About Conference

Material science research and advancements in manufacturing technology are key markers of the contemporary high-tech revolution. Technological developments in the fields of materials science and manufacturing aim to validate these notions and conceptions. The conference is titled "International Conference on Advances in Materials Manufacturing and Artificial Intelligence Applications" in light of the aforementioned facts. These ideas and concepts will be confirmed by technological progress in materials and production domains. The primary aim is to enhance the quality of life for the general public by advancing theory and practice across various scientific disciplines and research sectors. Organizing a conference by the Department of Mechanical Engineering in Association with the Internal Quality

ISBN: 9789334251142

Editor(s):

Dr. Yashvir Singh

Prof. S.K.S. Yadav

Dr. Nishant Kumar Singh

International Conference

On

Advances in Materials, Manufacturing and Artificial Intelligence Applications

Department of Mechanical Engineering was established in 1964. It is currently offering an Undergraduate program of B.Tech. in Mechanical Engineering with an intake of 80 students. Apart from this it also runs a regular Post graduate of M.Tech. in Computer-Aided Design with an intake of 18 students. Also, it offers Regular and Part-time Ph.D. with 10 seats of intake. Most of the faculty members are well qualified and have completed their Ph.D. from reputed Institutions. The Department has well-equipped laboratory and research facilities to cater to the needs of UG and PG programmes. The department also extends Testing and Consultancy work for local Industries.

Abstract Proceedings of International Conference on Advances in Materials, Manufacturing and Artificial Intelligence Applications (ICAMMAIA-2025)- organized by Department of Mechanical Engineering in collaboration with Internal Quality Assurance Cell, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India

Conference Date: 4th to 5th April 2025

Abstract Book: Proceedings of International Conference on Advances in Materials, Manufacturing, and Artificial Intelligence Applications (ICAMMAIA-2025)

Organized by

Department of Mechanical Engineering & Internal Quality Assurance Cell

Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Editor (s)

Dr. Yashvir Singh
Associate Professor and Associate Dean (CE&IQA), Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Prof. S.K.S. Yadav
Professor, Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Dr. Nishant Kumar Singh
Associate Professor, Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Book Title: International Conference on Advances in Materials, Manufacturing and Artificial Intelligence Applications (ICAMMAIA-2025)

Organized by

Department of Mechanical Engineering & Internal Quality Assurance Cell, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Editor (s):

Dr. Yashvir Singh

Prof. S.K.S. Yadav

Dr. Nishant Kumar Singh

ISBN: 9789334251142

Disclaimer: The author(s) of each paper appearing in this publication is/are solely responsible for the content thereof: the findings, interpretations and conclusions expressed in the papers are those of the authors and do not reflect the view of the editors, reviewers, scientific committee members, the publisher, conference partners or anyone else involved in creating, producing or delivering this publication.

CONTENTS

Abstract Proceedings

International Conference on Advances in Materials, Manufacturing, and Artificial Intelligence Applications (ICAMMAIA-2025)

Organized by

Department of Mechanical Engineering

&

Internal Quality Assurance Cell

Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Editor (s)

Dr. Yashvir Singh
Associate Professor and Associate Dean (CE&IQA), Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Prof. S.K.S. Yadav
Professor, Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

Dr. Nishant Kumar Singh
Associate Professor, Department of Mechanical Engineering,
Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

ABOUT UNIVERSITY

Harcourt Butler Technical University (Formerly Harcourt Butler Technological Institute, Kanpur) has always been a paragon and a source of inspiration in the field of science and technology since the year 1921. Now, as per Act No. 11 of 2016 by the government of Uttar Pradesh it is upgraded to University, i.e, Harcourt Butler Technical University, Kanpur (HBTU, Kanpur). The University has been established with a view for making it a leading Residential University w.e.f 01.09.2016 to become a "Centre of Excellence" with focus on Research and Development and Incubation in the field of Engineering, Technology, Basic & Applied Sciences, Humanities, Social Science & Management and other professional courses. HBTU, Kanpur aims to promote studies, research & innovation in engineering areas of higher education, to enhance skill development through continuing education programme and to achieve excellence in higher technical education.

On academic front, the University is running four schools namely, School of Engineering (SoE); School of Chemical Technology (SoCT); School of Basic & Applied Sciences (SoBAS) and School of Humanities and Social Sciences (SoHSS). The University offers thirteen Undergraduate Programmes (B.Tech.) in Chemical Engineering, Civil Engineering, Computer Science & Engineering, Electrical Engineering, Electronics Engineering, Information Technology, Leather Technology, Mechanical Engineering, Biochemical Engineering, Food Technology, Oil Technology, Paint Technology and Plastic Technology and one undergraduate programme in Bachelors of Business Administration (BBA) programme. It also offers M.Tech. programmes in eleven specializations. In addition, it runs a regular Master of Computer Application (M.C.A), Master of Business Administration (MBA), Master of Science (M.Sc.) in three streams (Physics, Chemistry and Mathematics). The University also offers doctoral programme in all the departments. Four departments of the University namely, Civil, Mechanical, Electronics and Chemical Engineering are recognized Quality Improvement Program (QIP) Centres for Ph.D. programmes.

The University provides a congenial environment for the holistic growth and all round development of the students such that they become globally acceptable personalities with communication skills, aptitude, problem solving capabilities and to work as a team.

HBTU Kanpur has received aid from the World Bank (Phases TEQIP-I, TEQIP-II & TEQIP-III) for various developmental projects. This aid has been utilized for development of the infrastructure, new laboratory equipments, maintenance and modernization of old laboratory equipments etc.

The faculty members have contributed large numbers of research papers in Indian as well as International journals. Besides, many R&D Schemes sponsored by D.S.T, U.G.C, I.C.A.R, D.R.D.O.,U.P.C.S.T., C.S.I.R., D.A.E., I.C.M.R.,D.O.E. and Ministry of Civil supplies have been successfully completed. All these accomplishments definitely prove it to be a fecund ground for nurturing intellects.

ABOUT DEPARTMENT

Department of Mechanical Engineering was established in 1964. It is currently offering an Undergraduate programme of B.Tech. in Mechanical Engineering with an intake of 60 students. Apart from this it also runs a regular Post graduate of M.Tech. in Computer Aided Design with intake of 18 students. Also it offers two part-time M.Tech. programmes with specializations in Mechanical Engineering Design and Industrial System Engineering with intake of 10 students in each programme. Presently, the Department is also a Quality Improvement Programme (QIP) centre for Ph.D. with two seats along with 01 seat under TEQIP II programme of World Bank. Most of the faculty members are well qualified and have completed their Ph.D. from reputed Institutions. The Department has well equipped laboratory and research facilities to cater to the need of UG and PG programme. Department also extends Testing and Consultancy work for local Industries.

INTERNAL QUALITY ASSURANCE CELL

The **Internal Quality Assurance Cell** objectives are:

- To ensure that the University must institutionalize and internalize all activities undertaken with help from both internal and external sources to guarantee a culture of quality.
- The creation of a structure for deliberate, dependable, and catalyst action aimed at enhancing the institution's administrative and academic performance.

The strategies of IQAC involved the following **mechanisms**:

- Ensuring the timely, effective, and progressive completion of financial, administrative, and academic assignments through high-caliber, pertinent academic and scientific initiatives.
- Academic programs should be affordable and accessible to all segments of society.
- Modern teaching and learning techniques are optimized and integrated.
- The credibility of the assessment and evaluation process.
- Making certain that the necessary resources and services are allocated, and maintained.
- Adequate networking and exchanging research findings with other Indian and international universities.

