic, social, and global relations perspective, developing a kind of passenger space travel comparable to air travel has enormous promise. Developing and innovating currently used technology is a good place to start for passenger space travel. It is possible that it will develop into the most significant commercial operation in space. In the various stages of such a mission, there are many concerns that must be handled, as is explained in the paper. Although in-depth market research on the space tourism industry is undoubtedly necessary to generate accurate forecasts and estimates and to draw investors, it is anticipated that this industry will eventually become one of the most significant in terms of economic importance. <i>Keywords:</i> Space Tourism, Space Planes, Reusable Launched Vehicle, Expandable Launched Vehicle

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3087
Title :	AI-Based Context-Aware Medical Coding System for Automated ICD Code Generation using NLP and Machine Learning
Authors:	Dhanshree Parsewar, Sayali Salunke, Dipali Bhusari <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Accurate medical coding is an important component of clinical documentation and clinical data utilization. However, mapping unstructured clinical notes into highly-structured medical codes is a time-consuming and error-prone process when carried out manually. In this study, we proposed an innovative clever automated medical coding framework that leveraged state-of-the-art natural language processing (NLP) and machine learning to improve medical code prediction in terms of both accuracy and interpretability. The model processed the physician notes through different stages: text preprocessing, analyzing negation and family history, and extracting semantic features through pretrained transformer embeddings. The model created features through feature engineering and used them to classify the medical codes with an ensemble gradient-increasing classification model. A confidence score was included in the framework to ensure a strong clinical use. A rule-based verification engine, capable of identifying duplicate codes, invalid combinations and the context in which the findings were written, was developed. An anomaly detection module was created in order to report abnormal code patterns that are indicative of an error or fraud and to provide explainable outputs with contextual reference clinical knowledge. Optional human review and adaptive feedback storage to improve future performance were also included, and the complete architecture was deployed with an interactive dashboard and application programming interfaces (APIs) for healthcare information systems integration <i>Keywords:</i> Automated Medical Coding, Natural Language Processing, Transformer Models, Ensemble Machine Learning

Paper ID :	MCA-PG-3088
Title :	CareChain: A Blockchain-Enabled Patient-Centric Health Record System
Authors:	Yash Bhoyar, Mahesh Awari , Prof. Sameer Kakade <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	CareChain is a patient-centered health record system powered by blockchain technology which overcomes new issues in centralized (traditional) medical record platforms. These include data breaches, unauthorized access, and limited patient control. In the proposed method, the presented approach solves the medical documents that are encrypted before uploading them to IPFS. Only their cryptographic hashes and essential metadata are recorded on Ethereum Blockchain. Smart contracts determine the functions of Patients, Doctors, and Administrators. To ensure role-based access control, the patient can explicitly permit or disable another participant's access as well as to enable temporary access for emergencies. All actions involving any sensitive data are recorded on the blockchain thereby creating transparency and traceability . A web app that connects the user with the blockchain and IPFS built with React, and having the backend in Node.js achieves ease of access and familiar UI with strong security guarantees. CareChain aspires to strengthen trust, privacy and accountability in digital healthcare data management through the use of a decentralized storage, permissioning through smart contracts, and a usable web front end. <i>Keywords:</i> Blockchain; Electronic Health Records; Personal Health Records; Smart Contracts; IPFS; Ethereum; Healthcare Security; Access Control; Audit Trail; Decentralized Systems.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3089
Title :	Storm-Shield: Intelligent Cyclone Prediction System Using ML
Authors:	Ayush Gayakwad, Rutuja Chakor, Arya Deshmukh , Yash Bhoyar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Storm-Shield is an AI-based cyclone risk prediction and visualization system developed to support proactive disaster preparedness and decision-making in regions vulnerable to severe weather events. The system works using past records of tropical cyclones, like IBTrACS, plus current weather details from OpenWeather APIs, and statements from the India Meteorological Department – the IMD. It makes forecasts with a Random Forest machine learning model; this model ranks cyclone strengths, and pinpoints where effects might be. A simple backend constructed using FastAPI makes swift data work, and gives current, up-to-date findings. A web dashboard which people can interact with – made using tools for showing things geographically – gives risk maps, active warnings, and help via a smart chatbot. By joining data analysis with visuals that are easy to grasp, the system's structure delivers speedy, clear results to those in power, people who study this, and ordinary citizens. Because of the system's design – which is made of parts that can be changed – it can easily grow; this includes adding pictures from satellites, showing how sure the forecasts are, and bringing in more tools to predict dangers. This illustrates what machine learning and analytics in real time can do for better knowing about, and dealing with, the dangers from catastrophes. <i>Keywords:</i> Disaster Forecasting, Machine Learning, Tropical Cyclones, Random Forest, Meteorological Data, Real-Time Visualization, Disaster Management

Paper ID :	MCA-PG-3090
Title :	Harnessing Deep Learning for Automated Software Bug Detection and Resolution: A Comprehensive Review
Authors:	Parmehswar Bodake, Divya Bar mase, Janhavi Godase, Prof. Sameer kakade <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Software development is becoming increasingly complex, necessitating robust code review and optimization techniques to ensure code quality, security, and performance. Traditional manual code review methods are time-consuming, error-prone, and inconsistent. This paper presents an AI-based code review and optimization system that automates code analysis, detects vulnerabilities, and provides optimization suggestions. The system integrates modern AI and web technologies, utilizing Gemini, CodeBERT, and machine learning models from Hugging Face for intelligent code assessment. Additionally, Python libraries such as Pandas, NumPy, and Scikit-learn are leveraged for efficient data handling and analysis. Cloudinary is used for file storage, ensuring seamless management of code-related files. ESLint is incorporated for best analysis practices, improving the system's ability to enforce coding standards and detect errors effectively. Our proposed system streamlines the code review process, reducing human effort while improving efficiency and accuracy. The system demonstrates high accuracy in detecting code defects through extensive testing, with a confusion matrix analysis validating its performance. This research highlights the system's architecture, implementation, and results, showing its potential to transform software development workflows.

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Paper ID :	MCA-PG-3091
Title :	DeepShield: AI-Driven Content Moderation System for Social Media
Authors:	Krushna Abhinath Gawas, Rutuja Deshmukh , Dr. K. K. Misal <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Social media keeps expanding fast, so checking what users post matters more now. Because of toxic comments, threats, insults, people feel unsafe using some platforms. Old ways of reviewing posts by hand take too long, miss things, yet struggle when volume spikes suddenly. Instead, a tool called DeepShield uses artificial intelligence to spot damaging words without delays. It relies on advanced language models like BERT - trained to grasp meaning from full sentences. Before sorting each message, it cleans up text, breaks it down, then turns it into digital signals. From there, harmful patterns get labeled clearly: whether hateful, rude, aggressive, or harmless talk. Out of the lab tests comes clear proof transformers handle context-driven toxicity better than old-school algorithms. Through smarter pattern spotting, this method scales smoothly while cutting response delays. Safety in online chats grows stronger when systems learn like humans do, one odd example at a time. <i>Keywords:</i> Content Moderation; Social Media; Hate Speech Detection; NLP; BERT

Paper ID :	MCA-PG-3092
Title :	Network Performance Monitoring Tool
Authors:	Sakshi Pandurang Nigade, Shreya G. Gurav, Kirti R. Kushwah <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In the modern digital landscape, efficient network performance is critical for ensuring reliable communication and uninterrupted business operations. This paper presents a Network Performance Monitoring Tool designed to monitor, analyze, and visualize key network parameters in real time. The system tracks metrics such as latency, packet loss, bandwidth usage, response time, and device availability using protocols like SNMP and utilities such as ping and traceroute. Collected data is stored and processed to generate meaningful insights through an interactive dashboard built with Python and Flask. The tool provides graphical representations, reports, and real-time alerts to help administrators detect issues such as network congestion, bottlenecks, and failures. The proposed solution is lightweight, scalable, and cost-effective, making it suitable for educational institutions and small to medium-sized organizations. It enhances network visibility and supports proactive decision-making for maintaining optimal network performance. <i>Keywords:</i> Network Performance Monitoring; SNMP; Latency and Packet Loss; Real-Time Monitoring; Network Visualization.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3093
Title :	Design and Development of an Intelligent Student Performance Prediction System Using Machine Learning
Authors:	Vaishnavi Mhaisane <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Educational institutions generate a significant amount of student-related data through various academic activities such as examinations, assignments, attendance tracking, and classroom engagement. Analyzing this data can provide valuable insights into student learning behavior and academic performance. Predicting student performance has become an important research area within educational data mining and learning analytics. Early identification of students who may face academic difficulties allows educators to provide timely support and improve learning outcomes. This research presents the design and development of an intelligent student performance prediction system using machine learning techniques. The proposed system analyzes multiple academic attributes including attendance, internal assessment marks, assignment completion rates, and previous academic records to predict student performance. Several machine learning algorithms such as Decision Tree, Random Forest, Support Vector Machine, and Logistic Regression are applied to build predictive models. Experimental results demonstrate that machine learning models can effectively analyze educational datasets and predict academic outcomes with high accuracy. The system can help educational institutions identify students who require additional academic support and improve teaching strategies. The proposed approach contributes to the growing field of educational data mining by providing an intelligent predictive framework for improving student success and academic performance. <i>Keywords:</i> Machine Learning, Student Performance Prediction, Educational Data Mining, Predictive Analytics

Paper ID :	MCA-PG-3094
Title :	AI-Based News Classification System for Automated Content Categorization
Authors:	Ratnadeep Rajabhau Mahamunia, Megha Jayakumar Nair, Hamza Mubarak Khan <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid growth of online news platforms has created a need for efficient techniques of news content organization. In this study, the authors propose a news classification system using Artificial Intelligence techniques that can classify news articles into various domains such as politics, sports, business, technology, and entertainment. The proposed system uses Natural Language Processing techniques for text preprocessing and feature extraction using machine learning and deep learning techniques. The study compares various algorithms for news classification using machine learning techniques. The authors found that the transformer model is more accurate than other algorithms for news classification due to its capability to understand the context of language. The proposed method is efficient for news classification in digital journalism. <i>Keywords:</i> Artificial Intelligence, News Classification, Natural Language Processing, Text Categorization, Content Automation

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3095
Title :	AI-Powered Learning Platform for Rural Students Project Research Paper
Authors:	Onkar Nanavare, Omkar Rajegore <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	An AI-powered digital learning platform was developed to improve access to quality education for rural school students. Many rural learners lack exposure to interactive and intelligent digital learning tools. The proposed system aims to provide a scalable and accessible web-based learning environment using the MERN stack (MongoDB, Express.js, React.js, and Node.js). The platform integrates artificial intelligence features such as an AI chatbot for doubt solving, quiz generation, lesson management, progress tracking, and short educational video reels uploaded by teachers and administrators. Secure JWT-based authentication and role-based access control are implemented for students, teachers, and administrators. Real-time updates using Web Sockets allow students to receive new lessons and notifications without refreshing the application. The platform also supports offline data caching and a mobile-first responsive design to ensure accessibility in low-bandwidth rural areas, improving student engagement and learning opportunities. <i>Keywords:</i> AI learning platform, MERN stack, Rural education, Educational chatbot, Digital learning system

Paper ID :	MCA-PG-3096
Title :	BERT-Driven Multi-Platform Contextual Sentiment Analysis Framework for Cross-Domain Review Intelligence
Authors:	Deepa Prasad, Ankita Bhosale , Rushikesh Chippa , Dr. Kapil Misal <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The increasing volume of online user-generated content has transformed how organizations evaluate customer feedback across digital platforms. This study introduces an AI-powered framework for contextual sentiment analysis of reviews gathered from sources such as Flipkart, YouTube, and Netflix. A key challenge involves handling unstructured data containing sarcasm, slang, emojis, and context-dependent expressions, which are often misinterpreted by traditional sentiment analysis techniques. To address these issues, the proposed system employs a BERT-based model capable of capturing deep contextual meaning through bidirectional text processing. The framework follows a structured workflow, including data collection, preprocessing, feature extraction, model fine-tuning, sentiment classification, and visualization. Reviews are categorized into Positive, Negative, and Neutral classes. Experimental results indicate that the proposed approach outperforms conventional models such as Naive Bayes, SVM, CNN, and LSTM in key evaluation metrics. Implemented using Flask, the system provides interactive dashboards, enabling organizations to extract actionable insights and improve customer satisfaction. <i>Keywords:</i> Contextual Sentiment Analysis, BERT, Natural Language Processing (NLP), Opinion Mining, Machine Learning

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Paper ID :	MCA-PG-3097
Title :	Confident-AI: Smart Interview Performance Analysis System
Authors:	Atharva Khulpe, Mayur Chavan, Prajwal Sawarkarc <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In the current hiring process, interviews play a major role in selecting suitable candidates. Although many individuals have strong subject knowledge, they often struggle to present themselves clearly due to nervousness and lack of confidence. In this project, we introduced Confident-AI, a web-based application that evaluates interview performance using both video and audio inputs. During a mock interview session, the system captures user responses through a webcam and microphone. The captured data is further processed to observe eye focus, facial reactions, clarity of speech, and the presence of filler words. Based on these observations, a confidence score is generated. <i>Keywords:</i> Interview evaluation; Confidence measurement; Artificial Intelligence; Speech behavior; Performance analysis

Paper ID :	MCA-PG-3098
Title :	DeepGuard: An Efficient Deepfake Video Detection Framework Using MesoNet-Based Deep Learning Architecture
Authors:	Yash Pawtekar, Rushikesh Patil , Rutuja Patil, Pramod Jadhao <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The increasing use of artificial intelligence for generating synthetic media has led to the widespread emergence of deepfake videos. These manipulated videos can imitate real individuals with high visual realism, creating serious concerns related to misinformation, identity misuse, and digital security. As deepfake generation techniques continue to evolve, identifying manipulated media has become more challenging for both human observers and automated systems. This research introduces DeepGuard, a lightweight deepfake detection framework developed using the MesoNet convolutional neural network architecture. The proposed system focuses on detecting intermediate-level visual inconsistencies that commonly appear in forged media during the synthesis process. The framework includes multiple stages such as frame extraction from videos, facial region detection, preprocessing, and classification using an optimized MesoNet model. By concentrating on subtle variations in facial textures and structural patterns, the model can effectively differentiate between genuine and manipulated content. The lightweight structure of the architecture ensures lower computational requirements while maintaining reliable detection performance. Experimental evaluation indicates that the proposed approach provides effective deepfake identification with improved processing speed compared to large deep learning models, making it suitable for real-time media verification and online content moderation systems. <i>Keywords:</i> Deepfake Detection, MesoNet, Convolutional Neural Networks, Digital Forensics, Media Authentication

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3099
Title :	AI-Powered Smart Policing and Crime Management System
Authors:	Aakansha Santosh Khedekar, Siddhi Nawale, Ishwari Patil, Faizan Khan <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Rising crime rates and the limitations of traditional policing have necessitated intelligent, technology driven law enforcement solutions. This paper presents an AI-Powered Smart Policing and Crime Management System (AISPCMS) — a full-stack web application developed using Flask (Python), MySQL, and machine learning that delivers role-based operational portals for Administrators, Police Officers, and Citizens. The system integrates crime prediction using a Long Short-Term Memory (LSTM) neural network, real-time geospatial hotspot detection through a kernel density estimation algorithm, an end-to-end First Information Report (FIR) management workflow, and a criminal suspect database with search capabilities. An interactive crime map rendered via Leaflet.js enables spatial situational awareness across all user roles. The system is evaluated using a hybrid dataset comprising five years of municipal crime records from Chicago and supplementary data from Pune, India, ensuring both model accuracy and real-world applicability. Experimental results demonstrate that the system achieves a 24-hour crime prediction accuracy of 91.4% and reduces average officer dispatch time by 37%, enhancing overall policing efficiency and enabling real-time citizen engagement. Keywords: Smart Policing; Crime Prediction; Machine Learning; LSTM; Hotspot Detection; FIR Management; Role-Based Access Control

Paper ID :	MCA-PG-3100
Title :	Early Eye Disease Detection Using AI and Retinal Image Processing
Authors:	Priyanka jadhav, Pranali Lavate, Prajakta Jadhav <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In the modern healthcare landscape, early detection of eye diseases is critical for preventing vision loss and improving patient outcomes. This paper presents an AI-based Eye Disease Detection System designed to analyze retinal fundus images and identify conditions such as diabetic retinopathy, glaucoma, and age-related macular degeneration. The system utilizes image processing techniques along with deep learning models such as Convolutional Neural Networks (CNN) and transfer learning approaches to classify retinal images accurately. Collected image data is preprocessed and analyzed to generate diagnostic insights through an interactive web-based platform. The proposed system provides automated detection, real-time analysis, and visual reporting, enabling early diagnosis even in low resource settings. The solution is scalable, cost-effective, and user-friendly, making it suitable for healthcare institutions and remote screening programs. It enhances diagnostic accessibility and supports proactive decision-making in ophthalmology. This research presents an Artificial Intelligence (AI)-based approach for early eye disease detection using retinal image processing techniques. The proposed system utilizes retinal fundus images as input and applies a series of preprocessing steps, including noise reduction, contrast enhancement, normalization, and image resizing, to improve image quality and ensure consistency. These enhanced images are then analyzed to extract significant features such as blood vessels, optic disc, macula, and lesion regions, which are crucial indicators of various eye diseases. Keywords: Eye Disease Detection; Retinal Image Processing; Artificial Intelligence; Deep Learning; CNN; Medical Imaging

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3101
Title :	AI-Based Smart Fall Detection System
Authors:	Mayuri Sanjay Dange, Pradny Gajare, Pratiksha Gandhale <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Falls are a common and serious problem, especially for elderly people living alone, patients in hospitals, and individuals with physical disabilities. If a fall is not detected quickly, it can lead to serious injuries and delays in medical help. This research proposes an AI-Based Smart Fall Detection System that can automatically detect when a person falls and immediately send alerts to caregivers or family members. The system uses Artificial Intelligence (AI) and machine learning techniques to monitor human movements through sensors or cameras. It is trained to recognize normal daily activities such as walking, sitting, lying down, or bending. When unusual movement patterns are detected, the system triggers an alert notification. For example, if an elderly person falls in a bathroom or a patient collapses, the system instantly informs caregivers. This ensures quick medical response. The system provides real-time monitoring, high accuracy, and fewer false alarms, improving safety and emergency support. <i>Keywords:</i> Fall Detection; Machine Learning; Smart Healthcare; Real-Time Monitoring; Emergency Alert System.