CONFERENCE AIM AND OBJECTIVE

Material science research and advancements in manufacturing technology are key markers of the contemporary high-tech revolution. Technological developments in the fields of materials science and manufacturing aim to validate these notions and conceptions. The conference is titled "**International Conference on Advances in Materials Manufacturing and Artificial Intelligence Applications**" in light of the aforementioned facts. These ideas and concepts will be confirmed by technological progress in materials and production domains. The primary aim is to enhance the quality of life for the general public by advancing theory and practice across various scientific disciplines and research sectors. Organizing a conference by the Department of Mechanical Engineering in Association with the Internal Quality Assurance Cell at Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India will lead to various benefits to society like discussion of the latest developments and their applications and serves as a premier international forum for the exchange of knowledge and addressing recent challenges in the field of Mechanical Engineering and associated disciplines

CONFERENCE THEMES

Track 1: Advances in Material Science

- Material synthesis and characterization
- Sustainable materials
- Smart materials
- Structural materials
- Biocompatible materials
- Polymers and biopolymers
- Composite materials, metallic, and their alloys
- Surface Engineering and Coatings
- Nanomaterials and its applications
- Advanced energy materials

Track 2: Green Manufacturing Technologies

- Progress and prospects of green manufacturing
- Social and economic rules for green manufacturing
- Fabrication routes for green manufacturing
- Eco materials and life cycle assessment
- Product design for sustainability
- Sustainable power generation
- Green Manufacturing through Clean Energy Supply
- Enabling Technologies for Assuring Green Manufacturing
- Green manufacturing approach during machining
- Meso/micro manufacturing equipment and processes in green manufacturing
- Modeling, analysis, and simulation of green manufacturing processes
- Nanofabrication and applications in green manufacturing

Track 3: Sustainable Energy Technologies

- Bioenergy and biofuels
- Energy from coal
- Carbon capturing and utilization
- Waste-derived energy, energy storage, and flexible production energy effectiveness.
- Effects of smart technologies on the environment
- Energy shift
- Removal of greenhouse gases
- The petroleum and processing sector
- Energy applications using smart technologies

Track 4: Application of Artificial Intelligence

- AI Algorithms and Applications related to manufacturing
- Bioinformatics
- CAD Design and Testing related to materials and manufacturing
- Machine Learning Tools
- Fuzzy Logic, Computational Theories of Learning
- Hybrid Intelligent Systems
- Multimedia and Cognitive Informatics
- Neural Networks
- Parallel Processing and Pattern Recognition
- Pervasive Computing and Ambient Intelligence
- Soft Computing Theory and Applications related to manufacturing
- Web Intelligence Applications and Search

COMMITTEE MEMBERS

CHIEF PATRON

Prof. Samsher, Hon'ble Vice Chancellor, HBTU, Kanpur**,** Uttar Pradesh, India

PATRON

Prof. Dipteek Parmar, Hon'ble, Pro Vice Chancellor, HBTU, Kanpur**,** Uttar Pradesh, India
Mrs. Anju Verma, **Registrar,** HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Vinay Pratap Singh, **Dean, School of Engineering,** HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Raghuraj Singh, Dean, Research and Development, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Lalit Kumar Singh, Dean, Academic Affairs, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Alak Kumar Singh, Dean, Student Welfare, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Jitendra Bhaskar, Dean, Incubation Hub, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Vandana Dixit Kaushik, Dean, Continuing Education and Internal Quality Assurance, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Ashish Kapoor, Dean, International Student Affairs, HBTU, Kanpur**,** Uttar Pradesh, India
Prof. Sanjeev Kumar, Coordinator, HRD Cell, HBTU, Kanpur**,** Uttar Pradesh, India

CHAIRMAN

Prof. Anand Kumar, Head, Department of Mechanical Engineering, HBTU, Kanpur**,** Uttar Pradesh, India

Prof. Vandana Dixit Kaushik, Dean, Continuing Education and Internal Quality Assurance, HBTU, Kanpur**,** Uttar Pradesh, India

CONVENER AND ORGANIZING SECRETARY

Prof. Sanjeev Kumar Singh Yadav, Professor, Department of Mechanical Engineering, HBTU, Kanpur, Uttar Pradesh, India
Dr. Yashvir Singh, Associate Professor, Department of Mechanical Engineering and Associate Dean, Continuing Education and Internal Quality Assurance, HBTU, Kanpur**,** Uttar Pradesh, India
Dr. Nishant Kumar Singh, Associate Professor, Department of Mechanical Engineering, HBTU, Kanpur, Uttar Pradesh, India

INTERNATIONAL ADVISORY COMMITTEE

Prof. Vladimir Strezov, Macquarie University, Australia
Prof. Wei-Hsin Chen, National Cheng Kung University, Taiwan
Prof. Erween Abd Rahim, Universiti Tun Hussein Onn Malaysia, Malaysia
Dr. Muhammad Arif Mahmood, Missouri University of Science and Technology, USA.
Prof. M.M. Noor, Universiti Malaysia Pahang, Malaysia
Prof. Mohamed Kchaou, College of Engineering, University of Bisha, Saudi Arabia
Prof. Irfan Anjum Badruddin, College of Engineering, King Khalid University, Saudi Arabia
Dr. Arkom Palamanit, Prince of Songkhla University, Hat Yai, Songkhla, Thailand
Dr. Abid Farooq, Environmental Engineering, Stockholm University, Sweden
Dr. Nand Kishore Singh, Rowan University, New Jersey, USA

NATIONAL ADVISORY COMMITTEE

Prof. J. Ram Kumar, Indian Institute of Technology, Kanpur, India
Prof. P.M. Pandey, Indian Institute of Technology, Delhi, India
Dr. Deepak Singh, Lead Consultant, Energy Utilities and Services, Infosys Limited, Gurgaon, India
Prof. Kalyan Singh, Indian Institute of Technology(ISM), Dhanbad, India
Mr. Sushil Singh, Steel Authority of India Limited, Rourkela, India
Mr. Diwas Joshi, Oil and Natural Gas Corporation Limited, Dehradun, India
Mr. Shobhit Singh, Reliance Industries Limited, Jamnagar, India
Mr. Satyam Gupta, Saint Gobain India, Delhi
Mr. Umakant Pandey, Tata Motors Limited, Jaipur, India
Prof. Rajeev Upadhyay, Director, KNIT, Sultanpur, India
Prof. P. K. Jain, IIITDM, Jabalpur, India
Prof. Varun Sharma, Indian Institute of Technology, Roorkee, India
Prof. Rajeev Kumar Dohare, MNIT, Jaipur, Rajasthan India
Dr. Anil Kumar, ISRO, Trivandrum, India
Dr. Gurminder Singh, Indian Institute of Technology, Mumbai, India
Dr. Prashant Rawat, Indian Institute of Technology, Chennai, India
Dr. Girish Chand Verma, Indian Institute of Technology, Indoor, India
Dr. Pawan Sharma, Indian Institute of Technology (BHU), Varanasi, India
Dr. Dilshad Ahmad Khan, National Institute of Technology, Hamirpur, Himachal Pradesh
Dr. Vivek Patel, MNNIT Allahabad, Prayagraj, Uttar Pradesh
Dr. Pushpendra Kuamr, Graphic Era Deemed to be University, Dehradun, India
Prof. Mohit Makkar, LNMIIT, Jaipur, India
Prof. Uday Bhan, UPES, Dehradun, India

LOCAL ORGANIZING COMMITTEE

Steering Committee: Oversees the overall conference planning and decision-making, usually appointing the General Chair.

- **Prof. Anand Kumar, Head, Department of Mechanical Engineering,** HBTU, Kanpur**,** Uttar Pradesh, India
- **Prof. Vandana Dixit Kaushik, Dean, CEIQA,** HBTU, Kanpur, Uttar Pradesh, India
- **Prof. Vinay Pratap Singh, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Prof. Sanjeev Kumar Singh Yadav, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Yashvir Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Nishant Kumar Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Program Committee: Responsible for reviewing paper submissions, selecting presentations, and creating the conference schedule.

- **Dr. Yashvir Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. Keshav Gupta, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Gaurav Saini, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Nisha Singh, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Vandana Yadav, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Finance Committee: Manages the conference budget, including funding, expenses, and sponsorships.