Paper ID :	MCA-PG-3102
Title :	Citizen Complaint & Issue Tracking System
Authors:	Smita pawar <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In many urban and rural areas of India, citizens face persistent difficulties in reporting civic issues such as potholes, garbage accumulation, streetlight failures, water leakage, and drainage problems to the concerned authorities. The traditional complaint management process is often manual, slow, paper-based, and fundamentally lacks transparency, accountability, and real-time tracking capabilities. Citizens have no mechanism to verify whether their complaints have been received, assigned, or resolved by the administration. This project, titled "Citizen Complaint & Issue Tracking System — A Web-Based Governance Support Platform", aims to bridge this gap by providing a centralized, secure, and efficient digital platform for civic issue management. The system enables citizens to register, submit categorized complaints across domains such as Road, Water, Electricity, and Sanitation, and track their resolution status in real time. An administrative module empowers authorities to view, manage, assign, and update complaint statuses efficiently. The backend is developed using Java 17 with the Spring Boot framework, incorporating Spring Security and JSON Web Token (JWT) authentication for secure stateless API access. Role-Based Access Control (RBAC) differentiates between CITIZEN and ADMIN users with distinct permissions. The frontend is developed using React.js with a component-based architecture and RESTful API integration. MySQL 8.x serves as the relational database with Hibernate/JPA for object-relational mapping. Input validation, global exception handling, and Swagger UI documentation are integrated for a production-quality implementation. The proposed system is scalable, user-friendly, and directly applicable to Municipal Corporations, Smart City Projects, Gram Panchayat digital services, college campus portals, and private society complaint management systems. It significantly improves governance responsiveness and citizen satisfaction through digital transformation of the complaint lifecycle. <i>Keywords:</i> Citizen Complaint Management, Issue Tracking System, Spring Boot, React.js, JWT Authentication

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3103
Title :	Secure authentication mechanisms in web applications using JWT and OAuth
Authors:	Anushka Arvind Desai, Aniket D. Talekar, Bhavesh S. Zalke <i>KJ Somaiya Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Secure authentication is a critical component of modern web applications, as increasing cyber threats demand reliable mechanisms to protect user data and system resources. This research paper focuses on implementing secure authentication mechanisms in web applications using JSON Web Tokens (JWT) and OAuth. JWT provides a compact and self-contained method for securely transmitting information between parties as a JSON object, enabling stateless authentication and efficient session management. OAuth, on the other hand, is an open authorization framework that allows secure third-party access to user resources without exposing sensitive credentials. The primary objective of this study is to analyze and implement a robust authentication system that enhances security, scalability, and performance in web applications. The proposed system integrates JWT for token-based authentication and OAuth for secure authorization workflows. Various security factors such as token validation, encryption, expiration control, and protection against common attacks such as token theft and replay attacks are considered during implementation. The results demonstrate that combining JWT and OAuth improves authentication efficiency while maintaining high security standards. The proposed approach enables developers to build scalable and secure web applications with reduced server load and improved user experience. This authentication model is suitable for modern distributed systems, APIs, and cloud-based applications. Keywords: Web Security, JSON Web Token (JWT), OAuth, Authentication, Web Applications

Paper ID :	MCA-PG-3104
Title :	Crop Disease Detection using Machine Learning and Image Processing Techniques
Authors:	Vinayak Rabhaji Khose, Prathamesh Mandlik, Aditya Navale , Faisal Khan, Pritish Bisne <i>KJ Somaiya Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The integration of deep learning and image processing in agriculture has significantly improved the identification, monitoring, and management of crop diseases. Traditional disease detection methods rely on manual inspection, which is time-consuming, less accurate, and requires expert knowledge. This study proposes an automated crop disease detection system using the MobileNetV2 architecture to enhance early diagnosis and support sustainable farming. A diverse dataset of crop leaf images covering five major crops—Tomato, Potato, Corn, Apple, and Grape—was used. Image preprocessing techniques such as resizing (224×224), normalization, and data augmentation were applied to improve model performance. Using transfer learning, the model achieved a classification accuracy exceeding 90%. Additionally, Grad-CAM visualization was implemented to improve model interpretability by highlighting disease affected regions. The system integrates a FastAPI backend and a Next.js frontend to enable real-time and scalable deployment. A unique contribution of this work is environmental monitoring, where weather data (humidity > 80% and temperature between 20°C–30°C) is used to trigger proactive alerts via Twilio SMS. The model is deployment-ready through TFLite and ONNX formats, making it suitable for edge devices. The results demonstrate that combining deep learning with environmental monitoring creates a scalable, real-time, and cost-effective solution for crop disease detection. Keywords: MobileNetV2, Crop Disease Detection, Deep Learning, Image Processing, Precision Agriculture, Grad-CAM

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Paper ID :	MCA-PG-3105
Title :	Digital Transformation and Marketing Evolution in the Software Industry
Authors:	Ajay Suresh Bhosale, Dr. Sajid Alvi <i>Dnyansagar Institute of Management and Research/Savitribai Phule Pune University, India</i>
Abstract:	The use of new technology in the form of artificial intelligence, cloud computing, big data analytics, and Internet of Things is transforming industries globally by reducing their reliance on conventional approaches and altering how people interact with each other, their jobs, and economic conditions. As a close relation of the Industry 4.0 paradigm, these technological innovations have greatly impacted the contribution of the software industry as a major facilitator of digital innovation in industries. With the growing use of digital solutions by organizations to enhance their efficiency, productivity, and competitiveness, software vendors are required to tailor their marketing strategies in order to deliver the complex technological value propositions in the most appropriate manner. The paper will discuss how the marketing environment of the software industry has been changing with the emergence of digital transformation. It looks at the change of traditional product-oriented marketing techniques to more integrated solutions and value-oriented marketing techniques. The research points to the new trends of digital engagement, ecosystem engagements, platform-based services, and data-driven customer relationship management. In addition, it speaks about the difficulties of software firms to position and promote digital transformation solutions in a fast-paced technological world. The article offers abstract knowledge on the connection between digital change and marketing change, which is added to the existing discussion of strategic marketing practices in the digital economy. <i>Keywords:</i> Digital Transformation, Software Industry, Marketing Strategy, Industry 4.0, Digital Marketing Evolution.

Paper ID :	MCA-PG-3106
Title :	AI-Based Cloud Monitoring System with CI/CD Pipeline
Authors:	Ajay kokate, Akash Khabale, Akshata Kamble <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Modern cloud environments host critical applications that require continuous monitoring and high availability. Traditional monitoring systems frequently struggle to detect anomalies in real time or adapt to dynamic workloads. To address this, we propose an AI-driven cloud monitoring system integrated directly with a Continuous Integration and Continuous Deployment (CI/CD) pipeline. This framework enhances the reliability, automation, and overall performance management of cloud infrastructures. By analyzing system logs, performance metrics, and resource utilization data using machine learning, the system anticipates issues rather than merely reacting to them. Techniques such as Isolation Forest anomaly detection and LSTM predictive analytics allow the system to identify unusual patterns and forecast potential failures, generating proactive alerts before service disruptions occur. Furthermore, integration with a CI/CD pipeline automates the testing, building, and deployment of both monitoring components and model updates. This significantly reduces manual intervention, lowers the Mean Time to Recovery (MTTR), and ensures continuous software delivery in containerized cloud setups. <i>Keywords:</i> AI, Cloud Monitoring, CI/CD Pipeline, Anomaly Detection, Predictive Analytics, Kubernetes, AIOps.

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Paper ID :	MCA-PG-3107
Title :	Adaptive Traffic Prediction Model Using KNN and Cross-City Transfer Learning
Authors:	Rohit Deepak Denge, Chirag Sham Deshmukh , Dr. K. K. Misal <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Traffic jams have been a serious problem in fast-developing cities, which causes elongated journey times and higher fuel usage along with environmental contamination. This problem can be solved by accurate traffic prediction systems that help in better management of the traffic and well informed travel decisions. In this study, we propose an Adaptive Traffic Prediction Model that is based on K-Nearest Neighbor (KNN) algorithm and cross-city transfer learning methods. Real-time traffic data is collected from public APIs and environmental conditions like temperature, weather are also taken into account. The model predicts traffic density and congestion levels at various locations by integrating historical and real-time data. KNN Algorithm is a supervised machine learning algorithm that helps to detect similar traffic patterns based on past information to give reliable predictions. Moreover, Transfer Learning across cities will enhance prediction accuracy by learning experience from other cities having significant data. <i>Keywords:</i> Traffic Flow Prediction; Machine Learning; KNN Algorithm; Real-Time Traffic Monitoring; Cross-City Transfer Learning

Paper ID :	MCA-PG-3108
Title :	Analysis of Agricultural Drones for Fertilizer Spraying in Smart Farming
Authors:	Akshad Arun Walunj, Sumit Wagh, Yogesh Sakunde <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The modernization of agriculture through intelligent systems and unmanned aerial vehicles is critical for addressing global food security and resource optimization. However, the adoption of precision farming technologies in developing regions is often hindered by significant linguistic barriers and low digital literacy among rural populations. This study investigates the integration of an advanced, artificial intelligence-driven multilingual chatbot module into the SG Agro smart farming platform. By transitioning the existing React.js and ASP.NET Core architecture to a mobile-first ecosystem, the system incorporates the Grok Large Language Model via an advanced Retrieval-Augmented Generation framework. Furthermore, the architecture leverages the Bhashini application programming interface for highly accurate Marathi and English speech-to-text processing, mitigating input challenges for smallholder farmers. Experimental investigations utilizing a dataset of real-world agricultural queries demonstrate that the Grok-powered module achieves high contextual accuracy and minimal latency. The integrated unmanned aerial vehicle scheduling system resulted in a twenty-five percent reduction in fertilizer usage and a forty percent decrease in operational time. <i>Keywords:</i> Agricultural Chatbot; Grok LLM; Precision Farming; Smart Agriculture; Unmanned Aerial Vehicles

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Paper ID :	MCA-PG-3109
Title :	AI-Based Mental Wellness Detection and Recommendation System
Authors:	Pranali B. Waghmare, Priya R. Wagh, Vinod T. Dikonda <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Mental health has become a critical concern in modern society due to increasing academic, professional, and social pressures. Early detection of stress and mental health issues is essential for maintaining overall well-being. This paper presents an AI-based Mental Wellness Detection and Recommendation System designed to assess users' mental health through structured questionnaires. The system provides two levels of assessment: a quick free test for basic stress estimation and a detailed main test for comprehensive analysis. Based on user responses, the system calculates a stress score and classifies it into categories such as Stable, Mild Stress, Moderate Stress, and High Stress. The application also maintains user history and visualizes stress trends. Additionally, for higher stress levels, the system recommends nearby mental health clinics. The system is developed using Python, Django, HTML, CSS, and machine learning techniques, offering a scalable and user-friendly platform for mental health awareness and early intervention. <i>Keywords:</i> Mental Health; Stress Detection; Machine Learning; Healthcare System; Web Application

Paper ID :	MCA-PG-3110
Title :	WIFIORA: AI-Powered Wi-Fi Range and Presence Intelligence System
Authors:	Vaishnavi Viishwanath Jadhao, Samiksha Krushna Zalke, Vishwajeet Vedpathak <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	WIFIORA is an AI-based system designed to monitor and improve Wi-Fi network performance in real time. It checks Wi-Fi signal strength using RSSI (Received Signal Strength Indicator), and measures internet speed such as download, upload, and ping. The system can also detect whether users or devices are present within the Wi-Fi range. Unlike normal tools that perform only one task, WIFIORA combines network monitoring, presence detection, and an AI chatbot in one platform. The chatbot helps users by answering questions and giving suggestions to fix network problems. The system also provides a simple dashboard to show network data and highlight weak signal areas. This helps users and administrators understand network performance and improve connectivity. <i>Keywords:</i> Wi-Fi Monitoring, Presence Detection, AI Chatbot, Network Performance, Internet Speed

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3111
Title :	Examining an AI-Based Seat Allotment Prediction Tool for Engineering Admissions in Maharashtra
Authors:	Atul Ambadas Khade, Manav Suresh Pachurkar, Rajashree Hanumant Naik <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Choosing the right engineering college shapes a student's career, yet the data required to make that choice wisely is locked away. Walk into any junior college in Maharashtra during June and you will find at least a dozen students hunched over printed CAP round PDFs with highlighters, trying to decode which colleges are 'safe' for their particular score and category combination. It is genuinely painful to watch because the data is all right there — every college, every branch, every cutoff — but it is presented in a format that requires patience most stressed 17-year-olds simply do not have at that moment. The paper under review here recognises this situation and proposes a web-based tool to handle the PDF reading automatically, store the cutoffs in a database, and let students check where their score stands. We read it hoping to find something worth recommending widely. Instead we found a tool that works via three if-else conditions and calls itself AI in the title. No training happened anywhere. No accuracy testing was done. Reservation categories — the single most important axis of Maharashtra admissions — do not appear in the design at all. This paper goes through all of it: what works, what does not, and concretely what would have to change for this to be something peer reviewers accept without hesitation. Keywords: Engineering College Admissions; Cutoff Score Prediction; PDF Table Extraction; Maharashtra CAP; Educational Recommendation; Data-Driven Guidance; Supervised Learning

Paper ID :	MCA-PG-3112
Title :	AI-Powered Smart Contract Analyzer and Risk Handler
Authors:	Dhruv Pashamallu, Shardul Ingle, Aakash Gopal Meghavath, Govind Janjire Manohar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's world, contracts play a major role in regulating business contracts and obligations across multiple industries, but due to the complexity and difficult legal language make them difficult to review those contracts. Contracts play a critical role in defining obligations and regulating business operations across various industries. However, the complex structure and legal terminology of contracts make manual review a challenging, time-consuming, and error-prone process. These difficulties may lead to financial losses, legal disputes, or reputational risks for organizations. To address these challenges, this research proposes AI-Powered Smart Contract Analyzer, an intelligent contract analysis and risk-scanning web application designed to automate and enhance the contract review process. The proposed system utilizes Natural Language Processing (NLP), Machine Learning techniques, and modern web technologies to analyse legal documents efficiently. It automatically extracts contract clauses, identifies potentially high-risk clauses, generates simplified plain-English summaries, and validates clauses against predefined industry standards. Additionally, the system integrates a chatbot that enables users to ask questions and receive real-time responses related to the analysed contract. By leveraging transformer-based language models, ensemble learning methods, and retrieval-augmented generation techniques, the proposed approach improves the accuracy, interpretability, and efficiency of contract analysis. The system aims to support organizations in making faster and more reliable contract assessments while reducing the risks associated with manual contract review. Keywords: Contracts, Reputation, NLP, ML, Web technologies, Chatbot, transformer-based model

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3113
Title :	Stock Market Prediction using Sentiment Analysis and Machine Learning
Authors:	Vishal Kailas Gayke, Hase Pooja Vijay, Gharatkar Khadija Asif <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The stock market is an important part of the financial system where investors buy and sell shares of companies. Predicting stock prices is difficult because market movements are affected by many factors such as economic conditions, company performance, global events, and investor behavior. This project presents a study of stock market trends using machine learning, data analytics, and sentiment analysis techniques. The main aim of this project is to analyze historical stock market data and identify patterns that can help in understanding market behavior. Data analytics methods are used to process and examine large volumes of financial data, including stock prices, trading volume, and past market trends. Machine learning algorithms are then applied to learn from this data and build models that can help in predicting possible future price movements. In addition, sentiment analysis is used to study opinions and expressed in financial news related to the stock market. <i>Keywords:</i> Stock Market Prediction; Machine Learning; Sentiment Analysis ; Financial Data Analytics; Artificial Intelligence in Finance.