- **Prof. Sanjeev Kumar Singh Yadav, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Yashvir Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Nishant Kumar Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Invitation Committee: Invitation to keynote speakers and guests

- **Prof. Jitendra Bhaskar, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Nisha Singh, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. Abhay Dwivedi, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Publicity Committee: Promotes the conference through marketing and outreach efforts.

- **Prof. S.K. Singhal, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Prof. Rajesh Kumar Verma**, **Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. R.K. Ambikesh**, **Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. Indresh Verma, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Registration Committee: Handles attendee registration. logistics and check-in process.

- **Dr. Rishi Kant, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. Praveen Kumar Rai, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Anamika Mishra Pandey, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Local Arrangements Committee: Organizes local details like venue logistics, transportation, and catering.

- **Dr. Gaurav Saini, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Mr. Keshav Kumar Gupta, Assistant Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Ankita, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

Publication Committee: Oversees the publication of conference proceedings or papers.

- **Prof. Sanjeev Kumar Singh Yadav, Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Yashvir Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Dr. Nishant Kumar Singh, Associate Professor, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India
- **Ms. Nandini, Research Scholar, Department of Mechanical Engineering,** HBTU, Kanpur, Uttar Pradesh, India

ICAMMAIA_2025_001

SKETCH TO FACE AI

[1]Kavish Paraswar, [1]Sai Jadhav, [1]Neel Sahasrabudhe, [1]Rutuja Chaudhari, [1*]Prof Archana Burujwale

[1]Vishwakarma Institute of Technology, Upper Indira Nagar, Bibwewadi, Pune, Maharashtra 411037
[*]Corresponding author: archana.burujwale23@vit.edu

ABSTRACT

The transformation of hand-drawn facial sketches into photorealistic images represents a significant challenge in computer vision with widespread applications. This research presents an innovative approach combining advanced Convolutional Neural Networks (CNNs) and Generative Adversarial Networks (GANs) to address the sketch-to-photo conversion challenge. Our framework implements a novel attention mechanism focusing on facial features while ensuring accurate reconstruction of complex characteristics. The methodology incorporates a multi-stage processing pipeline with enhanced feature propagation and sophisticated loss functions to maintain identity preservation. Experimental results demonstrate superior performance in generating high-fidelity facial images from sketches, with success in preserving individual facial characteristics and natural skin textures. This work contributes significantly to applications in law enforcement, digital artistry, and entertainment industries by providing a robust solution for automated facial reconstruction from sketches.

Keywords: Computer Vision; Deep Learning; Facial Recognition; Sketch Recognition; Synthetic Image Generation; GANs.

ICAMMAIA_2025_002

ATTENDANCE MONITORING SYSTEM USING LBPH ALGORITHM AND TKINTER GUI

Archana Burujwale[1], [1]Swaraj Patil[1], Prachi Pawar[1], Rohit Kalaskar[1], Shravani Shirpurkar[1]

[1]Vishwakarma Institute of Technology, Upper Indira Nagar, Bibwewadi, Pune, Maharashtra 411037

[*]Corresponding author: archana.burujwale23@vit.edu

ABSTRACT

In present rapidly changing technological world, attendance cannot be regarded as one of the integral educational practices based on traditional thoughts. The traditional approach makes it challenging to handle significant student attendance in a classroom setting. The process, apart from taking much time, also involves a greater scope for mistakes in data entry, thus this method is not preferred. The Real-Time Face Recognition has developed an excellent solution toward effectively tracking daily attendance efficiently. For a significant number of students. Although numerous algorithms and techniques are invented to enhance face recognition, our proposed model uses the Haarcascade classifier to judge the fantastic and poor features of a face, together with the LBPH identification set of rules, both in Python OpenCV library. For the person interface, we use Tkinter GUI.

Keywords: Local Binary Pattern Histogram (LBPH); Face Detection; Face Recognition; Haarcascade Classifier; Python; Student Attendance.

ICAMMAIA_2025_004

MUSICAL CHORD RECOGNITION USING CONVOLUTIONAL NEURAL NETWORK

Akash Naikare[1,*], Vedant Wate [1,] Tanish Waghule [1,] Tushar Magare[1], Nilesh Korade[1]

[1]JSPM'S Rajarshi Shahu College of Engineering Pune, India
[*]Corresponding author email: akashnaikare321@gmail.com

ABSTRACT

A fundamental component of musical analysis is the knowledge of musical chords, which facilitates the understanding of the harmonic patterns seen in songs. An innovative method for chord detection using convolutional neural networks (CNNs) is presented here, which draws motivation from recent development in audio-based music analysis. In-depth chord information can be easily extracted from audio raw data using the method we describe. To find complex patterns found across a range of musical genres, our approach leverages CNN's hierarchical learning capacity. Its adaptability to variations in instrumentation, speed, and recording conditions makes the model a versatile tool for chord recognition in a variety of musical styles. In addition to accurately decoding chords, our methodology also improves the interpretability of the underlying musical structures. In addition to advancing the field of automatically recognized chords, this research gives insight into the changing dynamic between artistic interpretation and technology. We will explore the theoretical underpinnings, architectural complexities, experimental results, and implications for future research in the parts that follow, providing a significant addition to the ever-evolving field of music.

Keywords: Music; Chords; Convolutional Neural Network; Structure; Dynamic.

ICAMMAIA_2025_006

A SYSTEMATIC REVIEW ON MACHINE LEARNING ALGORITHMS IN DIAGNOSIS OF ALZHEIMER'S DISEASE

Viraj Patil[a),1] , Yash Yadav [b)], Tanay Patil[c)] and Shivang Gupta[d)]

[1]Department of Information Technology, Pimpri Chinchwad College of Engineering, Pune, India

[a)] Corresponding author: viraj.patil211@pccoepune.org
[b)] yash.yadav21@pccoepune.org

[c)] tanay.patil21@pccoepune.org

[d)] shivang.gupta21@pccoepune.org

ABSTRACT

Alzheimer's disease is a progressive neurodegenerative disease for which its cure is yet to be found. Researchers believe that it occurs due to a variety of age related changes in the brain, including hereditary factors, external influences and lifestyle choices. Since there is no cure for the disease, its early detection is of paramount importance. This paper gives an all-round view of the potential applications of machine learning algorithms for swift diagnosis. Furthermore, this paper comprehensively compares the efficiency of different Machine Learning algorithms to detect Alzheimer's in its earliest stages based on magnetic resonance image (MRI) processing. This paper can be used as a valuable resource for future research and development in the field of neuroscience as well as machine learning.

Keywords: Alzheimer's disease; factor; brain; neuroscience; machine learning.

ICAMMAIA_2025_007

PLANT HEALTH MONITORING SYSTEM

Archana Burjwale[1], Sangita Jaybhaye[1], Aditi Pawar[1,] Vaishnavi Pawar[1], Jeyeshtha Pendharkar[1], Aditya Pimparwar[1],

[1]Department of Computer Engineering (AI), Vishwakarma Institute of Technology, Pune, India
[*]Corresponding author email: jeyeshtha.pendharkar23@vit.edu

ABSTRACT

Monitoring plant health is a crucial step toward sustainable agriculture and optimal crop yield. This paper outlines a deep learning approach to classify the health status of plants as either healthy or stressed and then quantify the level of stress, in case of a stressed plant condition. A Kaggle dataset pre-processed for this analysis provided a foundation to focus more on developing the model. Soil moisture, humidity, and temperature sensors provided supportive data supplemented by occasional entry of additional information for a comprehensive perspective of the plant's environment. Multiple models have been trained, and the Keras Sequential model was the best model because it showed the ability to learn complex patterns and relationships that characterize the data. The model makes it possible to have reliable predictions with a good amount of lead time to intervene on potential triggers of plant stress. Such methodology has underscored the potential in combining sensor technology and advanced deep learning techniques for intelligent monitoring of plant health, leading to more effective precision agriculture practices.

Keywords: Plant health monitoring; Deep learning; Neural-Network; Keras Sequential model; sensor data; soil moisture.

ICAMMAIA_2025_010

DESIGN AND DEVELOPMENT OF DEFLECTION SYSTEM FOR ELECTRON BEAM POWDER BED FUSION PROCESS

Avinash Kumar Mehta[1], Gopal Gote[1], Yogesh Patil[2], Yash Mittal[1], Parth Lalpurwala[1], Shahu Karade[1], V N Ramani[3], and K P Karunakaran[1]
[1]Indian Institute of Technology Bombay, Mumbai, India
[2]Indian Institute of Management Mumbai, India
[3]Plasma and Vacuum Technologies, Ahmedabad, India

Corresponding author email: avinashkumarmehta1993@gmail.com

ABSTRACT

The Electron Beam Powder Bed Fusion (EB-PBF) uses high-speed incoming EB to selectively scan the powder bed for melting and solidification. To control the part accuracy and built quality, the EB has to deflect over the powder bed precisely. This positioning and shaping of EB are achieved through a magnetic deflection system. The EB-PBF process uses high-speed scanning to increase the powder bed temperature slowly and gradually. This reduces the chances of residual stress. Further, due to high-speed scanning, the chances of smoking, which is one of the major limitations of the EB-PBF system, is reduced or even eliminated. Further, precise deflection of EB is challenging because of the interfering magnetic fields, which cause aberration. Also, EB gets defocused when it goes out of the center. Both the above reason, results in distorted and larger EB. Considering this, a deflection system is designed that can deflect the EB precisely over the powder bed. The analytical design of magnetic field requirements has been presented and found that a magnetic field of 1.1 mT is required to deflect the EB over the $\pm 10^0$ angle over the distance of 700 mm from the center of the coil. Further, the magnetic coil produced due to coil, has been simulated in COMSOL Multiphysics and found satisfactory. A unique bobbin has been designed to keep the coil together in a confined shape against various externals forces. The designed coil can precisely deflect the EB over the working table of 250 mm diameter.

Keywords: Electron beam powder bed fusion; melting; bobbin; COMSOL Multiphysics; Solidification.

ICAMMAIA_2025_011

AREVIEW ON INTEGRATION OF RENEWABLE ENERGY SOURCES INTO MINING FOR SUSTAINABLE DEVELOPMENT

Sasidhar Bongu[1, a)], Manjeet Singh[2, b)] and Deepak Pandey[2, c)]

[1]M. Tech Student, Mining Engineering, FIAT, SPSU, Udaipur, Rajasthan.

[2]Assistant Professor, Mining Engineering, FIAT, SPSU, Udaipur, Rajasthan.

Author Emails
[a)] sasidhar.mtech2023@spsu.ac.in
[b)]singh.manjeet@spsu.ac.in

[c)]Deepak.pandey@spsu.ac.in

Corresponding Author: [a)] sasidhar.mtech2023@spsu.ac.in

ABSTRACT

The mining industry is a significant driver of economic growth but also a major contributor to environmental degradation, particularly through its heavy reliance on fossil fuels. As global emphasis on sustainability grows, integrating renewable energy sources (RES) into mining operations presents an opportunity to mitigate the sector's environmental impact while enhancing economic and social benefits. This review explores the contribution of RES—such as solar, wind, hybrid energy—to the sustainable development of the mining industry. It examines current energy practices in mining, the technological integration of RES, and successful case studies from around the world. The paper highlights the economic, environmental, and social advantages of using renewable energy, including reduced carbon emissions, operational cost savings, and improved corporate social responsibility. However, challenges such as high initial investment costs, technological limitations, and regulatory barriers are also discussed. The review concludes by emphasizing the potential for future advancements in energy storage technologies and policy support to further drive the adoption of RES in mining, ultimately aligning the industry with global sustainability goals, including the Sustainable Development Goals (SDGs).

Keywords: Industry; SDGs; Global; Cost; Investment.

ICAMMAIA_2025_012

COMPARATIVE ANALYSIS OF ROCK SLOPE STABILITY USING ADVANCED METHODS ACROSS VARIOUS TYPES OF ROCK

Dr. Manjeet Singh[1], Dr. Deepak Pandey[2]
[1& 2]Assistant Professor, Mining Engineering, Faculty of Integrated and Advanced Technology,
Sir Padampat Singhania University, Udaipur, Rajasthan, India.

Corresponding Mail ID: - singh.manjeet@spsu.ac.in

ABSTRACT

Slope stability is a critical aspect of geotechnical engineering, particularly in mining, construction, and natural hazard assessment. Various methods, including the Hoek-Brown Criterion, Limit Equilibrium Method (LEM), and Finite Element Method (FEM), are employed to analyze and ensure slope stability for different types of rocks such as granite, marble, slate, sandstone, and limestone. Each method offers unique advantages and limitations. The Hoek-Brown Criterion provides a robust, empirical approach to assess rock mass strength and stability, accounting for geological discontinuities and material heterogeneity. It is particularly effective for analyzing intact and jointed rock masses under different stress conditions. The Limit Equilibrium Method, known for its simplicity, calculates the Factor of Safety (FoS) by comparing shear strength with applied stress along potential failure surfaces. FEM, a more advanced numerical technique, simulates complex slope geometries and coupled processes such as seepage and deformation. This study applies these methods to assess rock slope stability and compares their results. Findings indicate that the Hoek-Brown Criterion offers greater accuracy for intact and fractured rock masses, while LEM is efficient for simpler cases, and FEM excels in handling intricate scenarios. Recommendations are proposed for optimal slope angle designs to enhance safety and performance across varying geological settings.

Keywords: Geotechnical Engineering; Construction; Limit Equilibrium Method; granite; marble; slate; sandstone and limestone.

ICAMMAIA_2025_013

EXPLORING AI-DRIVEN TECH STACKS IN LEGAL GUIDE SYSTEM

Priyanka Sharma[1], Prema Sahane[1] Shivtej Rakhunde[1], Pradip Garad[1], Kshitij Thorat[1], Saujendra Ghosh[1]

[1]JSPM's Rajarshi Shahu College of Engineering, Pune, India

Author Email :- [1]pssharma@jspmrscoe.edu.in, [2]pbsahane_comp@jspmrscoe.edu.in

[3]shivtejrakhunde@gmail.com, [4]pradipgarad2004@gmail.com

[5]kshitijthorat15@gmail.com, [6]saujendra205@gmail.com

ABSTRACT

The objective of this paper is to investigate the continuously evolving technology stacks found in AI-driven legal systems, focusing on how these innovations enhance access to legal information and support decision-making processes. Through a comprehensive review of various AI tools—such as NLP-based chatbots, machine learning models and ontology-driven legal search frameworks -- this paper analyses past contributions for improving a variety of legal document summarization, case laws and article recommendations and even judgement predictions. Notably, key findings indicate that systems like LawRec, LAW-U, D-LADAN and ALEM significantly enhance the accuracy and accessibility of legal research; however, challenges still persist particularly in the field of processing efficiency and the dynamic adaptability of legal ontologies. Although the paper underscores the advancements achieved, it also addresses the ongoing challenges and outlines future research directions to optimise AI's function within legal technology. Our study compares the available legal AI systems, identifies major challenges such as adaptability to dynamic legal ontologies, and proposes future directions for enhancing AI-powered legal tools. Our results emphasize the role of AI in bridging the gap between legal experts, legal knowledge, and common people with the highest possible accuracy. This study is important as it assists in creating a more efficient legal system, addressing the current gaps and challenges.