Paper ID :	MCA-PG-3114
Title :	The Evolution of software Engineering with AI tools
Authors:	Vaibhav Mahangare , Prathmesh Mahangare, Nital Kanawade <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The integration of Artificial Intelligence (AI) into software engineering is precipitating a paradigm shift from traditional methodologies towards AI-augmented and autonomous systems. This research investigates the current impact, challenges, and future trajectory of AI tools within the software development lifecycle (SDLC). Utilizing a mixed-method approach—including a survey of 200 IT professionals and students, qualitative interviews with experts, and secondary data analysis—the study evaluates AI's role in code generation, bug detection, testing, and project management. Findings indicate significant improvements in developer productivity and code quality, with tools like GitHub Copilot demonstrably accelerating coding tasks. However, critical challenges persist, including security vulnerabilities in AI-generated code, ethical concerns like algorithmic bias, and a trust deficit among developers. The study concludes that AI is not a replacement for human engineers but a powerful collaborator. The future of software engineering hinges on developing robust frameworks for human-AI collaboration, enhancing the transparency and reliability of AI tools, and upskilling the workforce to thrive in this new ecosystem. <i>Keywords:</i> AI; AI tools; Software Engineering; code generation; Software Development Lifecycle

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Paper ID :	MCA-PG-3115
Title :	Multimodal and Explainable Fake News Detection System Using Deep Learning
Authors:	Surekha Jadhav, Vishranti Kadam, Nikhil Mali <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's digital world, the spread of fake news has become a serious issue, especially on social media platforms where information travels very quickly. False information can mislead people, influence opinions, and create confusion in society. Because manual verification of news is slow and difficult, there is a need for automated systems that can detect fake content efficiently. This research proposes a multimodal fake news detection system that analyzes both text and images using deep learning techniques. Unlike traditional methods that focus only on text, this system examines the relationship between written content and visual elements to improve detection accuracy. The model processes data through feature extraction, combines information from different sources, and classifies the news as real or fake. Additionally, explainable AI methods are used to provide clear reasons behind the model's predictions, making the system more transparent and trustworthy. The results show that the proposed approach performs better than single-modality systems and can be useful for real-world applications. Keywords: Fake News Detection, Deep Learning, Natural Language Processing, Explainable AI, Multimodal Learning

Paper ID :	MCA-PG-3116
Title :	Learning Analytics and Student Success Prediction System
Authors:	Devanshu Kishor Wankhade, Harshal Narayan Yeole, Yash Sharad Patil <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In the modern education system, a large volume of student data is generated through academic activities such as examinations, assignments and attendance records. However, this data is often not used properly in improving student outcomes. This study presents a learning analytics system that applies machine learning techniques, including Random Forest and Logistic Regression, to analyze student performance and predict academic success. The system processes key features such as attendance, internal marks, and assignment scores to classify students pass or fail and calculate their risk level on a scale of 0–100%. Additionally, clustering methods are used to group students into categories like high performers, average learners and at risk students. The results are presented through an interactive dashboard, enabling educators to identify struggling students early and take corrective actions, thereby enhancing overall academic performance. Keywords: Learning Analytics; Student Performance Prediction; Machine Learning; Educational Data Mining; Student Success

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3117
Title :	Vision-Based Multi-Task Learning for Automated Animal Breed Identification and Health Risk Prediction.
Authors:	Sakshi Wagh, Sakshi Kakade, Sakshi Pachpor <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This research presents an automated diagnostic framework that utilizes image-based analysis to identify animal breeds, estimate age, and assess potential health risks. To overcome the inconsistencies and slow pace of manual observation, this study leverages deep learning architectures, specifically Convolutional Neural Networks (CNNs) and ResNet-based transfer learning. By extracting sophisticated visual features, the system automates classification and generates predictive insights into an animal's physiological state. Preliminary results demonstrate that this computational approach significantly outperforms traditional methods in both speed and precision, offering a robust tool for data-driven decision making in veterinary and agricultural settings. <i>Keywords:</i> AI, Deep Learning, CNN, Animal Breed Recognition, Health Prediction

Paper ID :	MCA-PG-3118
Title :	Citizen Complaint & Issue Tracking System
Authors:	Smita pawar, Amar Shewalkar, Monika Shinde <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In many urban and rural areas of India, citizens face persistent difficulties in reporting civic issues such as potholes, garbage accumulation, streetlight failures, water leakage, and drainage problems to the concerned authorities. The traditional complaint management process is often manual, slow, paper-based, and fundamentally lacks transparency, accountability, and real-time tracking capabilities. Citizens have no mechanism to verify whether their complaints have been received, assigned, or resolved by the administration. This project, titled "Citizen Complaint & Issue Tracking System — A Web-Based Governance Support Platform", aims to bridge this gap by providing a centralized, secure, and efficient digital platform for civic issue management. The system enables citizens to register, submit categorized complaints across domains such as Road, Water, Electricity, and Sanitation, and track their resolution status in real time. An administrative module empowers authorities to view, manage, assign, and update complaint statuses efficiently. The backend is developed using Java 17 with the Spring Boot framework, incorporating Spring Security and JSON Web Token (JWT) authentication for secure stateless API access. Role-Based Access Control (RBAC) differentiates between CITIZEN and ADMIN users with distinct permissions. The frontend is developed using React.js with a component-based architecture and RESTful API integration. MySQL 8.x serves as the relational database with Hibernate/JPA for object-relational mapping. Input validation, global exception handling, and Swagger UI documentation are integrated for a production-quality implementation. The proposed system is scalable, user-friendly, and directly applicable to Municipal Corporations, Smart City Projects, Gram Panchayat digital services, college campus portals, and private society complaint management systems. It significantly improves governance responsiveness and citizen satisfaction through digital transformation of the complaint lifecycle. <i>Keywords:</i> Citizen Complaint Management, Issue Tracking System, Spring Boot, React.js, JWT Authentication, Role-Based Access Control, Spring Security, MySQL, Hibernate/JPA, Smart Governance, REST API, Web Application, Digital Governance

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-PG-3119
Title :	AI Authenticity Watermarker for Generative Media
Authors:	Snehal subhash wakade, Sakshi Yadav, Sejal Kakade <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid advancement of generative artificial intelligence has enabled the creation of highly realistic synthetic media, raising serious concerns related to misinformation, deepfakes, and digital trust. This paper proposes an AI-based authenticity watermarking system designed to embed and detect invisible digital watermarks in generative media. The proposed system integrates deep learning-based classification with digital watermarking techniques to ensure content authenticity and traceability. A Convolutional Neural Network (CNN) model is trained on labeled datasets consisting of watermarked and non-watermarked images. Additionally, frequency-domain analysis using Fast Fourier Transform (FFT) is employed for artifact detection in cases where watermark information is absent. The system is evaluated using metrics such as accuracy, PSNR, and SSIM. Experimental results demonstrate that the proposed approach achieves high detection accuracy while maintaining visual quality. This framework contributes toward enhancing trust and security in AI-generated content. <i>Keywords:</i> Generative AI; Digital Watermarking; Deep Learning; Media Authentication; Deepfake Detection

Paper ID :	MCA-PG-3120
Title :	Design and Implementation of Adaptive AI NPCs in Unity Using Reinforcement Learning
Authors:	Yash Sonawane, Rohan Yadav, Sumit Ugale <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This project focuses on creating smart and adaptive AI characters, known as non-player characters (NPCs), in Unity using reinforcement learning. NPCs play an important role in making games interactive and engaging, as they must make intelligent decisions based on their environment. The main objective of this work is to develop NPCs that learn from their actions, improve over time, and respond effectively to different situations in a game Environment. Unity is used to build the simulation environment and design AI NPC agents that learn through reward-based training using the ML-Agents toolkit and the Proximal Policy Optimization (PPO) algorithm. Key factors such as reward design, state observation, exploration strategy, and training duration are evaluated. The results show that reinforcement learning-based NPCs adapt better and demonstrate more realistic behavior compared to traditional scripted NPCs. This study highlights the effectiveness of Unity ML-Agents in developing adaptive AI NPCs and its potential applications in intelligent game environments and interactive simulations. <i>Keywords:</i> AI NPC, Unity, Reinforcement Learning, Game AI, Adaptive Behavior, PPO

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Paper ID :	MCA-PG-3121
Title :	A Multimodal Deep Learning Framework for Enhancing Communication and Mental Health Monitoring in Neurodivergent Individuals
Authors:	Ashish Badriprasad Vishwakarma, Dhanraj R. Sonawane, Mohammed Kaif I. Syed , Prof. Monika Shinde <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This study investigates the potential of employing advanced deep learning methodologies, specifically leveraging Vision Transformer (ViT) models, to develop an integrated automated Framework for the intelligent classification of communications gestures and mental health states. The research focuses on three critical domains: Sign language recognition for accessibility, early Early autism screening through behavioural patterns, and depression detection via facial and vocal cues. Traditionally, the detection and classification of such complex human behaviours involve manual analysis, which is resource-intensive and susceptible to oversight. By transforming multimodal system data into visual representations, the proposed ViT-based analysis offers a scalable and resilient solution for real-time monitoring. The framework aims to enhance diagnostic accuracy and provide a proactive capability for supporting neurodivergent individuals and mental health management. Keywords: Sign Language Recognition; Autism Detection; Depression Monitoring; Vision Transformers; Multimodal Deep Learning.

Paper ID :	MCA-PG-3122
Title :	Real-Time Chat Application integrated with Large Language Model (LLM) capabilities
Authors:	Hemant Kamthe, Nikhil Solankar, Purvesha Dhake <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Modern communication platforms are increasingly incorporating intelligent features to improve user interaction and efficiency. This work presents the design and development of a real-time chat application enhanced with Large Language Model (LLM) functionality, enabling both user-to-user and user-to-AI communication within a single system. The application is built using a full-stack framework, with Next.js handling the frontend, Node.js and Express managing backend operations, and MongoDB serving as the database. To deliver responsive AI interactions, Server-Sent Events (SSE) are employed to stream generated responses incrementally, minimising perceived delays. The system incorporates secure authentication using JSON Web Tokens (JWTs) along with bcrypt-based password hashing. Additionally, chat history is persistently stored, and token usage is monitored to optimise computational resources. The platform features a responsive interface using Tailwind CSS and supports Markdown rendering for improved readability. The resulting system demonstrates practical applicability in domains such as virtual assistance, customer service, and digital learning environments. Keywords: Real-Time Chat Application, Large Language Model (LLM), Server-Sent Events (SSE), Full-Stack Development, AI Integration.

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Paper ID :	MCA-PG-3123
Title :	Smart Energy Management System (SEMS) for Educational Institutions
Authors:	Prachi Pimpalkar, Priti Petkar, Prajakta Harer <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Energy consumption in residential environments is increasing rapidly, making efficient management essential. This project presents a Smart Energy Management System (SEMS) that uses machine learning to predict energy usage and provide actionable suggestions to reduce unnecessary consumption. A regression model is trained on real-world appliance energy data along with environmental factors such as temperature and humidity. The system also includes a web-based dashboard that allows users to view predictions and monitor trends. The model achieved moderate accuracy, which is expected due to the variability of real-world energy usage patterns. Overall, the system demonstrates how AI can assist in optimizing energy consumption in a practical and user-friendly way. <i>Keywords:</i> Smart Energy Management; IoT; Machine Learning; Load Prediction; Energy Optimization

Paper ID :	MCA-PG-3124
Title :	Design and Analysis of an AI-Driven Student Lifestyle Monitoring and Productivity Enhancement System
Authors:	Muzammil Shaikh, Bilal Shaikh, Pramod Jadhao <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The application of Artificial Intelligence and data analytics in student behavioral pattern analysis and learning outcome enhancement is on the rise. However, most of the existing systems are limited to analyzing student academic performance in terms of grades and LMS interactions, whereas student lifestyle factors such as sleeping habits, screen time, and study routines are not adequately analyzed. The research proposes an Artificial Intelligence-based student lifestyle monitoring and productivity enhancement system that analyzes student behavioral and lifestyle patterns to enhance their productivity. The proposed system collects data on various factors such as study sessions, screen time, sleeping habits, and student lifestyle routines. Using data analytics and machine learning techniques, the system analyzes student behavioral trends and productivity patterns. The system provides personalized recommendations to students on how to enhance their productivity and lifestyle by analyzing the data collected on student behavioral patterns. <i>Keywords:</i> Artificial Intelligence, Student Productivity Analytics, Lifestyle Monitoring, Behavioral Data Analysis

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Paper ID :	MCA-PG-3125
Title :	An Intelligent System for Heart Disease Prediction using Machine Learning
Authors:	Zayed Sheikh, Saif Shaikh, Pramod Jadhao <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Heart disease is one of the leading causes of mortality worldwide, making early prediction essential for effective treatment and prevention. This research presents a machine learning-based approach for predicting the likelihood of heart disease using patient health parameters such as age, cholesterol level, blood pressure, and heart rate. Various supervised learning algorithms including Logistic Regression, Decision Tree, and Random Forest are implemented and compared to determine the most accurate model. The dataset used for this study is obtained from publicly available sources and is preprocessed to handle missing values and improve data quality. The performance of each model is evaluated using accuracy, precision, recall, and F1-score. Experimental results indicate that the Random Forest algorithm achieves higher accuracy compared to other models. The proposed system can assist healthcare professionals in early diagnosis and decision-making, thereby reducing the risk of severe heart conditions <i>Keywords:</i> Heart Disease Prediction, Machine Learning Algorithms, Classification, Healthcare Data, Predictive Analysis, Medical Diagnosis

Paper ID :	MCA-PG-3126
Title :	Behavioural Analytics-Driven Churn Prediction System Using Hybrid Machine Learning Models
Authors:	Prathamesh Deepak Gawande, Aditya Dhage , Dhanashri Gavatre <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Customer churn is one of the most critical problems faced by organizations in industries such as telecommunications, banking, and e-commerce. Identifying customers who are likely to discontinue services enables businesses to implement effective retention strategies. This project proposes a Behavioural Analytics-Driven Churn Prediction System using Hybrid Machine Learning Models to accurately predict potential customer churn. The system analyzes customer behavioural data including service usage patterns, transaction history, engagement metrics, and complaint records. The framework includes data preprocessing, feature engineering, behavioural pattern analysis, model training, and prediction visualization. A hybrid machine learning approach combining Random Forest, Gradient Boosting, and Logistic Regression is used to improve prediction accuracy and robustness. Experimental results demonstrate that hybrid models outperform traditional single-algorithm approaches in churn prediction tasks. The system also provides visualization dashboards for business insights, helping organizations make data-driven retention decisions and reduce revenue loss. <i>Keywords:</i> Contextual Sentiment Analysis, BERT, Natural Language Processing (NLP), Opinion Mining, Machine Learning ;

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-RS-3127
Title :	Detection and classification of Diabetic Retinopathy: Survey Paper
Authors:	Swati B. Dhadake, Akanksha kulkarni <i>Symbiosis Institute of Technology, Pune, India</i>
Abstract:	Diabetic Retinopathy (DR) is a prevalent cause of visual impairment and blindness among diabetic patients. For successful medical treatment the classification and detection of DR are significant. In recent years, for DR diagnosis using computer -aided systems deep learning and machine learning have greatly enhanced. But issues like data drift, unbalanced datasets, and catastrophic forgetting in conventional models still exist. This survey for DR detection and classification, with emphasis on deep learning models, feature extraction methods, and incremental learning methods. We review several studies for DR classification that use Convolutional Neural Networks (CNNs), Support Vector Machines (SVMs). To solve the model adaptability and continual learning we also review new incremental learning methods like Elastic Weight Consolidation and learning without forgetting. A comparative examination of these methods emphasizes their limitations and advantages based on accuracy, sensitivity, and specificity. The importance of adaptive learning schemes and enhanced dataset finally provide directions for future work to improve the robustness and generalizability of DR detection models. Keywords: Diabetic Retinopathy, Deep Learning, Machine Learning, Incremental Learning, Feature Extraction, Convolutional Neural Networks, Transfer Learning, Medical Image Analysis, Elastic Weight Consolidation, learning without Forgetting.

Paper ID :	CSIT-RS-3128
Title :	Multimodal AI Frameworks for Personalized Mental Health Interventions: Integrating Voice, Text, and Biometric Data for Real-Time Crisis Detection
Authors:	Nikhil Vaidya, Lakhan Sagale <i>KJEMI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The contemporary mental health landscape is characterized by an escalating global crisis, with over one billion individuals living with a mental disorder and suicide persisting as a leading cause of death among youth.¹ Traditional digital interventions, primarily unimodal chatbots relying on rule-based logic or text-only sentiment analysis, have demonstrated significant limitations in detecting acute crises or providing personalized care that mirrors clinical intuition.³ This research proposes a novel multimodal AI framework that integrates textual data from Large Language Models (LLMs), vocal prosody through advanced acoustic encoders, and real-time biometric streams from wearable devices. By leveraging a Transformer-based fusion architecture with a proposed Semantic-Prosodic Synchronicity (SPS) contrastive learning objective, the framework aims to bridge the "cognitive-affective gap" observed in current generative AI systems.⁵ Preliminary simulations using augmented clinical datasets such as DAIC-WOZ and the Global Mental Health Dataset 2025 suggest a 15% increase in F1-score for crisis prediction compared to unimodal baselines.⁶ Furthermore, the framework incorporates federated learning with differential privacy to address the stringent confidentiality requirements of psychiatric data.⁸ These advancements offer a scalable infrastructure for real-time telehealth, enabling proactive rather than reactive mental health support in high-stakes clinical contexts. Keywords: Multimodal Artificial Intelligence in Mental Health, Crisis Prediction using Large Language Models, Semantic-Prosodic Synchronicity (SPS), Transformer-based Multimodal Fusion, Federated Learning with Differential Privacy

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Paper ID :	CSIT-RS-3129
Title :	Path Connectivity and Eulerian Paths on Space-Time Manifolds
Authors:	Dr Haloli H G <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This paper explores the concepts of path connectivity and Eulerian paths within the framework of space-time manifolds. Path connectivity, a fundamental notion in topology, is examined in the context of differentiable manifolds used in modern physics. We then extend graph-theoretic ideas—specifically Eulerian paths—into continuous and discretized models of space-time. The interplay between topology, geometry, and combinatorial structures provides insight into both mathematical theory and physical interpretations, particularly in relativity and quantum gravity <i>Keywords:</i> Manifold, Graph, Connectivity, space-time manifold, Topology, Eulerian Paths, Networks in space–time .Machine Learning]

Paper ID :	CSIT-RS-3130
Title :	An Intelligent Multi-Layered Cyber Security Framework for Intrusion Detection Using Machine Learning and Adaptive Threat Analytics
Authors:	Mrs. Salma Tainur Shaikh, Mrs. Ashwini V. Bhosale , Ms. Trupti M. Bhosale <i>Tuljaram Chaturchand College of Arts, Science & Commerce, Baramati, Pune, India</i>
Abstract:	The exponential growth of cloud computing, Internet of Things (IoT), edge computing, and distributed enterprise architectures has significantly expanded the cyber-attack surface. Traditional cybersecurity mechanisms such as firewalls and signature-based intrusion detection systems (IDS) are increasingly inadequate against sophisticated cyber threats, including zero-day exploits, polymorphic malware, advanced persistent threats (APT), and ransomware campaigns. This study proposes a comprehensive multi-layered cybersecurity framework integrating anomaly-based intrusion detection, supervised machine learning classification, adaptive threat analytics, and real-time response orchestration. The proposed framework operates across four security layers: network traffic acquisition, feature extraction and normalization, machine learning-based threat classification, and automated mitigation response. Support Vector Machine (SVM), Logistic Regression, and Decision Tree algorithms are evaluated using benchmark datasets such as NSL-KDD. Experimental analysis demonstrates that the optimized SVM model achieves 94.6% detection accuracy with a false positive rate below 3.1%, outperforming traditional signature-based systems. The proposed model enhances scalability, adaptability, and resilience in modern cyber environments. <i>Keywords:</i> Cyber Security, Intrusion Detection System, Machine Learning, Network Anomaly Detection, Zero-Day Attacks

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Paper ID :	CSIT-RS-3131
Title :	MedNexus:- A web based Platform for Clinical Data Analysis
Authors:	Dr. Swagat Sadashiv Ebhad, Dr.Vijay Agatrao Galande, Prof. Aleem U.V., Prof. Akshay Changle <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The rapid growth of healthcare data has created a need for efficient systems to manage, analyze, and interpret clinical information. This paper presents MedNexus, a web-based platform designed for clinical data analysis, visualization, and decision support. The system integrates electronic health records (EHR), applies data mining techniques, and provides real-time insights for healthcare professionals. The platform aims to improve clinical decision-making, optimize patient outcomes, and support medical research through scalable and secure architecture. The proposed model leverages cloud computing, big data analytics, and intuitive web interfaces to ensure accessibility and efficiency. <i>Keywords:</i> Clinical Data Analysis, Web-Based Platform, Healthcare Informatics, Data Mining, EHR, MedNexus

Paper ID :	CSIT-RS-3132
Title :	Towards Transparent and Trustworthy AI in Dermatology: A Review of Explainable Models for Skin Cancer Diagnosis and Clinical Integration
Authors:	Prof.Sumaira Anjum Shaikh, Dr.P.R.Patil, Prof.Aanadkumar Rao <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This Prompt diagnosis of skin cancer is key to enhanced outcome and survival rates in patients. Despite the extensive application of medical imaging to dermatological diagnosis, skin lesions are difficult to interpret because of overlap of visual appearances and poor quality of the image. Recent developments in DL, specifically, convolutional neural networks (CNNs) have greatly enhanced the segmentation, classification, and detection of lesions in patients and provided clinicians with a quicker and more efficient decision support. The review provides the overview of the state of the art DL models to skin cancer diagnosis and the discussion of how the preprocessing approach, augmentation mechanisms, and network architecture affect the performance of skin cancer models. Much-publicized datasets like HAM10000 and ISIC are noted as being of great significance in model training and benchmarking. Bibliometric search of 1,697 Scopus-indexed articles in 2019-24 reveals a consistent increase in the amount of research worldwide, and especially in dermatology-oriented groups. Although there has been high advancement, there are still issues of diversity in datasets, model interpretability, and clinical application in reality. Recommendations on future directions to increase the robustness, transparency, and clinical adoption. <i>Keywords:</i> Deep learning, convolutional neural networks, skin cancer, medical imaging, segmentation, classification.