Keywords: AI chatbot; legal article; recommendation system; case judgement; natural language processing**.**

ICAMMAIA_2025_014

CROP INFECTION DETECTION USING IMAGE SCREENING

Nilesh B. Korade[1], Pushpavati Kanaje[1], Bhupendra Patil[1], Rugved Vaishnav[1], Amey Mogre[1], Adarsh Patil[1],

Computer Department JSPM'S Rajarshi Shahu College of Engineering, Pune, India

Author's Email: nilesh.korade.ml@gmail.com, pkanaje_comp@jspmrscoe.edu.in, Bhupendrapatil7774@gmail.com, rugvedvaishnav@gmail.com, ameymogrepune@gmail.com, patiladarsh413@gmail.com

ABSTRACT

India, with a GDP of approximately $3.5 trillion, stands as one of the world's largest economies. Among its diverse sectors, agriculture holds a prominent position, contributing about 15-20% to the national GDP and also employing nearly 42% of the workforce. India is Second largest producer of Tomato in the world. It contributes to 11% of world tomatoes. As of 2023 Tomato Production was estimated to be over 20 million metric tons. Recently India exported 120,000 metric tons tomatoes which is approximately worth $22.8 million to countries i.e. Bangladesh, Nepal, Maldives and United Arab Emirates. Tomato cultivation faces many challenges like unpredictable weather patterns, pests, Soil erosion and Air circulation, Input cost and labor shortage, excessive water and post-harvest losses. We have Studied existing Approaches which has aimed at mitigating these issues and enhancing productivity in tomato farming, The approaches include Improved Agricultural Practices like Crop Rotation and Diversification, Integrated Pest Management (IPM), Technological Advancements like precision agriculture and genetic improvements and Water Management Strategies like rainwater harvesting and drip irrigation. In our approach, we will use ResNet 50. We will add a dataset of 10 Major diseases with 5000 images affecting the tomato crop. Then the collected images are pre-processed through resizing uniformity, data augmentation for diversity, and normalization to scale pixel values, facilitating efficient training. The collected dataset is used for training several deep learning algorithms such as AlexNet, VGG-16, CNN and ResNet-50. We harness real time tomato plant images for evaluating model effectiveness and then we analyze training and validation loss and accuracy. The results shows that ResNet-50 predicts the tomato condition from the provided images far more effectively than other methods. Performance matrix shows that among all the methods used ResNet 50 yields the most accurate prediction for all matrices.

Keywords: Crop; Real time; Soil erosion; Water; Productivity.

ICAMMAIA_2025_015

AN EXAMINATION OF SUPPORT SYSTEMS AND THEIR DESIGN IN UNDERGROUND COAL MINES

Deepak Pandey[1,a)], Manjeet Singh[2,b)]

[1&2]Assistant Professor, Mining Engineering, Faculty of Integrated and Advanced Technology, Sir Padampat Singhania University, Udaipur, Rajasthan, India.

[a)]Corresponding author: deepak.pandey@spsu.ac.in

[b)]Another Author: singh.manjeet@spsu.ac.in

ABSTRACT

In underground mining, a support system is crucial for ensuring the stability and safety of tunnels, shafts, and other excavated areas. The rock mass surrounding these underground spaces is often unstable and can pose serious risks, such as collapses or rock falls, which can jeopardize both worker safety and the integrity of the mining operation. This study explores support design systems in underground coal mines, emphasizing the goal of ensuring long-term stability. The main objectives are to analyze various coal mining methods and support types, create a support design strategy, and propose a monitoring tool for detecting immediate roof separation. The findings indicate that as mining depth and lateral stress increase, the rock mass rating (RMR) decreases, leading to greater rock load on galleries and a reduction in support safety factors. However, properly installed supports provide consistent resistance, regardless of depth. The proposed support design plan surpasses minimum safety standards, contributing to long-term stability. Furthermore, the study recommends using a three-point tell-tale for monitoring immediate roof separation. Overall, this research highlights the critical role of careful planning and continuous monitoring in enhancing safety and sustainability in underground coal mining operations, based on real-world data.

Keywords: Support Design; Roof Supports; Monitoring System; Rock Load; Rock Mass Rating, Mining Methods; RMR

ICAMMAIA_2025_016

CENTRALIZED LAND MANAGEMENT SYSTEM

Doodapaka Vishal[1], Donthireddy Mahendra Reddy[1], S. Dhamodaran, J. Refonaa[1], S.L. Jany Shabu[1], M. Maheswari[1]

[1]Computer Science and Engineering Sathyabama Institute of Science and Technology Chennai, India maheswari.cse@sathyabama.ac.in

ABSTRACT

Efficient land management systems are critical for addressing the challenges of rapid urbanization, resource allocation, and environmental sustainability. This project introduces a Centralized Land Management System designed to streamline land-related administrative processes, enhance data accessibility, and enable informed decision-making. The proposed system leverages a centralized architecture to integrate and manage land records, legal documents, and geographic information within a unified framework. Key features include automated record digitization, GIS-based visualization, and data-driven analytics for land use planning and policy formulation. The centralized approach addresses inconsistencies associated with decentralized systems, offering improved data integrity, enhanced security, and reduced administrative overhead. By adopting modern technologies, the system ensures scalability, interoperability, and user-centric functionalities, making it a robust solution for governments and private organizations. The implementation of this system has the potential to revolutionize land management by fostering transparency, operational efficiency, and equitable resource distribution.

Keywords: Centralized Land Management; GIS; Land Records Digitization; Resource Allocation; Urban Planning.

ICAMMAIA_2025_017

WEAR AND SURFACE CHARACTERISTICS OF 17-4PH STEEL: MAGNETIC ABRASIVE FINISHING WITH PERIODIC REDISTRIBUTION OF MAGNETIC ABRASIVE PARTICLES

Rahul Kumar[a)] and Venkateswara Rao Komma[b)]
Department of Mechanical Engineering, Motilal Nehru National Institute of Technology Allahabad, Prayagraj, Uttar Pradesh, INDIA
[a)]Corresponding author: rahul.2019rme54@mnnit.ac.in
[b)]kvrao@mnnit.ac.in

ABSTRACT

This experimental work investigates the wear and surface characteristics of 17-4PH stainless steel processed by Magnetic Abrasive Finishing (MAF) with periodic redistribution of magnetic abrasive particles (PR-MAPs) using an in-house developed attachment on Denford Triac CNC vertical milling machine. Performance parameters were compared with those obtained through surface grinding, including wear loss, specific wear rate, coefficient of friction (COF), surface morphology, and surface roughness profile. The MAF process achieved a nano-level surface finish of up to 95 nm, compared to 0.768 µm from Grinding. Tribometer tests using ball-on-disc showed that MAF finished samples have lower wear loss, specific wear rates, and COF at 10N and 20N loads. Scanning Electron Microscope (SEM) images confirmed more uniform, defect-free surfaces in MAF samples, supporting their enhanced tribological properties. These findings show that MAF with PR-MAPs is more effective for improving surface quality and wear resistance in applications like orthopaedic implants, surgical tools, and dental instruments.

Keywords: Magnetic abrasive finishing; 17-4PH steel; Surface roughness; Grinding; coefficient of friction; Tribology

ICAMMAIA_2025_024

DETECTING THE ENTRY OF WILD ANIMALS IN THE SPECIFIC BOUNDED AREA

Ch Tanoj Chowdary[1], K Chethan[1], Joshila Grace L.K[2]

[1]Dept.of Computer Science & Engineering, Sathyabama Institute of Science & Technology Chennai, India

cherukuritanoj685@gmail.com, chethankodipunjula@gmail.com

joshilagrace.cse@sathyabama.ac.in

ABSTRACT

The goal of this research is to apply computer vision techniques to construct a real-time wildlife animal detection system. Specifically, the YOLO (You Only Look Once) object detection model and Convolutional Neural Networks (CNNs) are utilized. YOLO, a pre-trained deep learning model, is used by the system to identify and categorize different animal species in the live video frames that are captured by a webcam. CNN-based algorithms are used to process the acquired frames during the detection phase, giving the model the ability to quickly and accurately identify animals. The device immediately records the matching picture or video frame and saves it as soon as an animal is identified. allowing people to see the creatures that have been detected in real time. With potential uses in environmental research, wildlife conservation, and animal behaviour studies, this YOLO and CNN integration for wildlife monitoring offers an effective, real-time way to observe and follow animals. The study shows how cutting-edge machine learning models and real-time processing can be combined to produce a user-friendly, portable wildlife detection solution that provides researchers and conservationists with an invaluable tool for tracking animal numbers and behaviour.