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Paper ID :	CSIT-RS-3133
Title :	Context-Aware Abnormal Event Detection via Adaptive CNN-LSTM Networks for Intelligent Transportation
Authors:	Balbhim L.Lanke, Sana D.Khan <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Abnormal Event Detection (AED) is a critical component of modern intelligent transportation infrastructure and urban surveillance. While deep learning models have achieved state-of-the-art results, many rely on static thresholds that fail to adapt to dynamic environmental contexts, leading to high false-alarm rates. This paper proposes a novel context-aware adaptive CNN-LSTM framework that dynamically adjusts anomaly detection thresholds. By integrating spatial features from a pre-trained ResNet-50 with the temporal modeling capabilities of Long Short-Term Memory (LSTM) networks, our system learns complex behavioral patterns. Unlike conventional methods, we introduce a statistical reconstruction error distribution model to compute a dynamic threshold $\tau(t)$. Experimental results on the UCSD Ped2 and Avenue datasets demonstrate an F1-score of 92.8%, outperforming baseline models. The framework's efficacy is further validated in intelligent transportation scenarios, including illegal driving and pedestrian violations. Keywords: Abnormal Event Detection, Deep Learning, Adaptive Thresholding, Intelligent Transportation Systems (ITS), Spatio-Temporal Modeling.

Paper ID :	CSIT-RS-3134
Title :	Secure Collaborative Intelligence: A Systematic Review of Privacy-Preserving Federated Learning Techniques, Attacks, and Future Research Directions
Authors:	Pranali Awate, Sumedha Patil, Pramila Mate, Dhanashri Dhawale, Sharmila Dhamal <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Federated learning has emerged as a promising paradigm for collaborative machine learning without centralizing sensitive data. Despite its advantages, recent studies show that federated learning systems remain vulnerable to privacy leakage through gradient inversion, membership inference, and model reconstruction attacks [5], [12]. To mitigate these risks, several privacy-preserving mechanisms have been proposed including differential privacy, homomorphic encryption, secure multi-party computation, and secure aggregation protocols [3], [4], [2]. This review systematically analyses recent literature focusing on privacy protection in distributed machine learning environments. The study classifies existing techniques based on privacy mechanisms, evaluates them using datasets and performance metrics, and identifies research challenges such as scalability, communication overhead, and model accuracy trade-offs. A taxonomy of privacy-preserving federated learning approaches is presented along with a comparative analysis of forty representative studies. Furthermore, open research challenges and future directions are discussed to guide the development of robust privacy-preserving federated learning systems for healthcare analytics, financial fraud detection, cybersecurity monitoring, and Internet of Things applications. Keywords: Federated Learning; Privacy-Preserving Machine Learning; Differential Privacy; Homomorphic Encryption; Secure Multi-Party Computation.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-RS-3135
Title :	AI-Driven Cybersecurity Enhancement via Machine Learning for Anomaly Detection using Behavioral Analytics
Authors:	Hina Naaz, Dr. Reema Ajmera <i>Nirwan University, Jaipur, Rajasthan, India</i>
Abstract:	User-generated cyber threats are increasingly critical due to unpredictable behavioral patterns within network systems. Although several techniques have been developed to detect variations in user behavior, existing models often lack robustness, reliability, and accuracy. To address these limitations, this paper proposes a TL-CsLeNet (Transfer Learning based Customized LeNet) model for effective anomaly detection. The proposed framework consists of three stages: preprocessing using Slice Adaptive Sigmoid Z-score normalization, feature extraction using Higher Order Statistical (HOS), raw data, Mutual Information (MI), and MDE-IG features, and anomaly detection using the TL-CsLeNet model. The model efficiently captures complex behavioral patterns and enhances classification performance. Experimental results demonstrate that the proposed approach achieves a maximum accuracy of 98% on 90% dataset size, outperforming conventional methods. The results confirm the model's effectiveness, scalability, and suitability for real-time cybersecurity applications. <i>Keywords:</i> Anomaly Detection; TL-CsLeNet; Cybersecurity; Machine Learning; Behavioral Analytics

Paper ID :	CSIT-RS-3136
Title :	Digital Twin & AI for building Resilience in Supply Chain
Authors:	Nazia Qureshi, Dr. Jeyandran Venkataraman, Sameera Shaikh <i>IIT Mumbai India.</i>
Abstract:	Supply chain disruptions driven by geopolitical instability, pandemics, and demand volatility have intensified the need for resilient and adaptive supply chain systems more recently with many black swan events. This paper reviews the role of digital twins, artificial intelligence (AI), and generative AI (GenAI) in enhancing supply chain resilience. Drawing on foundational and recent academic works (e.g., Ivanov & Dolgui; Jackson et al., 2024; Singh et al., 2022; Meena et al., 2025) alongside industry reports from McKinsey, BCG, Deloitte, and Accenture, this review orchestrates current knowledge into a unified study for “cognitive supply chain” framework. The study highlights how digital twins enable real-time system representation, AI facilitates predictive optimization, and LLM-based systems support decision-making, Supply chain resilience and human-AI collaboration. Key challenges, including data fragmentation, model integration, and governance, are discussed, and future research directions are proposed. <i>Keywords:</i> Cognitive Supply Chain, Disruptions, Resilience, Artificial Intelligence, LLM, Digital Twin

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	CSIT-RS-3137
Title :	Information Technology as a Game-Changer for India Marginal Farmers
Authors:	Narendra V Pisal, Dr Sajid Alvi <i>Dnyansagar Institute of Management and Research, Baner-Balewadi, Pune-411045, India</i>
Abstract:	In India, marginal farmers, who represent over 85% of the 146 million farming households and cultivate less than 2 hectares, face numerous challenges including market volatility, climate unpredictability, and limited access to credit. Information Technology (IT) is transforming their situation by providing tools for informed decision-making and market connectivity. Mobile apps such as Kisan Suvidha, AgriApp, and MeKisan offer weather forecasts, market prices, and agricultural advice, helping to reduce costs by 15-20%. Digital marketplaces like e-NAM enable direct transactions with buyers, increasing farmer incomes by 10-25% by cutting out intermediaries. AI applications enhance agricultural practices, while satellite data aids in irrigation and yield predictions. Government initiatives streamline access to subsidies and financial solutions, improving credit availability for farmers. Although challenges like digital literacy exist, low-cost data initiatives are bridging the gap. Overall, IT is empowering marginal farmers, fostering rural development, and enhancing food security. <i>Keywords:</i> Digital marketplaces, marginal farmers, precision farming, agri-tech, digital literacy

Paper ID :	CSIT-RS-3138
Title :	AI-Based Multi-Sensor Fusion Framework for Non-Destructive Road Material and Quality Evaluation
Authors:	Sunita Chavan, Gulnaz Thakur, Priyanka Kendre, Anandkumar Rao <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Road infrastructure assessment is essential for ensuring safety, durability, and adherence to construction standards. Traditional inspection techniques are typically limited to surface-level analysis and often fail to capture subsurface defects or material inconsistencies. This paper presents an artificial intelligence-based multi-sensor fusion framework for non-destructive road material and quality evaluation. The proposed system integrates data from thermal imaging, ground penetrating radar, laser scanning, and vibration sensors to obtain a comprehensive understanding of pavement conditions. A feature-level fusion approach is employed to combine heterogeneous data, followed by machine learning models for defect detection, layer thickness estimation, and material classification. Experimental evaluation on different road conditions demonstrates improved accuracy and reliability compared to single-sensor methods. The proposed framework will support proactive maintenance strategies and enhance transparency in infrastructure assessment without causing physical damage to the pavement. <i>Keywords:</i> Multi-Sensor Fusion, Artificial Intelligence, Non-Destructive Testing, Pavement Analysis, Road Quality Assessment

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Paper ID :	ETC-UG-3139
Title :	EDUSYNC: Synchronized Platform for Students, Teacher Guardians Parents
Authors:	Prathamesh Savji, Venkatesh Sanganwar, Anup Shendge, Nishant Shinde, Prof.Jayshree Palkar <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In the modern era of digital education, institutions increasingly rely on mobile solutions to manage academic activities efficiently. Traditional web-based systems often lack mobility and real-time responsiveness, leading to delays in information flow among students, teachers, and administrators. To address these issues, EduSync (Synchronized Platform for Students, Teacher Guardians Parents) has been developed as a Web based mobile application designed to synchronize academic information in real time and enhance communication within the educational ecosystem. EduSync provides an integrated platform that connects students, teachers, parents, and administrators for seamless sharing of attendance records, notices, assignments, and performance updates. The website is built using HTML & CSS a for the frontend, with an SQL database managed via XAMPP for backend operations. Its modular structure ensures data consistency, easy navigation, and secure role-based access. The application also includes a notification feature that enables instant updates and alerts, thereby improving overall coordination and transparency. By offering a portable, user- friendly, and scalable solution, EduSync significantly reduces manual workload and enhances the efficiency of academic management. The project represents a step forward in transforming traditional education systems into smart, connected, and responsive digital environments. <i>Keywords:</i> EduSync; Web Application; Academic Management; Real-Time Synchronization; Student Information System

Paper ID :	ETC-UG-3140
Title :	Thermoelectric Power Generation with Inverter Using ESP8266
Authors:	Moumita Giri, Sakshi Vyavahare,Swagat Khandagale, Rutuja Kale,Prof.Chetna .H. Jain <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The Thermoelectric Power Generator is a robust, solid-state renewable energy system designed to capture waste heat from industrial or domestic processes and convert it into usable electrical power. Operating on the Seebeck effect, the system utilizes Thermoelectric Generator (TEG) modules to create a voltage from temperature differentials, all while being monitored by an ESP8266 microcontroller for precise data tracking of thermal and electrical parameters. Because these modules naturally produce low-voltage DC, the design incorporates a critical power conditioning stage featuring a boost converter and an integrated inverter. This setup efficiently steps up the voltage and converts it into standard AC power, making it compatible with conventional AC loads. By providing a sustainable method for energy recovery without the need for moving parts, this project represents a highly efficient and low-maintenance solution for improving overall energy through the reclamation of otherwise lost thermal energy. <i>Keywords:</i> Thermoelectric, Seebeck effect, TEG modules, Boost converter, Energy recovery

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3141
Title :	Vedic Core: A Low Latency Arithmetic Unit
Authors:	Milind Nagalkar, Ketan Aswale , Sanskriti Chavhan , Shailesh Lonkar, Prof. Supriya Doke <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	High-speed arithmetic units are essential components in modern Very Large-Scale Integration (VLSI) systems, particularly in applications such as Digital Signal Processing (DSP), radar systems, and wireless communication. Among various arithmetic operations, multiplication plays a significant role in determining system performance. This work presents the design and FPGA implementation of a 4×4 bit Vedic Core based on the Urdhva-Tiryakbhyam (Vertical and Crosswise) technique from Vedic mathematics. In the proposed design, partial products are generated simultaneously using AND gates, and an efficient addition network consisting of Full Adders and Half Adders is used to combine these results, thereby reducing overall propagation delay. The complete architecture is modeled using VHDL and synthesized with Xilinx ISE 14.7 (Project Navigator), targeting a Spartan-6 FPGA (XC6SLX9-TQG144). The design is further validated on hardware using JTAG programming. The obtained results demonstrate improved timing performance along with efficient utilization of FPGA resources such as Look-Up Tables (LUTs), when compared to conventional multiplier designs. Due to its parallel structure and reduced latency, the proposed Vedic Core is well suited for high-speed and real-time arithmetic operations in embedded systems and DSP applications. <i>Keywords:</i> Vedic Multiplier, Urdhva-Tiryakbhyam, Spartan-6 FPGA, VHDL, Low Latency.

Paper ID :	ETC-UG-3142
Title :	Advancing Elderly Care: ToT-Based Fall Detection System
Authors:	Nikhil Sonone, Yash Patil, Pranali Ambavale, Vaishnavi Pawase, Anusha Vaidya <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The increasing population of elderly individuals worldwide has created significant healthcare challenges, particularly related to fall incidents that can cause severe injuries, disability, or even mortality. Therefore, developing an efficient monitoring system for elderly safety has become an important research area. This project presents the design and implementation of an IoT-based elderly fall detection system using an ESP32 microcontroller and multiple sensors. The proposed system continuously monitors body movement and posture using the MPU6050 accelerometer and gyroscope sensor to detect sudden changes in acceleration and orientation that may indicate a fall event. Additional sensors such as a pulse sensor and barometric sensor are incorporated to improve detection accuracy and monitor the users health condition. A GPS module provides real-time location tracking, while GSM/Wi-Fi communication enables immediate alert transmission to caregivers through SMS or mobile notifications. The system processes sensor data using a threshold-based fall detection algorithm implemented on the ESP32 for real-time analysis. Experimental testing shows that the proposed system can detect falls with high accuracy and send alerts within a few seconds, reducing response time during emergencies. The developed prototype provides a low-cost, portable, and reliable solution that enhances elderly safety, supports independent living, and contributes to the development of smart healthcare monitoring systems <i>Keywords:</i> IoT, Fall Detection, ESP32, Elderly Safety, Smart Healthcare

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3143
Title :	Design and Implementation of an AI-Based Voice Assistant System Using Raspberry Pi for Real-Time Voice Interaction
Authors:	Om Tungatkar, Manoj Biradar, Shubham Jagtap, Yash Patil, Prathmesh Goskonda, Rajesh yawle <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This project presents the design and implementation of an AI-based Voice Assistant using a Raspberry Pi, aimed at creating a cost-effective, standalone, and interactive system capable of understanding and responding to human voice commands. The system combines speech recognition, natural language processing (NLP), and speech synthesis to enable real-time two-way communication with the user. The hardware setup includes a Raspberry Pi board interfaced with a USB microphone, speaker, and optional physical buttons or sensors for additional control. The software layer is developed primarily in Python, integrating various open-source libraries such as Vosk or Google Speech API for speech-to-text conversion and eSpeak or gTTS for text-to-speech responses. For processing commands and queries, the system utilizes rule-based logic or lightweight AI models for tasks such as weather reporting, time and date queries, controlling connected IoT devices, or performing online searches. The voice assistant is designed to function both online and offline, allowing flexibility in deployment for home automation, educational, or personal productivity use cases. It features modularity for future scalability, such as integrating machine learning for smarter responses or expanding into multilingual capabilities. By focusing on real-time voice interaction and low-cost deployment, this project bridges key domains such as Embedded Systems, Artificial Intelligence, Internet of Things, and Human Computer Interaction. It offers a practical demonstration of how open-source tools and affordable hardware can be combined to create intelligent and user-friendly voice-controlled systems. Keywords: Raspberry Pi, AI Voice Assistant, Speech Recognition, Natural Language Processing (NLP), Text-to-Speech (TTS), Embedded Systems, Python Programming, Human-Computer Interaction (HCI)

Paper ID :	ETC-UG-3144
Title :	SMART RF-Based Personal Safety Device For Women
Authors:	Amar Kasat, Shivshankar Gumtapure, Anishka Kamble, Madhav Kanchewad, Kranti D. Patil <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's world, keeping people safe in remote areas or places with poor network connections is still a major challenge. Most emergency systems rely on GPS, GSM, or the internet, but these don't always work well in such areas. To fix this, a new type of emergency alert device has been developed. It uses LoRa technology, which is a type of radio frequency (RF) communication, to send distress messages even when there is no internet or mobile network. This system includes a wearable device that has an ESP32 microcontroller, a LoRa Ra-02 module, and a touch sensor that can be pressed by hand to send an alert. When someone is in danger, the device creates a secure distress message and sends it wirelessly to several receiving devices that can be up to 10 to 20 kilometers away, depending on the environment. Each receiver saves the time and location of the alert so that help can come quickly. Unlike traditional systems that need GPS or mobile signals, this device works without any connection, making it very useful in places like rural areas, during disasters, or in places with weak or no network. Using LoRa helps the device use very little power, doesn't require a license, and still works well even in areas with many obstacles or long distances. Keywords: LoRa, RF communication, ESP32, wearable device, emergency alert system, offline communication, low power, disaster management, long-range transmission.

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Paper ID :	ETC-UG-3145
Title :	BrainLink
Authors:	Aditya Sawai, Tanuja Ramteke, Jaya Nirmal, Rohit Lavand, Dr.Trupti Thite <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	BrainLink is a proposed Brain Computer Interface system that uses electroencephalography technology to enable hands free interaction with a computer by interpreting human brain activity. The system captures EEG signals using electrodes placed on the scalp along with a BioAmp signal amplification module to detect weak brain signals related to cognitive activities such as attention levels and eye blinks. These signals are amplified and processed in real time using Python, where techniques like signal filtering, feature extraction, and analysis are applied to identify meaningful patterns. The extracted patterns are then mapped to specific computer commands, allowing actions such as scrolling a window without using a keyboard or mouse. The main objective of this proposed system is to develop a reliable and efficient framework that converts brain signals into practical control commands. It is designed to be non invasive, cost effective, and user friendly, making it suitable for assistive technology. Experimental results indicate stable signal responses with minimal delay achieved through effective filtering and threshold based decision logic. By combining neuroscience and computing, BrainLink demonstrates the potential of brain driven interfaces in areas such as assistive systems, neurorehabilitation, automation, and smart human machine interaction, representing a step toward more natural and intuitive human computer interaction. Keywords: Brain–Computer Interface (BCI), Electroencephalogram (EEG), Human–Computer Interaction (HCI), Signal Processing, Neurotechnology, Accessibility, BioAmp, Python.