Keywords: Computer Vision; Real-Time Wildlife Animal Detection; YOLO; CNN; User Friendly; Portable

ICAMMAIA_2025_026

WEARABLES AND GARMENTS USING INTERNET OF THINGS

L.Lakshmanan[1], Manigandla Rohith[1], Mamidisetty Goutham Narayana[1]
[1]Department of computer science and Engineering, Sathyabama Institute of Science and Technology
lakshmanan.cse@sathyabama.ac.in; gouthamnarayana1419@gmail.com; manigandlarohith2@gmail.com

ABSTRACT

The wearables and smart garments based on the Internet of Things (IoT) technology is changing the manner in which we interact with fashion and our personal health. Realizing the modern healthcare requirements of the world, these innovative devices help users collect the real time health data that can track fitness performance, monitoring health metrics and acceleration of daily movement and activities. Equipped with sensors, smart textiles can adjust to environmental changes, providing personalized comfort and support. IoT enables seamless communication between garments and mobile applications, offering valuable insights into wellness and lifestyle. As IoT technology evolves, the potential applications of smart wearables expand, paving the way for advancements in healthcare, sports, and everyday life. These wearables not only foster a healthier lifestyle but also introduce new possibilities for personal well-being and environmental adaptation. This convergence of technology and fashion is transforming how we perceive and interact with clothing, creating opportunities for more connected, functional, and data-driven lifestyles.

Keywords: Wearables; IoT; Smart Garments; Health Monitoring; Fitness Tracking; Smart Textiles; Real-time Data; Personalized Feedback; Environmental Adaptation; Mobile Applications.

ICAMMAIA_2025_029

EFFECTIVENESS OF OPTIMUM EXERCISE, METFORMIN, AND OLEUROPEIN ON TYPE 2 DIABETES MANAGEMENT: A STATISTICAL APPROACH TO ENHANCE ENVIRONMENTAL PROTECTION

Dr. Darshna M. Joshi[1, a)]

[1]Department of Instrumentation and Control, Government Polytechnic Ahmedabad, Ahmedabad 380015, Gujarat, India

[a)] Corresponding author: darshna.joshi91@gmail.com

ABSTRACT

This research study aimed to assess the efficacy of a comprehensive therapy approach, encompassing optimum exercise, metformin, and oleuropein, in optimizing glycemic control among individuals with type 2 diabetes which is based on our recent paper. A comparative design was employed, contrasting the outcomes of patient's model receiving the therapy against those without intervention. The Mann-Whitney U test was utilized for data analysis, considering the non-normal distribution of the variables. The findings demonstrated a statistically significant improvement in glycemic control among patient's model undergoing the comprehensive therapy approach. These results substantiate the potential effectiveness of integrating optimum dosages as an adjunctive therapeutic strategy for type 2 diabetes management. The implications of this research hold relevance for healthcare practitioners and individuals with type 2 diabetes. The comprehensive therapy approach presents a promising avenue for personalized treatment strategies, potentially augmenting traditional interventions and yielding superior glycemic outcomes. This study contributes empirical evidence supporting the efficacy of optimum exercise, metformin, and oleuropein integration in optimizing glycemic control among individuals with type 2 diabetes. The findings underscore the potential of this comprehensive therapy approach to revolutionize the management of type 2 diabetes.

Keywords: Glucose transporter 4; Traditional Herbs; Alternative Therapy; Allopathic Drugs

ICAMMAIA_2025_030

YOLOV8 BASED POTHOLE DETECTION AND REPAIR COST ESTIMATION

Kalyani Ghuge, Monish Wadile, Prakasha Sharma, Sahil Kapase, Sahil Kumbhar, Shubham Pathak
Department of Computer Science and Engineering (AIML), Vishwakarma Institute of Technology
Pune, India

kalyani.ghuge@vit.edu, monish.wadile22@vit.edu, passionit.prakashsharma@gmail.com, sahil.kapase221@vit.edu, sahil.kumbhar22@vit.edu, shubham.pathak22@vit.ed

ABSTRACT

Automated pothole detection and repair cost estimation are critical for maintaining safe and efficient road infrastructure. This research introduces a novel system integrating deep learning for comprehensive pothole management. A custom dataset of pothole images was compiled, preprocessed, and augmented to train a robust deep learning model capable of accurately detecting potholes and analyzing their dimensions. The system then leverages these dimensions to estimate the cost of necessary repairs. Deployed, the system provides real-time pothole detection, generates precise polygonal boundaries for damage assessment, and calculates repair cost estimations, all within an intuitive user interface. The proposed solution offers significant potential for local authorities and road maintenance agencies to optimize pothole repair strategies, reduce response times, and improve road safety. This work explores the application of advanced computer vision techniques to address the challenges of pothole management and contribute to the development of smart infrastructure solutions.

Keywords: Potholes; YOLOv8; CNN; Images; Deep Learning; Road Infrastructure; Urban Safety

ICAMMAIA_2025_031

SCHEDULING JOBS ON NONIDENTICAL MACHINES WITH AUTOMATED GUIDED VEHICLE INTEGRATION

Swapnil More[1, 2 a)] and Dr. Naveen Kumar[1, b)]

[1]Mechanical Engineering Department, Sir Padampat Singhania University, Udaipur, 313 601, India
[2]General Science and Humanities Department, Shah and Anchor Kutchhi Engineering College, Mumbai, 400 088, India

Author Emails
[a)] Corresponding author: swapnil.more@spsu.ac.in, swapnil.more@sakec.ac.in
[b)]naveen.kumar@spsu.ac.in

ABSTRACT

This paper presents an approach for scheduling jobs on non-identical machines while incorporating automated guided vehicles (AGVs) and considering make span as the primary performance metric. Recurrent Neural Networks have been employed to schedule jobs on nonidentical machines when only one copy of a tool is available, and AGVs are utilized to carry jobs to the machine.

Keywords: Vehicle; AGVs; Machine; Neural Network; Metric.

ICAMMAIA_2025_032

INNOVATIVE STRATEGIES TO MINIMIZING HIGH INITIAL CAPITAL INVESTMENT IN SMART TECHNOLOGIES ADOPTIONS IN WEST AFRICA MINING INDUSTRY

Rahinatu Abdul-Rahman[1, a)], Dr. Deepak Chandra Pandey[2, b),] and Dr. Manjeet Singh[3, c)]

[1]M. Tech Student, Mining Engineering, FIAT, SPSU, Udaipur, Rajasthan

[2&3]Assistant Professor, Mining Engineering, FIAT, SPSU, Udaipur, Rajasthan

Corresponding Author: [a)]abdulrahmanrahinatu.mtech2024@spsu.ac.in

[b)]deepak.pandey@spsu.ac.in

[c)]singh.manjeet@spsu.ac.in

ABSTRACT

The integration of smart technologies in the mining sector presents significant opportunities for improved operational efficiency, safety, and sustainability. Nonetheless, the substantial initial capital investment required for such technologies constitutes a major obstacle, especially in financially constrained regions like West Africa. This study investigates innovative strategies to alleviate upfront costs while promoting the incorporation of smart technologies in West African mining operations. By employing a combination of public-private partnerships, modular and scalable technology solutions, and innovative financing models such as pay-per-use and leasing arrangements, this research delineates methods to mitigate the financial burden on mining companies. Furthermore, the study underscores the importance of collaborative ecosystems, including government incentives, technology providers, and local stakeholders, in promoting cost-effective adoption. Through case studies and economic analysis, this paper demonstrates how strategic approaches can enable West African mines to capitalize on the advantages of smart technologies without compromising financial viability. The findings offer actionable insights for mining operators, policymakers, and technology providers aiming to drive digital transformation in the region while ensuring sustainable and inclusive growth. The study found that phased implementation and collaborative funding can reduce initial capital expenditure by up to 40%. Modular smart technologies align investments with operational needs, while public-private partnerships provide crucial funding and expertise. Despite challenges, innovative financing and implementation strategies enable mining companies in West Africa to overcome capital constraints and harness the potential of smart technologies, ensuring sustainable and advanced operations without compromising financial viability.

Keywords: Smart technologies; mining industry; West Africa; capital investment; smart technologies.

ICAMMAIA_2025_033

LIFE CYCLE ANALYSIS FOR BIO-ETHANOL FUEL

Atul Kumar[1], Anurag Mishra[2], Virendra Kumar[3]

[1]Department of Mechanical and Aerospace Engineering, Amity School of Engineering & Technology Lucknow, Uttar Pradesh, India
[2]Department of Mechanical and Aerospace Engineering, Amity School of Engineering & Technology Lucknow, Uttar Pradesh, India
[3]Department of Mechanical Engineering, Madan Mohan Malaviya, University of Technology, Gorakhpur, Uttar Pradesh, India

[1]at981991@gmail.com
[2]corresponding author: amishra7@lko.amity.edu
[3]vkme@mmmut.ac.in

ABSTRACT

This study presents the life cycle analysis (LCA) of bioethanol fuels, emphasizing a comprehensive perspective from production and transportation stand points. Bio-ethanol made from biomass (corn, sugarcane, switch grass, and agricultural waste) is a more sustainable and eco-friendly fuel than fossil fuels. It is crucial to take into account the environmental impact of its production, distribution, and utilization. With a focus on the environmental benefits and drawbacks at each stage, the production of bioethanol fuel is investigated at several levels, including feedstock cultivation, processing, transportation, and burning. We assess the fossil energy ratio (FER) for a range of biomass sources in this work, such as switch grass, maize, sugarcane, and agricultural waste. Furthermore, we evaluate the global warming potential (GWP), total greenhouse gas emissions, and equivalent CO_2 emission reductions

Keywords- Life cycle analysis (LCA); Bio-ethanol fuels; Fossil fuel energy ratio; Greenhouse gas emission; Global warming

ICAMMAIA_2025_035

VISION BEYOND SIGHT: AI-POWERED ASSISTIVE TECHNOLOGY FOR THE VISUALLY IMPAIRED

Archana Burujwale[1], Prathmesh Pattewar[1], Anushree Shekokar[1], Arya Barsode[1], Govind Vasave[1]

[1]Department of Computer Science, Vishwakarma Institute of Technology, Pune, India
Authors Email: archana.burujwale@vit.edu, prathmesh.pattewar24@vit.edu, anushree.shekokar24@vit.edu, arya.barsode24@vit.edu, govind.vasave24@vit.edu

ABSTRACT

The application of artificial intelligence (AI) in numerous assistive processes has enhanced the lives of several visually impaired individuals. This paper presents an AI-supported smart system that is capable of converting images and text on the images to audio descriptions so that visually impaired individuals can interpret the visual content with some auditory feedback. This system employs the best models offered by Hugging Face to translate our images into text and employ some other models to generate the speech from text. For translating images into text, some pre-trained transformers like Vision Transformers are employed along with T5-style language models to describe visual images in text form with fine and contextually rich details. Then the text-to-speech module, which again converts this text to audio, employs any one of the sophisticated software text-to-speech(TTS)-style models such as Tacotron or FastSpeech can also be employed to transform the text into sound form. By integrating these several models into a real-time system, high accuracy and reliability are achieved. There are additional changes and additions for multilingual support, customizing the user's audio preference, and providing easy access and an endearing UI for a system that fills the perception gap between sight and sound for the blind. This exhibit of AI is biased towards inclusivity technology, which focuses on artificial intelligence to introduce a revolution. Different complex testing with various real-time scenarios confirmed the potential of the system to deliver accurate and meaningful data to the users in an effective manner, and this was a significant step ahead in terms of the ease of access for future assistive technology.

Keywords: Assistive technology; Hugging face; Vision Transformers; T5-style language; Tacotron; FastSpeech; multilingual support

ICAMMAIA_2025_037

CONGO RED DYE ADSORPTION FROM SYNTHETIC EFFLUENTS USING RSM OPTIMIZATION TECHNIQUES

Avanish Kumar, Ashish Kapoor, G.L. Devnani, Dan Bahadur Pal

Department of Chemical Engineering, Harcourt Butler Technical University Kanpur Uttar Pradesh India

*Corresponding Author: danbahadur.hbtu@gmail.com

ABSTRACT

The bioadsorbent obtained from water hyacinth roots (WHR) has proved to be highly effective and sustainable for removing harmful dyes like Congo red (CR) from wastewater. In the paper the s study investigates the adsorption performance of WHR-based bioadsorbent for removal of Congo red. The adsorption process is analyzed using FESEM before the adsorption phase to examine the natural structure of water hyacinth roots. The optimal conditions for maximum adsorption capacity (9.5 mg/g) and removal efficiency of up to 95%, which was determined by response surface methodology, the optimal value of dye removal is achieved at 45°C, a reaction time of 30 minutes, pH 7.5, and the magnetic stirring speed was 300 rpm. During analysis, it is found that adsorption process follows the pseudo-second-order kinetic model (R^2 = 0.99) along with Freundlich isotherm model (R^2 = 0.95), which accurately representing the CR dye removal mechanism of simulated waste water.

Keywords: Water Hyacinth Root (WHR); Adsorption isotherm; Kinetics; intra particle diffusion

ICAMMAIA_2025_039

EXPLORING STRUCTURED AND SEMANTIC-BASED APPROACHES IN TEXT SUMMARIZATION

Yashwanth damarla[1], S chakri varma[1], M. Vanathi M.E[2].

[1]Final year student, [2]Assistant Professor

Department of Computer Science & Engineering, Sathyabama University, Chennai, India

Yashwanth2640@gmail.com; Chakrivarma111@gmail.com; vanathi.cse@sathyabama.ac.in

ABSTRACT

Text summary is essential for gleaning pertinent information from large texts because there is so much data available today. We see lengthy articles on news web sites, blogs, evaluation sites, and so forth. This studies paper gives several techniques to generate long summaries of textual content material. So far, diverse works have explored unique techniques for textual content summarization. In unique, the methods described in this text generate utility summaries (ABS) or extracted text files (EXT). Query-primarily based techniques are in short discussed. This article specifically discusses structural and semantic strategies for extracting text files. Different databases with DUC2000 corpus, a set of ML rules, had been used to test the overall files and multi-format record compressions produced by means of those fashions. We verify tendencies, styles, past patterns, and the scope of utility of these strategies. In textual content. Generalization among different regions.

Keywords: Text summarization; Machine learning; pre-processing; multiple text documents; DUC2000.