Paper ID :	ETC-UG-3146
Title :	Vani.ai: Next Generation Multilingual Streaming using WebSockets and Edge Fallback
Authors:	Priya Thakur, Tanmayee Panat, Yash Pawar, Vaishali Nikalje , Dr. Trupti Thite <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's globalized world, real-time multilingual communication is heavily dependent on cloud-based infrastructure, which often fails in low-connectivity environments. To solve this challenge, this project focuses on designing a highly scalable, deviceagnostic transcription and translation pipeline. The system utilizes a Hybrid Fallback Architecture, prioritizing a high performance FastAPI cloud backend via WebSockets for zero-latency streaming. However, in the event of network disruption, the system seamlessly transitions to In-Browser Machine Learning (WebAI), utilizing quantized models via WebAssembly to maintain offline, on-device translation without requiring local software installation. Furthermore, the system enhances accessibility and professional utility by integrating Real-Time Speaker Diarization to visually distinguish multiple speakers, and users can dynamically inject domain-specific vocabulary (custom glossaries) to ensure the accurate transcription of complex technical jargon, preventing phonetic misspellings. By eliminating the need for bulky, dedicated embedded hardware, this proposed architecture provides a cost-effective, highly portable, and fault-tolerant solution that bridges linguistic barriers in classrooms, corporate conferences, and assistive technology sectors. Keywords: Artificial Intelligence (AI), Machine Learning, Speech Recognition, Real Time Transcription, Multilingual Platform.

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Paper ID :	ETC-UG-3147
Title :	Automated solar panel cleaning and fault detection system
Authors:	Mrudula Khade, Sakshi Hande, Vaishnavi Holkar, Suraj Gounder, Supriya A. Dhoke <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	One of the fastest-growing sources of renewable energy in the world is solar power. However, dust, bird droppings, and pollution in the environment can greatly reduce the efficiency of solar panels. This problem gets worse in deserts and high altitude installations where cleaning by hand is hard or even impossible. Also, cleaning by people on a regular basis raises the cost of labor and the risk of accidents. This paper describes an IoT-enabled Automatic Solar Panel Cleaning and Fault Detection System that uses the ESP32 microcontroller. The system has sensors that detect dust, motorized cleaning units, sensors that monitor current and voltage, and cloud-based IoT monitoring. When the dust level on the solar panel surface goes above a certain level, the automated wiper mechanism cleans it. At the same time, the system checks the output parameters of the panels to find problems and performance drops in real time. The suggested system cuts down on human involvement, makes energy use more efficient, lowers maintenance costs, and lets people monitor things from afar using IoT platforms. This solution is especially helpful for solar farms in desert areas and rooftop installations in tall buildings. <i>Keywords:</i> Solar panel cleaning, IoT, ESP32, fault detection, renewable energy, automation, smart monitoring

Paper ID :	ETC-UG-3148
Title :	Wireless Solar-Powered Street Lamp Monitoring & Fault Detection
Authors:	Aditya Desai, Shravani Chipade, Pratiksha Dhole, Zaheer Chandargi , Prof. Nilesh Mohota <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	A smart solar street light monitoring and fault detection system utilizing a tiered communication architecture was designed and implemented in this research project. The system serves as a critical infrastructure for energy efficiency and maintenance optimization in urban environments. Consequently, the network was engineered with three distinct nodes—Master, Transceiver (Middle), and End Slave—to enable wide-area coverage through data relaying. The main objective of this project is to automate the identification of electrical and environmental faults using real-time sensor data. The performance of each solar pole was monitored using high-side current sensing via INA219 and dedicated Voltage Sensors. Factors such as solar charging efficiency, load power consumption, and ambient light levels via LDR sensors were continuously analyzed by ESP32 microcontrollers. The design process involved the integration of 433MHz RF modules for local mesh communication and a SIM800L GSM module for long-range reporting to a central host. A parametric study of the system's fault logic successfully identified four critical error states: absence of solar charging during daylight, unauthorized light activation during the day, nocturnal lighting failure, and abnormal solar voltage at night. The 3-node configuration achieved reliable relaying of data from the furthest pole to the master gateway. It was observed that the automated SMS alerting system provided real-time maintenance notifications within a 30-second cooldown period. <i>Keywords:</i> Wireless Sensor Network (WSN), GSM SIM 800L; Fault Detection, RF Communication, Smart Street Light, INA219, ESP32, Edge Computing.

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Paper ID :	ETC-UG-3149
Title :	Design, Implementation, and Performance Evaluation of an IoT-Enabled Smart Cradle System for Real-Time Infant Monitoring and Care
Authors:	Madhupriya Kulkarni, Saili Jamdar, Suhani Kakade, Shraddha Yelmeli, Dr. Deepthi D. Kulkarni <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This paper presents the design, hardware integration, and performance evaluation of an IoT-enabled smart cradle system for real-time infant monitoring and automated intervention. The proposed system employs an ESP32 dual-core microcontroller interfaced with an IR presence sensor, DHT22 temperature-humidity sensor, a digital microphone for cry detection via amplitude-threshold temporal gating, a resistive wetness sensor, an ESP32-CAM module for 30-second periodic visual updates, a stepper motor for cradle rocking, and a servo motor for toy actuation. All sensor data and alerts are relayed via Firebase Realtime Database to a cross-platform Expo Go mobile application. Under controlled laboratory conditions, cry detection achieves 95% accuracy with system response latency below 2 seconds. Accuracy degrades to 78% under simultaneous variable ambient noise, identifying the primary optimisation target. Comparative analysis against thirteen prior works confirms the proposed architecture closes identified gaps in multi-modal actuation, edge-based audio processing, and privacy-preserving camera design. <i>Keywords:</i> IoT; ESP32; smart cradle; cry detection; infant monitoring; real-time actuation

Paper ID :	ETC-UG-3150
Title :	IoT-Based Navigation and Safety System for the Visually Impaired
Authors:	Vedant Vijay Doke, Rohit Lawand, Shruti Gavhane, Sakshi Londhe, Prof. Nilesh Mohota <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Independent navigation is a critical challenge for the visually impaired, as safe and reliable mobility greatly influences their quality of life. Conventional assistive tools, such as the traditional white cane, are primarily limited to ground-level tactile feedback, leaving users vulnerable to head-level obstacles, water-logged terrain, and unassisted emergencies such as falls. To address these challenges, this paper presents "Third Eye for the Blind," an automated, IoT-based dual-node assistive system utilizing sensor fusion and cloud connectivity. The system features a Smart Stick equipped with ultrasonic and soil moisture sensors to detect immediate ground obstacles and wet potholes, providing auditory alerts. Simultaneously, a Smart Cap provides upper-body protection through an ultrasonic sensor linked to haptic vibration feedback. Furthermore, an MPU6050 accelerometer is implemented within the cap to automatically detect sudden falls. The proposed system significantly enhances environmental awareness, increases user safety, and improves emergency response times. Experimental implementations demonstrate that the ESP32-driven architecture, synchronized via the thingspeak cloud platform, can effectively detect multi-level hazards and rapidly transmit GPS-encoded SOS alerts via a SIM800L GSM module, making it a promising and reliable tool to assist visually impaired individuals in independent daily navigation. <i>Keywords:</i> Visually impaired, Internet of Things (IoT), obstacle detection, fall detection, ESP32, ThingSpeak, smart cane, wearable devices.

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Paper ID :	ETC-UG-3151
Title :	AI and IoT Smart Agricultural System
Authors:	Prathamesh Honalkar, Vikas Sapate, Prafulla Chaudhari , Amar B. Deshmukh <i>Anantrao Pawar College of Engineering and Research, India</i>
Abstract:	Agriculture plays a vital role in developing countries like India, yet farmers face challenges such as unpredictable weather, inefficient irrigation, and resource wastage. This paper presents an AI and IoT-based smart agricultural system designed to assist farmers in real-time decision-making. The system integrates sensors to monitor soil moisture, temperature, humidity, and light intensity, with data transmitted to a cloud platform for analysis. Instead of full automation, the system provides alerts and recommendations, allowing farmers to retain control. Experimental results show a reduction in water usage by 30-40% and improved crop yield by approximately 25%. The proposed system achieves around 90% decision accuracy, making it efficient, affordable, and suitable for small and medium-scale farms. This approach enhances sustainability and precision farming practices. <i>Keywords:</i> Smart Agriculture; IoT; Artificial Intelligence; Precision Farming; Decision Support

Paper ID :	ETC-UG-3152
Title :	Design and Verification of AHB to APB Bridge Design using Verilog HDL
Authors:	Sumit Shivaji Chaskar, Ansari Mohd Noor Alam, Kolhe Arnav Vijay, Suvarna Hande, Dia Magnani <i>International Institute of Information Technology Pune, India</i>
Abstract:	In the recent System-on-Chip (SoC) designs, communication between high-speed components of the system and low power auxiliary interfaces is of primary importance for the overall performance of the System-on-Chip. This paper addresses the design and functional verification of an AMBA AHB-Lite to APB bridge. The bridge is designed as a protocol converter between the high-speed Advanced High-performance Bus (AHB) and the low-bandwidth Advanced Peripheral Bus (APB). The bridge is designed using the Verilog language as a parameterized RTL module based on a finite state machine (FSM) structure. In order to ensure that the design is reliable and complies with the required protocol, we developed an elaborate verification environment using Universal Verification Methodology (UVM) and SystemVerilog. The testbench environment is designed in a layered style, where active AHB and APB agents are integrated, together with a virtual sequencer that generates the appropriate input, and reactive scoreboards for data checks. The key verification components include the randomization strategy, where constraints are defined for different transfer sizes, such as Byte, Half-word, and Word. Additionally, we designed a content-driven verification (CDV) model that monitors the content of different operation types and machine sizes. The simulation results demonstrate that the bridge correctly handles multi-cycle transfer and protocol handshaking, together with data integrity. The paper demonstrates the efficiency of UVM in reducing the verification time and attaining high functional coverage for machine interconnects. <i>Keywords:</i> AMBA Protocol, AHB-Lite, APB, UVM, SystemVerilog;

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Paper ID :	ETC-UG-3153
Title :	Coal Mine Safety Monitoring and Alerting System using LoRA
Authors:	Arjun Ganesh Kulkarni, Dr. Amar Deshmukh, Smita Landge, Rani Bangar <i>Anantrao Pawar College Of Engineering and Research Parvathi, Pune, India</i>
Abstract:	Coal mining remains one of the most hazardous industries due to the presence of toxic gases, extreme environmental conditions, and the risk of structural failures. Conventional safety systems often depend on manual checks and delayed communication, which makes it difficult to respond quickly in emergencies. To address these issues, this project introduces an IoT-based safety monitoring and alerting system designed to provide real-time data collection and instant hazard detection. The proposed system integrates sensors to monitor gas levels, temperature, humidity, and vibrations within the mine. The data is processed using microcontrollers and transmitted wirelessly to miners and supervisors. Instant alerts are sent through buzzers, SMS, or mobile notifications whenever unsafe conditions are detected. In addition to immediate hazard response, the system maintains logs for future analysis and preventive maintenance, thereby enhancing miner safety, reducing accidents, and saving lives. <i>Keywords:</i> Coal Mine Safety, IoT, Real-Time Monitoring, Gas Detection, Hazard Prevention, Alert System, Wireless Communication.

Paper ID :	ETC-UG-3154
Title :	A Review of Smart Helmet Technologies: From Safety to Connectivity
Authors:	Pranav Rajesh Shinde, Rutuja Pandurang Nichit , Dipali Gupta <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Smart helmet systems have emerged as an important solution to reduce fatalities in two-wheeler accidents. This paper presents a detailed review of previously published research work on smart helmets based on Internet of Things (IoT). Various researchers have proposed systems using sensors such as accelerometers, vibration sensors, GPS modules, and GSM modules for accident detection and real-time location tracking. Most of the systems detect accidents using threshold values and send alert messages to emergency contacts. Some advanced systems also include image processing and cloud-based monitoring for improved accuracy. However, issues such as network dependency and false triggering still exist. From the analysis of different research works, it is observed that systems using Arduino Uno, MPU6050 sensor, GSM module (SIM800L), and GPS module provide a cost-effective and reliable solution. This review helps in understanding existing technologies and identifying improvements for future smart helmet systems. <i>Keywords:</i> Smart Helmet, Accident Detection, Location Tracking, Embedded Systems, GPS-GSM Communication

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3156
Title :	Real-Time Yoga Pose Recognition and Correction Feedback System
Authors:	Abhijeet Arun Bhoite, Arti kale , Manjusha Bichhewar, Rohan Bhand, Prof. Vaishali joshi <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Human pose estimation focuses on identifying and analyzing essential skeletal landmarks within images and videos, which is vital for applications in physiotherapy and fitness. This paper introduces PoseAlign, an AI-driven system that facilitates real-time pose detection, estimation, and correction. Originally created for static images, PoseAlign has now been enhanced to accommodate live camera tracking, effectively serving as an AI-based virtual trainer. The system features progress monitoring, alerts regarding exercise suitability based on health conditions, voice-assisted feedback, yoga pose identification, and a pose timer, all aimed at improving user experience and preventing injuries. We review recent developments in pose estimation, such as multi-person tracking, 3D pose estimation, and occlusion management, while examining cutting edge deep learning models that contribute to enhanced accuracy. Lastly, we explore the challenges and future prospects of integrating pose estimation into physiotherapy and fitness monitoring. <i>Keywords:</i> Pose estimation, Deep learning, Computer vision, Physiotherapy, Fitness,

Paper ID :	ETC-UG-3157
Title :	Smart Fridge Inventory System Using IOT
Authors:	Atharva Khalde, Shantanu Kamthe, Sahil Ghanwat, Kedar Khamkar, Prof. Pranali Awate <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This research presents the development of an automated Smart Fridge Inventory System designed to mitigate domestic food waste through real-time expiration tracking. The methodology utilizes a tiered IoT architecture, integrating a Mobile Progressive Web App (PWA) with a dedicated hardware interface. Data acquisition is achieved via the Google Vision OCR engine and the OpenFoodFacts API, enabling the digital capture of physical product attributes. This data is synchronized through a Firebase Realtime Database, which serves as the central orchestration layer between the software and hardware components. The hardware implementation leverages a 38-pin ESP32 microcontroller, selected for its high GPIO density to support an 8-bit parallel JHD12864E Graphical LCD (128x64). To optimize performance, the system executes localized processing on the ESP32, utilizing Network Time Protocol (NTP) for synchronized time-stamping. A Bubble Sort algorithm is implemented within the firmware to dynamically prioritize the display of inventory based on the proximity of expiration dates. Furthermore, the system incorporates an automated migration logic where expired items are programmatically moved to a shopping list node, closing the loop between consumption and replenishment. Results demonstrate a low-latency synchronization between the cloud and the parallel-interface display, providing a robust, user-centric solution for inventory management. <i>Keywords:</i> IoT, ESP32, Firebase, Google Vision OCR, Inventory Management, JHD12864E GLCD, Embedded Systems, Food Waste Mitigation.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3158
Title :	ML Based Health Prediction System as Paas
Authors:	Apurva Davakhar, Jayesh Daud, Aditya Bhujbal, Sakshi Deshmukh, Prof. Hina Naaz <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Cardiovascular diseases (CVDs) remain one of the primary causes of death worldwide, highlighting the need for efficient and proactive health monitoring systems. Conventional diagnostic methods largely depend on periodic clinical check-ups, which may result in delayed identification of potential risks. This study introduces Dr. Robo, an advanced Heart Disease Prediction System developed as a Platform-as-a-Service (PaaS). The system employs an ensemble learning approach by combining Random Forest, Support Vector Machine (SVM), and K-Nearest Neighbors (KNN) algorithms to enhance prediction performance. Using the UCI Heart Disease dataset, the model achieves an accuracy of 91.4%. The proposed system is built on a cloud based Streamlit framework, enabling real-time prediction of cardiovascular risk and remote patient monitoring through an interactive web dashboard. It also incorporates automated clinical report generation using ReportLab, notification services via the Pushbullet API, and a personalized dietary recommendation module named Chef Robo. Experimental findings indicate that the ensemble model provides superior performance compared to individual algorithms, making it a reliable, scalable, and user-friendly solution for early detection and management of heart-related conditions. <i>Keywords:</i> Machine Learning, Ensemble Learning, Cardiovascular Disease Prediction, Platform-as-a-Service (PaaS), Cloud Computing, Remote Health Monitoring, Random Forest, SVM, KNN

Paper ID :	ETC-UG-3159
Title :	Hydroeye: Real Time River Water Quality Monitoring Using AI
Authors:	Aakash Pingale, Omkar Sathe, Shweta Padwal, Mahesh Patil , Prof. K.D. Patil <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Water pollution remains a significant global challenge, affecting environmental sustainability, public health, and the availability of clean water resources. Continuous monitoring of river water quality is essential to detect pollution at an early stage and enable timely corrective actions. This paper presents a real-time river water quality monitoring system that integrates sensors, wireless communication, a mobile application, and artificial intelligence. The proposed system utilizes sensors to measure key water quality parameters such as pH, turbidity, temperature and total dissolved solids (TDS), interfaced with a microcontroller for automated data acquisition. The collected data is transmitted to a cloud server through a cellular network, enabling monitoring even in remote areas without reliable internet connectivity. An Android-based mobile application is developed to display real-time data and provide location tracking of the monitoring unit using map integration. Furthermore, artificial intelligence, integrated using Gemini, is employed to analyze water quality data, detect anomalies, and identify pollution conditions. The system also generates real-time alerts for both authorities and citizens improving awareness and response time. The proposed solutions cost- scalable, making it suitable for efficient environmental monitoring and rapid decision-making. effective, reliable, <i>Keywords:</i> River water quality monitoring, Internet of Things, artificial intelligence, environmental monitoring, mobile application, pollution detection, real-time monitoring.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3160
Title :	AGROBOT: An IoT-Enabled Autonomous Agricultural Robot for Precision Farming
Authors:	Aditya Landge, Prajwal Patil, Shubham Jadhav, Sakshi Jadhav, Digambar A. Jakkan <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Agriculture forms the backbone of India's economy, supporting nearly 70% of the population. However, conventional farming methods limit productivity and degrade soil quality while being labor-intensive. This paper presents AGROBOT, an innovative Internet of Things (IoT) powered autonomous robot designed to perform ploughing, seed dispensing, and precision farming operations. Built using an ESP32 microcontroller, soil moisture sensors, motor drivers, and wireless communication modules, AGROBOT offers a cost-effective and reliable solution for modern agriculture. The robot follows a zigzag navigation pattern to ensure complete field coverage and provides real-time monitoring through a mobile application. With dimensions of 1000 mm × 800 mm × 700 mm and weighing 120 kg, the system is designed to be portable, modular, and eco-friendly. AGROBOT helps small and marginal farmers increase operational efficiency, reduce labor dependency, and adopt sustainable farming practices through precision agriculture techniques. <i>Keywords:</i> IoT, agriculture automation, autonomous robot, precision farming, ESP32, sustainable farming

Paper ID :	ETC-UG-3161
Title :	Automated Irrigation System and Leaf Disease Detection Using Raspberry Pi
Authors:	Priyanka Santosh Kharade, Vaishnavi Indore, Yash Badhekar, Pratiksha Ranmale, Prof. Kiran Ghate <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The agricultural sector plays a crucial role because it provides essential food resources and drives economic development. The productivity of crops decreases because traditional farming methods lack effective water management systems and they fail to identify plant diseases until later stages. The paper presents an Automated Irrigation System and Leaf Disease Detection framework which uses Raspberry Pi and IOT technology to solve these existing problems. The system monitors agricultural field soil and environmental parameters through its environmental sensors which include a soil moisture sensor, pH sensor, and DHT22 temperature-humidity sensor that operate with an ESP32 microcontroller. The system uses sensor data to automatically operate irrigation and spraying systems which optimizes water distribution while maintaining appropriate conditions for crop growth. The system uses a Raspberry Pi together with a Pi camera module to take photographs of plant leaves which helps in disease detection. The system employs an AI image processing model to examine captured images which detects leaf diseases in their initial development stages and alerts farmers to take appropriate measures. The proposed system achieves precision agriculture through its automated irrigation system together with its realtime monitoring feature and its smart disease detection capability which reduces manual labor and enhances crop yield. <i>Keywords:</i> Automated Irrigation, Raspberry Pi, Internet of Things (IOT), Precision farming, Leaf Disease Detection

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3162
Title :	Specs Powered Portable Language Translator
Authors:	Sairaj Revane, Atharva Pawase, Hariom Tirkamte , Tushar Ramekar, Hina Naaz <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The SPECS-powered portable language translator is an innovative device designed to enable real-time communication between people speaking different languages. This compact and user-friendly system integrates Speech Processing, Embedded Computing, and Smart technologies (SPECS) to provide fast and accurate translation. It captures spoken input through a microphone and processes it using speech recognition and natural language processing (NLP) techniques. The system then translates the input into the desired target language and delivers the output in both text and audio form for better understanding. With features like wireless connectivity, portability, and quick response time, the device is highly useful for travelers, students, and professionals. It ensures smooth interaction without the need for manual translation. Overall, this project aims to break language barriers, improve communication efficiency, and offer a reliable solution for multilingual conversations in everyday situations across different regions and cultures. <i>Keywords:</i> SPECS,Natural Language Processing(NLP),Speech Recognition,Portable Language Translator;

Paper ID :	ETC-UG-3163
Title :	Copy-Move Forgery Detection Using DCT and Sift
Authors:	Saurabh Bandu Bankar, Harshal Ghodke, Abhay Jadhav, Hrushikesh Bhalerao, Prof. Mahesh Sapte <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	In today's digital world, images can be easily edited or manipulated, making it difficult to verify their authenticity. One of the most common image tampering techniques is copy move forgery, where a region of an image is copied and pasted within the same image to hide or duplicate content. This paper presents a Copy-Move Forgery Detection (CMFD) system using Discrete Cosine Transform (DCT) and Scale-Invariant Feature Transform (SIFT). DCT extracts frequency-domain features while SIFT extracts robust local keypoints invariant to rotation and scale. The proposed system performs preprocessing, feature extraction, feature matching, and forgery localization. Experimental evaluation on benchmark datasets demonstrates reliable detection even under rotation, scaling, and compression. The system is suitable for applications in digital forensics, journalism, and legal investigations. <i>Keywords:</i> Image forgery detection, copy-move forgery, DCT, SIFT, digital forensics, image authentication.

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Paper ID :	ETC-UG-3164
Title :	Brain Tumor Detection System Using Deep Learning and MRI Image Analysis
Authors:	Birajdar shreenivas, Abhijit Birajdar, Nilesh Pinjari, Prof. Priyanka Kulloli <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Brain tumor detection is a critical task in medical imaging, as timely and accurate diagnosis can greatly influence the success of treatment and patient recovery. Conventional diagnostic methods require manual interpretation of MRI scans by radiologists, which can be subjective and time-consuming. To address these challenges, this paper presents an automated Brain Tumor Detection System using image processing and deep learning techniques. The system preprocesses MRI images to remove noise and enhance quality, followed by segmentation to isolate the suspected tumor region. A Convolutional Neural Network (CNN) model is implemented to automatically learn and classify MRI scans into tumor and non-tumor categories, achieving high accuracy and robustness. The proposed system significantly reduces manual intervention, increases diagnostic speed, and improves reliability. Experimental results demonstrate that the CNN-based model can effectively detect and localize tumor regions in MRI images with 98% classification accuracy and 97.97% Dice similarity coefficient, making it a promising tool to assist radiologists in clinical decision-making and early diagnosis. Keywords: Brain tumor detection, image processing, MRI scans, convolutional neural network, machine learning, segmentation, feature extraction, deep learning, automated diagnosis

Paper ID :	ETC-UG-3165
Title :	Modeling of reptile search algorithm with deep learning approach for copy move image forgery detection
Authors:	Sakshi shinde, Divya Shinde, Sushma Kure, Akshada Shrivastav, Prof. Mahesh Sapte <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Copy-move image forgery is one of the most common types of digital image manipulation, where a part of an image is copied and pasted within the same image to hide or duplicate objects. Detecting such forgery is challenging due to variations in scale, rotation, and illumination. This project proposes a hybrid approach that combines the Reptile Search Algorithm (RSA), a nature-inspired optimization technique, with deep learning models for effective detection of copy-move forgery. The RSA is used to optimize feature selection and enhance the learning capability of the deep neural network. The deep learning model extracts robust spatial features, while RSA improves accuracy by minimizing detection errors. The proposed system aims to achieve high precision, robustness, and efficiency in identifying forged regions. Experimental results demonstrate improved performance compared to traditional methods, making the approach suitable for real-world forensic applications. Keywords: Copy-Move Forgery Detection, Reptile Search Algorithm (RSA), Deep Learning, Image Processing, Optimization, Digital Image Forensics.

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Paper ID :	ETC-UG-3166
Title :	SMS Voting System Using Gsm and Arduino
Authors:	Avhad Vaibhav Navnath, Dr. Amar B Deshmukh, Vaibhav Avhad , Digamber Mane, Bhimasha Jamadar <i>Anantrao Pawar College of Engineering and Research Parvati ,Pune, India</i>
Abstract:	SMS voting leverages the widespread availability of mobile phones and cellular networks to enable voters to cast their ballots via text messages. This approach provides a convenient and efficient platform for conducting elections, surveys, and polls without requiring advanced mobile devices or internet access. Furthermore, SMS voting can enhance civic participation by reaching rural and underserved populations who may otherwise face barriers to traditional voting methods. However, despite its advantages, SMS voting raises significant concerns related to security, privacy, authentication, and reliability. Ensuring that votes are transmitted securely, counted accurately, and protected from manipulation remains a key challenge. Additionally, issues such as message delivery failures, SIM swapping, and network vulnerabilities can compromise the integrity of the voting process. This review paper explores existing research on SMS-based voting systems, focusing on their architecture, implementation techniques, security mechanisms, and usability. It aims to analyze the strengths and weaknesses of current approaches and identify potential improvements to make SMS voting a more secure and trustworthy component of modern electronic election systems.

Paper ID :	ETC-UG-3167
Title :	E-Vote Secure OTP and RFID Based Voting System
Authors:	Bhagyashri Bokdiya, Vaishnavi Bansode, Aarohi Bhosale, Shrushti Borse, Prof. Chetna Jain <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The proposed project, E-Vote: Secure Aadhaar-Based Online Voting System, aims to develop a secure and reliable digital voting platform that integrates Aadhaar-based authentication with OTP and RFID-based verification to ensure accurate voter identification. The system verifies the voter's identity through RFID card scanning followed by Aadhaar based OTP authentication under the framework of the Unique Identification Authority of India (UIDAI). To further enhance security and prevent impersonation, fingerprint verification is incorporated as an additional layer of authentication. This multifactor authentication mechanism ensures that only eligible voters can cast their vote and eliminates the possibility of duplicate or fraudulent voting. The system is designed to support remote voting, allowing citizens to vote securely even if they are in a different state from their registered constituency. After successful authentication, voters are presented with candidate details specific to their constituency, ensuring accurate vote allocation. The system maintains strict vote confidentiality by separating voter identity from the voting database and implementing encryption techniques for secure data transmission and storage. <i>Keywords:</i> Aadhaar Authentication, OTP Verification, RFID Technology, Online Voting System, Biometric Authentication, Multi-Factor Authentication, Data Encryption, Remote Voting.

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Paper ID :	ETC-UG-3168
Title :	IoT-Based Smart Aquarium Monitoring and Control System
Authors:	Mrunal Tribhuvan, Dr. Amar B Deshmuk, Sharanya Adapv, Ankita Gund <i>Anantrao Pawar College of Engineering and Research Parvati, Pune, India</i>
Abstract:	The Smart Fish Aquarium Monitoring and Control System is an automated solution designed to maintain optimal aquatic conditions for fish health and sustainability. The system continuously monitors critical water parameters such as temperature, pH level, turbidity, and dissolved oxygen using integrated sensors. These real-time data are processed by a microcontroller and transmitted to a cloud or mobile application for remote monitoring. Based on predefined threshold values, the system automatically controls aquarium devices including heaters, aerators, filters, and lighting to ensure a stable environment. Alerts and notifications are generated in case of abnormal conditions, enabling timely intervention. This smart system reduces manual effort, minimizes human error, and enhances fish survival rates by providing precise and efficient aquarium management. It is suitable for home aquariums, research laboratories, and commercial aquaculture applications. <i>Keywords:</i> Internet of Things (IoT), Smart Aquarium, Water Quality Monitoring, Temperature Sensor, pH Sensor

Paper ID :	ETC-UG-3169
Title :	Design and Verification of an APB-Interfaced UART Transceiver Using Verilog HDL
Authors:	Anisha Chavan, Ashwini Muthe , Shruti Varale , Dia Magnani, Suvarna Hande <i>International Institute of Information Technology, Pune, India</i>
Abstract:	Universal Asynchronous Receiver Transmitter (UART) is commonly utilized for reliable serial communication due to its simplicity and flexibility. In modern System-on-Chip (SoC) design, the efficient integration of peripherals using standardized buses such as the Advanced Peripheral Bus (APB) is critical for power-effective and low bandwidth applications. This paper proposes the design and verification of a UART transceiver using the Verilog HDL that supports efficient processor-controlled communication via a standardized interface. The proposed system allows flexible configuration of UART parameters, including baud rate, data length, parity, and stop bits, making it adaptable to different application needs. Both the transmitter and receiver use serial data handling with 16x oversampling, which improves accuracy and reduces communication errors. To ensure efficient processor-controlled communication, the design integrates with the standardized Advanced Peripheral Bus (APB) interface. Finally, verifying the design through an APB-based test bench is essential to confirm its effectiveness in digital communication systems. <i>Keywords:</i> UART Transceiver, AMBA APB Protocol, Verilog HDL, SoC Design, APB Slave Interface

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-UG-3170
Title :	Machine Learning Based Predictive Maintenance for Industrial Motors: A Systematic Future Research Direction
Authors:	Mrunali Dedunta, Tejal Bagade, Mitali Firodiya , Kartik Kale, Riyaj Kazi <i>Dr. DY Patil college of engineering, India</i>
Abstract:	Industrial motors are essential components in modern manufacturing systems, and their unexpected failures can result in significant downtime, safety risks, and economic losses. Conventional maintenance strategies such as reactive and preventive maintenance are often insufficient to handle unplanned breakdowns efficiently. In recent years, machine learning (ML)–based predictive maintenance has emerged as a reliable solution for monitoring motor health, detecting faults, and predicting failures at an early stage. This review paper presents an overview of ML techniques applied to predictive maintenance of industrial motors, including supervised, unsupervised, and deep learning approaches. The study focuses on commonly used condition monitoring data such as vibration signals, temperature measurements, and motor current signature analysis. Key challenges related to data imbalance, feature extraction, model interpretability, and real-time industrial deployment are also discussed. Furthermore, recent advancements and representative studies utilizing ML algorithms such as Support Vector Machines, Random Forests, Convolutional Neural Networks, and Recurrent Neural Networks are reviewed. The findings indicate that ML-based predictive maintenance improves system reliability, reduces maintenance costs, and enhances operational efficiency. Future research directions emphasize IoT integration, edge computing, and federated learning. <i>Keywords:</i> predictive maintenance, machine learning, industrial motors, vibration analysis, fault diagnosis, condition monitoring.

Paper ID :	ETC-UG-3171
Title :	Rationbot: Automated Ration Distributing System
Authors:	Pramod Mahankal, Sahil Malushte, Hrutik Wale, Zeeshan Shaikh <i>KJ Somaiya's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	An Automated Ration Distribution System is a smart solution designed to improve the efficiency, transparency, and reliability of the public distribution system. It uses embedded systems and RFID technology to ensure that essential commodities are distributed only to authorized users. The system typically includes a microcontroller, RFID reader, RFID card, and an electronic weighing mechanism. Users authenticate themselves by scanning their RFID card, after which the system verifies their details from a stored database and automatically dispenses the allotted ration. This approach reduces manual intervention, minimizes errors, and prevents unauthorized access. The system helps in eliminating corruption, duplication, and unfair practices in ration distribution. It also maintains proper transaction records for monitoring and control. Overall, the automated ration distribution system provides a secure, accurate, and efficient method for distributing essential goods. <i>Keywords:</i> Automated Ration System, RFID Technology, Embedded Systems, Microcontroller, Public Distribution System.

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Paper ID :	ETC-UG-3172
Title :	Smart Battery Switching Circuit with Flexible Solar in Electric Vehicle
Authors:	Vijay bhagwan pitale, Om Chopade, Sohamnath Patekar, Chaitanya Budde, Prof. D. A. Jakkan <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Electric vehicles (EVs) are gaining significant importance as sustainable alternatives to conventional fuel-based transportation. However, challenges such as limited battery range, long charging duration, and dependency on grid-based charging infrastructure restrict their widespread adoption. This paper presents a Smart Battery Switching Circuit with Flexible Solar Integration designed to enhance energy efficiency and reliability in EV systems. The proposed system utilizes an Arduino-based control unit and MOSFET based switching circuitry to automatically transfer load between dual batteries based on voltage thresholds, ensuring uninterrupted power supply. Additionally, flexible solar panels are integrated to continuously charge the inactive battery, promoting renewable energy utilization. The system demonstrates near-zero switching delay, improved battery life, and reduced dependency on external charging sources. Experimental results indicate enhanced operational efficiency and approximately 20–25% improvement in energy utilization. Furthermore, the system reduces deep discharge cycles, thereby increasing battery lifespan and reliability. The proposed design offers a cost-effective, modular, and scalable solution for small and medium electric vehicles, contributing to the development of sustainable and intelligent mobility systems. <i>Keywords:</i> Electric Vehicle, Arduino, MOSFET, Smart Switching Circuit, Flexible Solar Panel, Renewable Energy, Battery Management System, Embedded Control

Paper ID :	ETC-UG-3173
Title :	Bi -Directional Visitor Counter Using ESP32
Authors:	Ranjeet yadav, Omkar Nayak, Mohit Nilvarn, Pratham Pradeshi <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The education system is changing fast with technology. This has brought chances for teachers and students but it also means teachers have a lot more work to do. Teachers have to do things like write down what they said in class, get tests, give grades and talk to each student one on one. These tasks take a lot of time so teachers have time to actually teach. This paper is about a tool called the Teacher Assistance Platform that uses artificial intelligence to help teachers with these tasks. The Teacher Assistance Platform uses computers to understand what people are saying, language models that can understand a lot of things and a system that gets all the parts working together. The Teacher Assistance Platform automates the tasks that teachers have to do, like lecture documentation and assessment preparation and grading and personalized feedback generation, for students. The Teacher Assistance Platform is an AI- driven tool that can really help teachers. The proposed system converts lecture audio into structured textual content, performs abstractive summarization, generates assessments, evaluates student submissions, and delivers personalized feedback through an integrated analytics dashboard. A modular multi-agent architecture enables task parallelism, scalability, and reliability. Experimental evaluation demonstrates significant improvements in processing efficiency, grading consistency, and content quality compared to manual methods. The results confirm that agent-based AI systems can effectively augment educators, enabling a more intelligent, efficient, and data-driven educational ecosystem. <i>Keywords:</i> Artificial Intelligence, Teacher Assistance Platform, Large Language Models, Multi-Agent Systems, Speech-to-Text, Educational Automation.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-PG-3174
Title :	A Review of IoT and Computer Vision-Based Systems for Smart Aquaculture Monitoring
Authors:	Shruti Rodgi, Prof. Prajakta.Khairnar. <i>Ajeenkya D Y Patil School Of Engineering Lohegoan, Pune 411081, India</i>
Abstract:	The growing environmental and development concerns of aquaculture have increased the need for underwater monitoring systems. Recent studies presented hybrid IoT systems and computer techniques aimed at monitoring different aspects of the underwater ecosystem. Deep learning techniques integrated with underwater cameras enable automatic identification of fish, tracking of their movement patterns, and estimation of population variations while preserving natural aquatic conditions. Moreover, IoT sensor networks are utilized to monitor key water quality parameters including pH, turbidity, temperature, and dissolved matters. These sensors constantly collect environmental data and transfer it to the cloud for monitoring, visualization and real-time statistics. In this paper we present a comparative study of monitor system architecture, sensing technologies and machine learning approaches reported on recent studies. The existing systems have identified numerous challenges like distortion. Keywords: : Smart Aquaculture, Water Quality Monitoring, Internet of Things (IoT), Underwater Imaging, Automated Control Systems

Paper ID :	ETC-PG-3175
Title :	AI and IoT-Based Cow Detection and Health Monitoring System
Authors:	Gouri Yogeshwar Choudhari, Prof.Sagar Dhawale , Prof.Kalpita Mane <i>Ajinkya D.Y.Patil School of engineering ,Lohegaon ,Pune, India</i>
Abstract:	Precision Livestock Farming (PLF) endeavors to improve animal health management through the implementation of continuous, data-driven monitoring and the early identification of disease. Within this paper, a detection and surveillance system for livestock is proposed using AI-IoT, incorporating wearable sensing, environmental sensing, computer vision, and a combination approach for machine learning. The health conditions of the animal, based upon body temperature and activity measures, can be obtained from lowpower, wearable IoT-based devices, while environmental conditions that impact animal welfare can be measured from sensors. The acquired multimodal data is then analyzed using preprocessing, normalization, and feature fusion methods to form a comprehensive feature representation of animal health and classification approach using CNN. The experimental results clearly prove that the introduced approach performs better than current conventional data mining techniques, neural network approaches, and sensory integration methods, with an appropriate level of accuracy as 95.42% and F1 value of 94.99%, hence verifying the efficiency of multimodal fusion methods to ensure efficient diagnosis with the possibility of making instant decisions. Keywords: Internet of Things, Artificial Intelligence, Animal Detection, Animal Health Monitoring, CNN-BiLSTM-XGBoost.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-RS-3176
Title :	Towards Pain-Free Diabetes Management: Recent Advances and Challenges in Non-Invasive Blood Glucose Monitoring
Authors:	Dipali Gupta, Chetana H. Jain, Supriya Atul Dhoke <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Diabetes management requires continuous monitoring of blood glucose levels, traditionally achieved through invasive methods such as finger-pricking. However, these techniques are painful and inconvenient, leading to poor patient compliance. Recent advancements in non-invasive glucose monitoring technologies aim to provide painless, continuous, and real-time glucose measurement. This paper reviews the latest developments in non-invasive techniques, including optical sensing, photoplethysmography (PPG), electromagnetic methods, and wearable biosensors. The role of artificial intelligence and machine learning in improving prediction accuracy is also discussed. Furthermore, the challenges associated with accuracy, calibration, and physiological variability are analyzed. The study concludes that while non-invasive technologies show great promise, achieving clinical reliability remains a significant challenge. <i>Keywords:</i> Non-Invasive Glucose Monitoring, Biosensors, PPG, Wearable Devices, Machine Learning

Paper ID :	ETC-RS-3177
Title :	ElderAid: An Integrated Physical and Mental Health Monitoring Device for Independent Elderly Care in Remote Areas
Authors:	Rajesh U. Yawle a , Digambar G. Matala b , Trupti G. Thithe c , Mahesh Sapte d , Nilesh Mohota <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	With the rise of independent living in remote areas, continuous health monitoring for the elderly is a critical necessity. Older adults face heightened risks from chronic conditions like hypertension, diabetes, and heart disease, yet rural healthcare is often hampered by cost and poor accessibility. This study introduces ElderAid, an integrated wearable device designed for holistic health oversight. By utilizing low-power sensors, the device tracks vital signs—including heart rate, blood pressure, and oxygen saturation—alongside physical activity. Uniquely, ElderAid incorporates mental health screening by monitoring stress through Heart Rate Variability (HRV) and interactive questionnaires. Data is processed locally via low-power microcontrollers to ensure efficiency and transmitted securely to caregivers through wireless connectivity. The system features an automated alert mechanism to trigger timely medical interventions during emergencies. While the current prototype focuses on physiological stress, it establishes a foundation for future AI-driven cognitive state inference and dementia detection. By merging physical and mental health monitoring into a compact, reliable platform, ElderAid enhances the safety and autonomy of seniors in resource-constrained environments, bridging the gap between remote living and quality clinical oversight. <i>Keywords:</i> Wearable Health Devices, Low-Power Microcontrollers, Remote Health Monitoring, Heart Rate Variability

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-RS-3178
Title :	Design, Simulation and Implementation of Dual Band Microstrip Antenna for X-band Satellite Applications
Authors:	Mrs. Kranti D. Patil, Digambar Jakkan, Swati Jakkan <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Modern wireless communication systems often require the antenna to work at several frequencies simultaneously. Multiband Microstrip antenna has attracted much attention in modern wireless communication. Several types of structures such as slot loading, T-type slot, H-slot antenna, different types of monopole antenna. Different types of stub loading can also produce multiple resonant frequencies. A novel pentagonal structure patch has been introduced in this paper obtained from the rectangular Microstrip antenna (RMPA). Multiband operation can be achieved using the modified structure. The good agreement of VSWR, gain and radiation efficiency at these resonant frequencies makes the antenna more practical and efficient. <i>Keywords:</i> Dual band , RMPA, stub loading, VSWR.

Paper ID :	ETC-RS-3179
Title :	Automatic Water Level Indicator and Controller by using ARDUINO
Authors:	Prof.Anita A.Patil, Priti K.Tekade, Shifa M.Patil, Sunil B.Kapure <i>KJEI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The drinking water crisis in India is reaching alarming proportions. It might very soon attain the nature of global crisis. Hence it is of extreme importance to preserve water. In home based water tanks, the one problem that is very common to us is the control of the water level of the overhead tank, as a result the wastage of water is increasing day by day. But we all know water is very precious to us. This problem can be controlled by a simple electronic circuit consists with some cheap electronic components that circuit is called 'water level indicator'. As the water level rises or falls, different circuits in the controller send different signals. The relay operates the water pump. So when the water level is maximum, the relay turns the pump OFF and when the water level is minimum, the relay turns ON the pump. This reduces the water wastage due to overflow from tanks and also ensures that water in the tank is always available to use. Also reduces human involvement in turning ON and OFF the pump, as this process is made entirely automatic. <i>Keywords:</i> Relay, LCD,Ultrasonic sensor, Arduino,Bridge Rectifier, Motor, 7- Segment Display, etc.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ETC-RS-3180
Title :	Comparison of AI-Based Intrusion Detection Systems: Techniques, Performance Evaluation, and recent developments
Authors:	Parmeshwar Sambhaji Kokare, Dr. GopalKrishna Dalvi, Dr. Subhash Deokar <i>Alard university, Pune, India</i>
Abstract:	Intrusion Detection Systems (IDS) are critical in ensuring the security and integrity of modern networks by detecting and mitigating malicious activities. Recent advancements in machine learning (ML), deep learning (DL), and artificial intelligence (AI) have emerged as promising approaches for enhancing IDS capabilities. Although existing studies have explored the advantages and limitations of these approaches individually, a notable gap remains in offering a detailed analysis of their applicability to specific use cases and scenarios. This paper addresses this gap by providing a comprehensive review that not only evaluates the strengths and weaknesses of ML, DL, and AI-based IDS but also offers practical guidance for selecting the most suitable approach based on unique intrusion detection contexts. Key factors considered include network size, data availability, privacy constraints, and security requirements. By aligning IDS strategies with these factors, this review equips practitioners with actionable insights to make informed decisions and optimize their IDS implementations. Ultimately, this work serves as a valuable resource for understanding the evolving landscape of IDS technologies and their applicability to diverse environments. Keywords: Intrusion Detection Systems, Cybersecurity, Network Security, Artificial Intelligence, Machine Learning and Deep Learning

Paper ID :	ETC-RS-3181
Title :	A Comprehensive Survey on Secure Information Hiding in Digital Videos Using Deep Learning
Authors:	Mrs. Jayashri D.Palkar, Anusha Vaidya, Deepthi Kulkarni , Vaishali Joshi, Priyanka kulloli <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The protection of information concealed within digital videos has attracted considerable interest because of the rapid expansion of multimedia communication. This survey offers a thorough analysis of deep learning techniques for video steganography and watermarking, addressing models, methods, datasets, evaluation metrics, challenges, and future prospects. The document consolidates recent progress and emphasizes research deficiencies for upcoming studies. Safe information concealment in digital videos has attracted considerable interest due to the rapid expansion of multimedia communication. This survey offers a comprehensive analysis of deep learning techniques for video steganography and watermarking, addressing models, approaches, datasets, assessment metrics, obstacles, and prospective paths. The paper combines recent progress and emphasizes research deficiencies for upcoming endeavors. Safe information concealment in digital videos has attracted considerable interest owing to the rapid expansion of multimedia communication. This survey offers a comprehensive analysis of deep learning techniques applied to video steganography and watermarking, including models, methods, datasets, evaluation criteria, challenges, and potential future developments. The document combines recent developments and points out research deficiencies for upcoming studies. Safe information concealment in digital videos has attracted considerable interest because of the rapid expansion of multimedia communication. This survey offers a comprehensive analysis of deep learning approaches for video steganography and watermarking, addressing models, methods, datasets, evaluation criteria, challenges, and future prospects.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ME-UG-3182
Title :	Optimization of CNC Router Machine
Authors:	Nikhil Sambhaji Khuspe, Vedant Mehatre, Rushikesh Pawar, Dr. K. B. Gavali <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Computer Numerical Control (CNC) machines are widely used in modern manufacturing industries due to their high precision, productivity, and automation capabilities. However, the high cost of industrial CNC machines makes them difficult to access for small workshops, educational institutions, and hobbyists. This project focuses on the design and development of a low-cost CNC router machine capable of performing operations such as cutting, engraving, and drilling on materials like wood, plastic, and soft metals. The machine is designed using a mechanical frame, stepper motors, lead screw or belt drive mechanisms, and a spindle motor for material removal. A microcontroller-based control system is used to control the movement of the machine along the X, Y, and Z axes. CAD software is used to design the machine components, while CAM software converts the design into G-code instructions that guide the machine operation. The developed CNC router aims to provide acceptable machining accuracy while maintaining low manufacturing cost. The system demonstrates the potential of CNC technology in small-scale applications and educational laboratories. The proposed machine can help students and small manufacturers understand CNC machining principles and perform basic fabrication tasks efficiently. <i>Keywords:</i> CNC Router, Automation, Stepper Motor, G-Code, Small-Scale Manufacturing

Paper ID :	ME-UG-3184
Title :	PRANA: Precision Rover for Autonomous Navigation & Analysis
Authors:	Siddhant Khobaragade, Adnan Juwle, Juned Jiya <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Prana Rover is an autonomous mobile robot designed for soil sampling and analysis in-situ on large farms. Operating over rough, off-road agricultural terrain, Prana carries an onboard drilling mechanism and sensors to extract soil cores up to 20 - 30 cm depth and immediately evaluate their nutrient content. It employs a four-wheel drive (BLDC motors with high torque) for locomotion, a powered auger and linear actuator for sample extraction, and NPK soil probes to measure nitrogen, phosphorus, potassium and pH levels. Navigation combines GPS/RTK positioning, inertial and vision-based sensing under a ROS 2 control framework, enabling the rover to follow planned paths and avoid obstacles (as in recent field robots). Extracted soil data are analyzed onboard via embedded ML models and transmitted via wireless link to a user app. In operation, Prana automates the laborious process of deep soil testing: it gathers samples across the field, analyzes nutrient levels, and produces a soil health map. This saves farmers substantial time and effort while providing actionable soil fertility reports within minutes (helping avoid over- or under-fertilization of different zones) <i>Keywords:</i> Autonomous Rover, Precision Agriculture, Soil Nutrient Monitoring, Deep Soil Sampling, Agricultural Robotics, Autonomous Navigation, Auger-Based Soil Extraction, Embedded Systems, Machine Learning, Internet of Things (IoT), Field Data Analytics, Smart Farming.

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Paper ID :	ME-UG-3185
Title :	Experimental Investigation of a Smart Solar Tracker with Automated Spray Cleaning System for Enhanced Photovoltaic Efficiency
Authors:	Nikhil Omprakash Baheti, Abhijit Bhingare, Suraj Korade , Adarsh Bawkar, Dr. Manoj Kumar Chaudhary <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	The increasing demand for electricity and the depletion of conventional energy resources have made renewable energy an essential alternative for sustainable power generation. Among various renewable sources, solar energy is clean, abundant, and environmentally friendly. However, the efficiency of photovoltaic panels is often reduced due to improper solar alignment and dust accumulation on the panel surface. This project proposes a smart solar tracking system integrated with an automated spray cleaning mechanism to enhance photovoltaic efficiency. The system uses Light Dependent Resistors (LDR sensors) to detect the intensity and direction of sunlight. Based on the sensor inputs, an Arduino microcontroller controls a stepper motor to rotate the solar panel using a lead screw linear motion mechanism, ensuring maximum exposure to sunlight throughout the day. In addition, an automated spray cleaning system with a linear cleaning mechanism is incorporated to remove dust and dirt from the panel surface. This helps maintain optimal panel efficiency and reduces manual maintenance requirements. The combined tracking and cleaning system improves energy output and ensures reliable solar power generation. This system offers a cost-effective and efficient solution for improving solar panel performance in real-world environmental conditions. <i>Keywords:</i> Solar Energy, Solar Tracking System, LDR Sensors, Arduino, Linear Cleaning Mechanism, Photovoltaic Efficiency.

Paper ID :	ME-UG-3186
Title :	Performance Evaluation of Single and Double Layer TiN Coatings on AISI D2 Tool Steel
Authors:	Gayatri Somnath Khandale, Yogesh Pawar , Sanket Khamthe, Ritesh Bhandare, Prof.M.S.Devdhe, Dr.A.H.Karle <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This study evaluates the performance of Titanium Nitride (TiN) coatings applied to AISI D2 tool steel via the Physical Vapour Deposition (PVD) process. The objective is to compare the mechanical properties of uncoated, single-layer TiN- coated, and double-layer TiN-coated samples. Although AISI D2 tool steel is extensively utilized in industrial settings for its superior wear resistance, it is hindered by drawbacks including frictional wear and surface degradation. To address these limitations, a TiN coating is applied to improve surface properties. The experimental investigation comprises tensile and impact testing performed in accordance with Indian Standards (IS). The uncoated sample demonstrated an ultimate tensile strength of 753. 63 MPa, a yield strength of 599. 49 MPa, and an impact energy of 15 J. The coated samples, whether single or double layered, are anticipated to exhibit enhanced mechanical performance and wear resistance. Comparing single- and double-layer coatings aids in understanding how coating thickness influences performance. The study concludes that TiN coating significantly improves the performance of AISI D2 tool steel, with double-layer coatings anticipated to yield even better results. <i>Keywords:</i> AISI D2 Tool Steel, Titanium Nitride (TiN), PVD Coating,

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Paper ID :	ME-UG-3187
Title :	Experimental Analysis of the Thermodynamic Performance of an Ice Plant With Nano Fluids With Primary Refrigerants R- 134a
Authors:	Akash Ghuge, Mayur Kheratkar, S.B. Mane , Dr. K.B.Gavali, Dr. Manoj Kumar Chaudhary <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This experimental study investigates the thermodynamic performance of a conventional ice plant using nano-fluids in combination with the primary refrigerant R-134a. Aluminum Oxide (Al₂O₃) nano-particles were dispersed in compressor lubricant at concentrations of 0.2%, 0.4%, and 0.6% by volume. Performance parameters such as Coefficient of Performance (COP), refrigeration effect, compressor work, pull-down time, and power consumption were evaluated. Results show that 0.4% nano-fluid concentration improved COP by 12–18% and reduced power consumption by 10% compared to the conventional system. <i>Keywords:</i> Ice plant, Nano-fluid, R-134a, COP improvement, Heat transfer enhancement

Paper ID :	ME-UG-3188
Title :	Design and Development of Smart Wi-Fi Plug
Authors:	Rahul Shivaji Yadav, Aniruddha Burgute , Satyajeet Dhumal ,Anish Indulkar , Swaroop Patil <i>Marathwada Mitra Mandal's College of Engineering Karvenagar Pune, India</i>
Abstract:	Consumers routinely use electrical devices, leading to a disparity between consumer demand and the supply side, a significant concern for the energy sector. Implementing demand-side energy management can enhance energy efficiency and mitigate substantial supply-side shortages. Current energy management practices focus on reducing power consumption during peak hours, enabling a decrease in overall electricity costs without sacrificing usage. To tackle the mentioned challenges and maintain system equilibrium, it is essential to develop a flexible and portable system. Introducing an intelligent energy management system could pre-empt power outages by implementing controlled partial load shedding based on consumer preferences. During a demand response event, the system adapts by imposing a maximum demand limit, considering various scenarios and adjusting appliance priorities. Experimental work, incorporating user comfort levels, sensor data, and usage times, is conducted using Smart Energy Management Systems (SEMS) integrated with cost-optimization algorithms. With the continuous development of Internet of Things technology and AI technology, a new generation of smart home systems is being promoted. Traditional smart home devices are complex to operate, resulting in high learning costs. They also lack security and reliability, and cannot guarantee the use and safety of the elderly and children, limiting their popularity. This system is based on ATMEGA2560 and IoT to design and implement a smart home system suitable for people of all ages. It solves complex operation problems through voice control, solves safety problems through fall detection, GPS positioning and light alarm control, and improves reliability through intelligent remote control. In addition, the system can sense fire, hazardous gases, and earthquakes and sound an alarm. The system reduces CPU occupancy time by changing the writing mode of the display module, thereby reducing the system's requirements for the processor and reducing the processor cost. In image processing, by recording a large number of faces, the recognition accuracy can be improved, the requirements and costs of image processing chips can be reduced, and low-cost remote video monitoring can be achieved. <i>Keywords:</i> Smart energy management systems, Smart grid Smart Plug, ATMEGA2560 IoT GPS Security Sense, Demand response, Renewable energy, Internet of things, Sensor.

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Paper ID :	ME-UG-3189
Title :	Manufacturing and testing of Parabolic dish concentrator for desalination
Authors:	Aniket Akhade, Shubham Satish Karge, Harshvardhan Rajsingh Kathaith, Ojas Sawant <i>Vidyavardhini's College of Engineering & Technology, India</i>
Abstract:	This study presents the manufacturing and testing of a parabolic solar dish concentrator developed for solar thermal applications such as cooking, water boiling, and desalination. The parabolic dish was fabricated using segmented reflector panels coated with aluminum foil and experimentally tested under outdoor conditions on a rooftop in Vasai, Maharashtra. The concentrator had a reflector area of approximately 1.5 m² and was oriented in the East–West direction to maximize incident solar radiation and focus the reflected rays onto a receiver positioned at the focal point. Experimental measurements were carried out by recording solar radiation, ambient temperature, and receiver temperature during operation. The system operated under solar radiation levels ranging from 650-900 W/m² with ambient temperatures between 31–39 °C. The receiver surface temperature reached 145–200 °C while water temperature increased up to 60–80 °C during heating and boiling experiments in the summer season. The developed system achieved an efficiency of up to 60% and successfully produced approximately ₹3.6/ Ltr of drinkable water, demonstrating its potential as a low-cost and sustainable solar thermal solution. <i>Keywords:</i> Parabolic solar dish concentrator; Solar thermal energy; solar desalination; Experimental analysis.

Paper ID :	ME-PG-3190
Title :	IoT-Based Smart Solar Tracking System for Enhanced Energy Efficiency
Authors:	Nanasaheb S. Zende, Vijay D. Kolate, Dr. Manoj Kumar Chaudhary <i>KJ Somaiya's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This research introduces an innovative IoT-enabled solar pane cleaning system designed to enhance the efficiency and performance of solar energy harvesting. The system employs Internet of Things (IoT) technology to automate and optimize the cleaning process ensuring optimal energy output from solar panels. Utilizing real-time data and sensors, the system intelligently identifies and schedules cleaning cycles based on environmental conditions, dust accumulation, and solar panel efficiency. The integration of IoT not only streamlines maintenance operations but also contributes to increased energy yield and prolonged solar panel lifespan. This research bridges the gap between renewable energy and smart technology, offering a sustainable and intelligent solution for maximizing the potential of solar energy systems. Solar panels operate by harnessing sunlight through solar cells. The efficiency of a solar panel is directly linked to the amount of light it receives the more light that impacts the panel. The greater the power it can generate. However, an inherent challenge arises due to the upward angle of solar panels, making them prone to accumulating dust and birds over time. Unlike rain, these elements do not effectively clean the panels. The accumulation of dirt on solar panels obstructs the penetrations of sunlight, diminishing the overall impact on the panel and subsequently reducing its power output. It is noteworthy that solar panel manufacturers and installers often project energy figures based on the optimal performances of clean panels. When dirt interferes, the panels may fall short of meeting these projected figures. Recognizing the detrimental impacts of dirt on solar panel efficiency, there is a compelling need for regular cleaning to maintain peak performance. To address the issue, we are actively engaged in the design and development of an automatic cleaning machine specifically tailored for solar panels. This innovative solution aims to enhance panel efficiency by ensuring the removal of accumulated dirt, thereby maximizing power output and extending the lifespan of the solar panels. Through this initiative, we are contributing to the sustainability and effectiveness of solar energy systems. <i>Keywords:</i> Solar Panel Cleaning, Renewable Energy, Energy Harvesting, Sensor Networks

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ME-RS-3191
Title :	Environmental Impact Assessment of Natural Refrigerants in HVAC Systems.
Authors:	Subhash Kumar, Manoj Kumar Chaudhary, Sagar Gadakh G H Raison College of engineering and management Pune, <i>India</i>
Abstract:	Heat pumps began to become fashionable among the mid-2000s; Associate in nursing around thirty eighth of homes had equipment by 2015. Heat pump technology has been promoted as being extremely energy economical; however there is usually conflicting recommendation on however best to figure Associate in Medical equipment and variable info on what quantity electricity it'll use. Apparatus performance is not a tough and quick issue and depends on: The indoor and outside temperatures once it's operational, what further energy use is concerned, like use of the dissolve system. system loading – performance are reduced if the warmth pump solely operates in difficult conditions, like getting used to heating cold rooms on cold mornings and evenings) to going away from the warmth pump incessantly. The quantity of your time the area was cooler than 16°C fell from thirty eighth of the time to but four-dimensional and needed no further electricity to run the Heat pump <i>Keywords:</i> Heat Pump, COP, R-290,R-22

Paper ID :	ME-RS-3193
Title :	Comparative Study of 3D Printed Polymer Materials Using Statistical Methods
Authors:	Sateesha Patil, Dr. Niteen Bhirud <i>Ajeenkya D Y Patil University, Charholi Bk, Lohegaon, Pune, 412105, Maharashtra, India.</i>
Abstract:	Additive manufacturing has revolutionized the modern manufacturing world in a big way for the ability to fabricate complex components with polymer materials in a short time (Wong and Hernandez, 2012). Among different additive manufacturing techniques, fused deposition modelling (FDM) is widely used because of its simplicity, cost effectiveness and the ability to manufacture functional prototypes (Dizon et al., 2018). This study aims at the fabrication and comparison of selected 3D printed polymer materials using the statistical methods. Polymer filaments such as PLA, ABS, Nylon, Polycarbonate, and Polypropylene are produced using FDM 3D printing system and their mechanical and tribological properties are tested by tensile strength, hardness, and wear tests as per the standards of ASTM. Statistical methods like Grey Relational Analysis are used for the determination of the influence of printing parameters and to find the optimal material performance (Zhang et al., 2021). A real-life example is presented by the manufacturing of lightweight components for the interiors of cars, as well as customized medical assistive devices made up of optimized polymer materials. <i>Keywords:</i> Polymer Materials, Fused Deposition Modelling, Mechanical properties, Tribological behavior, Grey Relational Analysis, Statistical Evaluation, Material Optimization, Engineering Applications

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Paper ID :	ME-RS-3194
Title :	Modeling and Prediction of Surface Roughness in Wire Arc Additive Manufacturing (WAAM): A Literature Review
Authors:	Khandu H raut, K.D.Sapate, K.B.Gavali <i>Alard University, India</i>
Abstract:	Wire Arc Additive Manufacturing (WAAM) has emerged as a prominent technique for fabricating large-scale metallic components, offering advantages such as high deposition rates, cost-effectiveness, and material efficiency. Despite its benefits, achieving consistent surface quality remains a significant challenge, directly impacting the functional and aesthetic aspects of manufactured parts. This literature review explores the current state of research on modeling and prediction of surface roughness in WAAM, focusing on methodologies, tools, and frameworks utilized to optimize surface quality. Key aspects examined include the role of process parameters (e.g., wire feed speed, travel speed, heat input), material behavior, and environmental factors influencing surface roughness. The review also evaluates computational approaches, such as Finite Element Modeling (FEM), machine learning, and statistical regression techniques, that aim to predict and control surface irregularities. By analyzing existing gaps and emerging trends, this study highlights the importance of integrating advanced predictive models with real-time monitoring systems to enhance surface quality. Furthermore, it identifies opportunities for future research in developing robust, generalized frameworks that accommodate diverse materials and complex geometries. This review serves as a comprehensive reference for researchers and practitioners seeking to advance the field of WAAM through improved surface roughness prediction and optimization. <i>Keywords:</i> Wire Arc Additive Manufacturing, Surface Roughness, Additive Manufacturing, Machine Learning, Artificial Neural Networks and Optimization Techniques

Paper ID :	ME-RS-3195
Title :	Structural Performance of Carbon Fibre-Reinforced Honeycomb Industrial Safety Helmets Fabricated via Fused Deposition Modelling: Finite Element Analysis and Experimental Validation
Authors:	Purva S. Adhawade, Mahesh K. Gaikwad , Gayatri Patil <i>K J College of Engineering and Management Research, Pune-411048, India</i>
Abstract:	Industrial safety helmets are the primary passive protection against occupational head injuries in construction, manufacturing, and allied sectors. Conventional acrylonitrile butadiene styrene (ABS) monolithic shells exhibit limited energy-absorption capacity, motivating the development of structurally superior alternatives. This paper presents the design, finite element analysis (FEA), fabrication, and experimental validation of a hybrid industrial safety helmet comprising a hexagonal honeycomb core manufactured by Fused Deposition Modelling (FDM) in Polylactic Acid (PLA), reinforced with a hand laid carbon fibre-reinforced polymer (CFRP) outer shell. Parametric CAD models were developed in CATIA V5 and static structural analyses conducted in ANSYS Workbench. Under a 2 mm prescribed crown displacement, the ABS baseline helmet yielded a maximum von Mises stress of 32.47 MPa and a force reaction of 218 N. The optimized CFRP-honeycomb helmet achieved a force reaction of 6336.2 N and a von Mises stress of 53.24 MPa, a 29 fold improvement in load carrying capacity with a safety factor of 10.9 against CFRP compressive failure. Experimental compression testing on a 400 kN Universal Testing Machine (UTM) produced a force reaction of 6330 N at 2.2 mm displacement, deviating less than 0.1% from the FEA baseline prediction. The results confirm that FDM-fabricated honeycomb CFRP helmets represent a structurally superior, weight-competitive alternative to conventional ABS helmet designs. <i>Keywords:</i> carbon fibre-reinforced polymer, fused deposition modelling, honeycomb structure

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Paper ID :	ME-RS-3196
Title :	Review on Performance and Emission Characteristics of Diesel Engines Fueled with Biodiesel-Based Fuels.
Authors:	Sandesh B. Mane, Kumar D.Sapate , K. B.Gavali <i>Alard University, S.No. 47 and 50 Marunji Hinjewadi Pune 411057</i>
Abstract:	Biodiesel has emerged as a promising renewable alternative diesel fuel in the compression ignition engine and reduced emissions. This review examines the performance and emission characteristics of diesel engines fueled with biodiesel-based fuels, synthesizing findings from extensive research. The recent findings include performance parameters like Brake thermal efficiency, brake specific fuel consumptions, fuel properties, combustion under certain conditions, emission trends Carbon monoxide, Nitrogen Oxides, and unburnt hydrocarbons. Additionally, advancements in Artificial Intelligence (AI) techniques are highlighted for their effectiveness in predicting and optimizing engine performance with biodiesel blends. The study further explores the challenges and opportunities associated with integrating biodiesel into existing diesel engine systems, emphasizing strategies to overcome technical limitations while maximizing environmental and economic benefits. The insights presented aim to guide future research and practical applications in developing cleaner, more efficient diesel engines powered by biodiesel blends. <i>Keywords:</i> Artificial Intelligence, Biodiesel, Combustion, Diesel Engines, Emission Reduction.

Paper ID :	ME-RS-3197
Title :	A Review on Enhancing Adhesion and Durability of PVD Hard Coatings through Micro Blasting
Authors:	Devdhe Mayur Sayaji, Sunil Waddar, Prerna Mishra <i>JSPM University Pune, India</i>
Abstract:	The functionality and lifespan of cutting and forming tools are influenced by adhesion between hard coatings and substrates. Inadequate bonding can cause early failure, increased wear, and coating delamination. Use of correct surface preparation techniques for maximizing coating-substrate interactions is crucial in overcoming the above issues. The microblasting technique is used primarily as a surface cleaning procedure. Studies reveal improved adhesion and durability of hard coatings. Microblasting generates beneficial compressive stresses and acts as a means for surface roughening to improve mechanical interlocking. This review article also elaborates that microblasting can be utilized post-nitriding to alter the surface topography and to improve the compressive stress state within the nitrided layer. The nitrided surface, which has been compressively strengthened, demonstrates enhanced adhesion and wear performance when coated through Physical Vapour Deposition (PVD), in comparison to substrates that are prepared using conventional methods. The review concludes that Microblasting can be a pretreatment strategy for advanced high-durability coated tooling systems. <i>Keywords:</i> Microblasting, PVD Coating, Post-treatment, Tool Wear, Tool Life

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	ME-RS-3198
Title :	Design and Optimization of Aluminum-Based Alloys for IC Engine Applications: Performance Evaluation and Microstructure–Property Relationships
Authors:	Dinesh Chaudhari, Saloni D. Shinde <i>KJEl's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	Aluminum-based alloys have become the backbone of modern internal combustion (IC) engine manufacturing due to their superior strength-to-weight ratio, excellent thermal conductivity, and corrosion resistance. This paper presents a comprehensive study on the influence of alloying elements such as silicon (Si), magnesium (Mg), copper (Cu), and nickel (Ni) on the mechanical, thermal, and tribological properties of aluminium alloys. The research integrates findings from over 50 scholarly articles published between 2021 and 2026, focusing on composition optimization for engine components such as pistons, cylinder heads, and engine blocks. The study further evaluates microstructural evolution, heat treatment effects, and performance trade-offs. Results indicate that Al-Si-Mg systems with controlled Cu and Ni additions provide optimal performance under high thermal and mechanical loading conditions. <i>Keywords:</i> Aluminium alloys, IC engines, piston materials, alloy composition, thermal performance, mechanical properties

Paper ID :	ME-RS-3199
Title :	A Machine Learning Approach for Detecting Diabetic Retinopathy Using Retinal Image Analysis
Authors:	Gaikwad Pradeep Uttam , Mahesh C. Shinde, Vijay Gulab Kharade , Mohammed Irfan, Shamshoddin Pathan <i>Jayawantrao Sawant College of Engineering, Hadapsar Pune-411028, India</i>
Abstract:	Image segmentation is defined as the process in which a digital image is divided into multiple segments or sets of pixels, commonly referred to as image objects. Through segmentation, the representation of an image is simplified so that meaningful information can be more easily analyzed. Retinal imaging is widely used as a clinical procedure for visualizing and recording the structure of the retina. Blood vessel segmentation in retinal images is commonly performed for the early diagnosis of retinal diseases such as hypertension, diabetes, and glaucoma. It is considered an essential preprocessing step in the detection of retinal disorders. The extraction of retinal vasculature is used to support the early identification of diabetic retinopathy and to help prevent vision loss. The morphology of blood vessels in retinal fundus images is regarded as an important indicator of diseases. In diabetic retinopathy detection, colour fundus images are preprocessed, diagnostic features are extracted, and classification is performed using image processing algorithms.

3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026)

Paper ID :	MCA-RS-3200
Title :	Gesture Controlled Virtual Mouse with Voice Integration Using Computer Vision and AI
Authors:	Sameer Kakade, Amit Bhusari, Pramod Jadhao, Pritish Bisane, Sujata Patil <i>KJJI's Trinity Academy of Engineering, Pune-411048, India</i>
Abstract:	This work introduces a multimodal human– computer interaction system that combines real-time hand-gesture mouse control with on-device voice assistant, providing touchless and accessible computing with standard webcams and microphones. Gesture recognition utilizes MediaPipe landmark tracking and OpenCV pipelines to translate fingerstate encodings into mouse events like movement, clicks, dragging, and scrolling. Pinch dynamics are also extended for system-level commands, and a hybrid offline/online voice loop is used for application launching, operating system automation, and contextual queries. The new system has four primary contributions: (1) a stable gesture encoding scheme with temporal stabilization, (2) a latency-conscious controller that adjusts cursor gain based on motion size, (3) bidirectional arbitration of gesture and voice input modes, and (4) a full evaluation testbed covering accuracy, latency, resource utilization, and accessibility in diverse lighting and backgrounds. Experimental benchmarks illustrate $\geq 95\%$ accuracy in click detection, < 0.20 s latency for gesture actions, and robustness in low-light conditions using adaptive thresholding and confidence gating. The system addresses typical issues of lighting sensitivity, pinch variability, and network reliance in voice services. Future research will add eye-gaze fusion, improved multimodal arbitration, and multilingual ASR/NLU to further expand accessible and context-sensitive interaction. Keywords: Hand gesture recognition, Gesture Controlled Virtual Mouse, virtual mouse system, MediaPipe, OpenCV

Paper ID :	MCA-RS-3202
Title :	A review on Nano-Enhanced Composites Materials for Brake Pad Application
Authors:	Vrushali S. Gaikwad, Mahasidha Birajdar, Abhijeet Auti <i>KJJI's Trinity college of Engineering and Research, Pune-411048, India</i>
Abstract:	Brake pads are essential components in automotive braking systems responsible for converting kinetic energy into thermal energy through friction. Traditional brake pads relied heavily on asbestos-based materials due to their excellent thermal resistance and mechanical strength. However, the carcinogenic nature of asbestos led to the development of safer and environmentally sustainable alternatives. Recent research has focused on nano-enhanced composite materials that provide improved tribological behavior, thermal stability, and wear resistance. This paper reviews the development of nano-reinforced brake pad composites including natural fiber reinforced materials, ceramic nanoparticle composites, and metal matrix composites. The review summarizes material composition, fabrication techniques, tribological properties, and research trends reported in literature between 2016 and 2026. Comparative analysis indicates that nano-reinforced composites significantly enhance friction stability, reduce wear rate, and improve thermal resistance. Hybrid composites combining nano-reinforcements and natural fibers appear to be promising candidates for sustainable brake pad applications. Keywords: brake pads, nano composites, friction materials, tribology, automotive braking systems

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About ImCReTE 2026:

The 3rd International Multidisciplinary Conference on Research, Technology & Engineering (ImCReTE-2026), organized by Trinity Academy of Engineering on 11th April 2026, aims to bring together innovative academicians, researchers, and industry experts on a common platform. The conference focuses on the rapid strides and technological advancements in the fields of Science, Engineering, and Technology. It provides an opportunity for knowledge exchange, discussion of emerging trends, and presentation of cutting-edge research. ImCReTE-2026 also aspires to showcase the technical excellence of budding technocrats, research scholars, and professionals from academia and industry.

By fostering interdisciplinary collaboration and innovation, the conference contributes to the advancement of research and encourages participants to address real-world challenges through technological solutions.

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2. Electronics, Communication & Instrumentation Engg, VLSI Design, Embedded System.
3. Mechanical, Mechatronics, Robotics & Automation, Production, Automobile, Thermal.
4. Civil & Environmental, Geotechnical Engg.

Prepared by

Prof. Mayur S. Devdhe

Assistant Professor,
Department of Mechanical Engineering,
Trinity Academy of Engineering, Pune

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