ICAMMAIA_2025_041

ASSESSING RISK FACTOR OF CARDIOVASCULAR DISEASE

Sai Sandeep Chitluri, Joseph Gowtham Chejarla, P. Nandhini M.E

Department of CSE, Sathyabama Institute of Science and Technology, Chennai, India.

saisandeepchitluri2004@gmail.com

gowthamchejarla@gmail.com

nandhini.p.cse@sathyabama.ac.in

ABSTRACT

With progressions in AI inside biomedical and medical care fields, there has been critical advancements in the utilization of medical data for the prevention of disease, enhancement of patient care, and local area wellbeing administrations. However, issues like poor quality medical data can make it difficult to the precision of these studies. Also, varieties in illness designs across various districts further entangle infection flare-up forecasts. Accordingly, the proposed framework utilizes AI calculations customized for really anticipating illness events in locales with high sickness predominance. It confirms these altered expectation models utilizing genuine medical clinic information. To resolve the issue of deficient information, the framework incorporates a dormant component model to remake missing data of interest, zeroing in explicitly on persistent circumstances like cerebral in some areas, infarction is common. By using both organized and unstructured clinic information, machine From Covid-19 to chronic kidney disease, machine learning algorithms are used to predict potential diseases. what's more, coronary illness. Outstandingly, existing examination in clinical large information examination frequently ignores the synchronous investigation of organized and unstructured information types. Our proposed calculation exhibits prevalent precision, achieving precision of 94.9 percent and exhibiting faster convergence than conventional disease risk prediction methods. These headways contribute altogether to improving medical care independent direction and illness the board procedures.

Keywords: Chronic Kidney Disease; Covid-19; Machine Learning; Decision Tree; Random Forest and Logistic Regression.

ICAMMAIA_2025_042

SMART SOLAR CUTTER WITH RGB SENSOR FOR AUTOMATED LEAF HEALTH MONITORING.

G. Saritha[1], P. Kiruthikaa[1], I. Imaa[1], T.Saravanan[1], A. Vaishnavi[1]
Department of Electronics and Communications Engineering, Sri Sai Ram Institute Of Technology, Chennai, India

ABSTRACT

To maximize crop productivity and sustainability in modern agriculture, precise cutting and plant health monitoring are crucial. An RGB sensor-equipped smart solar cutting system for automated plant leaf health monitoring and selective cutting is presented in this research. Solar energy powers the system, guaranteeing emission-free and environmentally responsible operation. In order to identify the health of the leaves, an RGB sensor is installed. The colour changes from green for healthy leaves to red for damaged leaves and yellow for stressed or maybe infected leaves. With the option of manual or automatic control modes, the system alerts the user through a mobile application based on real-time sensor data. By just cutting unhealthy leaves, the cutting mechanism minimizes needless removal and encourages plant recovery.

Keywords: RGB sensor; Leaf health monitoring; Selective cutting; Solar-powered system; Automated plant care; Mobile application; Real-time monitoring; Crop productivity

ICAMMAIA_2025_043

CHALLENGES IN ACHIEVING A ZERO-WASTE SOCIETY: AN EVALUATION FOR SUSTAINABILITY

Sarvagya Sujit Mishra[1, a)] Suyog Shrestha[1, b)], Deepak Singhal[1,c)], Sushanta Tripathy[1,d)]

[1]School of Mechanical Engineering, KIIT University, Bhubaneshwar, India

[a)]sarvagyaamishraa@gmail.com
[b)]suyogstha77@gmail.com
[c)]dsinghal.iiit@gmail.com (Corresponding author)
[d]sushant.tripathy@gmail.com

ABSTRACT

A zero waste society is a concept which is all about decreasing the amount of waste by reusing,recycling,and making the most out of resources instead of throwing things away.it's important because it helps to protect the environment, saves natural resources, reduces pollution and also supports more sustainable economy. Several major obstacles exist when attempting to establish a zero-waste society across economic, technological, behavioral, policy, and environmental terms. Through this study we use Analytic Hierarchy Process (AHP) to evaluate these challenges by synthesizing research and expert advice and numerical modeling. Environmental concerns stand as the primary challenge according to the study results (0.4899 weight) because greenhouse gas emissions (0.2395) and soil and water contamination (0.6232) represent the greatest obstacles. Unenforceable policies (0.6232) and inconsistent regulations (0.2395) within policy frameworks (0.1395) create strong barriers towards waste reduction. Economic obstacles represented a major challenge to adopt viable sustainable waste management solutions because of both substantial startup expenses (0.3338) and worldwide disparities in resource distribution (0.5247). Inadequate recycling platforms coupled with limitations in waste-to-energy transformations create new inefficiencies related to technical barriers (0.0864) in waste management systems. Demographic conditions (0.0511) with two obstacles specifically low awareness (0.6232) and cultural resistance to change (0.2395) prevent the adoption of zero-waste systems. The analyst used pairwise comparisons to achieve a consistency ratio (CR) less than 0.1 for reliability purposes. The research highlights our requirement for combination policy implementations and financial encouragement together with regulatory frameworks and technological improvements to address existing barriers. This document proposes waste-free sustainability progress through fundamental waste-sorting at origins and efficient landfill optimization and community activation and circular economy system application.

Keywords: Economic; Analytic; Recyclic; Reusing; Demographic.

ICAMMAIA_2025_045

OPTIMIZATION OF WEAR AND FRICTION PROPERTIES OF A-MNO_2/EPOXY NANOCOMPOSITE FOR AUTOMOTIVE APPLICATIONS USING TAGUCHI PROCEDURE

Md Zakir Hussain[1], Pranjal Sarmah[2], Surendra Kumar Yadav[3], Virendra Kumar[4], Nishant K. Singh[5]

[1]Department of Mechanical Engineering, Saroj Institute of Technology & Management, Lucknow,226021, India.
[2]Department of Mechanical Engineering, Dibrugarh University, Dibrugarh, 786004, India.
[3]Department of Mechanical Engineering, K R Mangalam University, Gurugram, 122003, India.
[4]Department of Mechanical Engineering, Madan Mohan Malaviya University of Technical, Gorakhpur- 307010, India.
[5]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur-208002, India.

*Corresponding Author: nsingh@hbtu.ac.in

ABSTRACT

The high wear resistance behavior of α-MnO_2/epoxy nanocomposite makes it a promising material for use in the automotive industry. The Taguchi procedure is used in this study to determine the wear and friction coefficient of 0.05 wt.% α-MnO_2/epoxy nanocomposite and optimize various wear and friction variables. Three controllable variables, namely sliding distance, sliding velocity, and normal load, were chosen to conduct tests. Tests were performed using an appropriate orthogonal L_9 array. The nanocomposite was examined using an energy-dispersive X-ray, scanning electron microscope, and X-ray diffractometer. Main effect plots, interaction plots, and analyses of variance were used to analyze the most influential factors. The main effect plots illustrate that the test was carried out at optimal combination with a sliding distance of 500 m, a sliding velocity of 0.5 m/s, and an applied normal force of 2.5 N. The observations indicate that the sliding distance had the greatest impact on wear, representing 67.4% of the total. Normal load, on the other hand, had the highest influence on the friction coefficient, contributing 56.91%. When compared to the general linear model, the findings reveal that the regression models accurately determined the impact of sliding wear factors. The material loss process was caused by the formation of fractures in the micrographs of the worn samples. The findings reveal that the regression models based on the simulation method accurately characterized the tribological behavior of the 0.05 wt.% α-MnO_2/epoxy nanocomposite.

Keywords: Polymer; manganese dioxide; wear; Taguchi; Monte Carlo simulation.

ICAMMAIA_2025_046

TEMPLE FLORAL WASTE BASED BIOADSORBENT FOR REMEDIATION OF DYE FROM WASTEWATER

Shipra Sachan, Ashish Kapoor*, Dan Bahadur Pal*

Department of Chemical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India

*Corresponding author: ashishkapoorchem@gmail.com, danbahadur.chem@gmail.com

ABSTRACT

This study addresses the pressing environmental issue of dye pollutants in wastewater, focusing on the preparation and characterization of a bioadsorbent derived from Tagetes erecta (TE) floral waste. The biomass was processed through a detailed sequence of collection, cleaning, washing, segregation, drying, grinding, and calcination to produce TE floral waste as a bioadsorbent. The resulting TE floral waste was characterized using proximate and ultimate analyses (CHNS/O analysis) and advanced techniques, including Field Emission Scanning Electron Microscopy (FESEM), Energy Dispersive Spectroscopy (EDS), X-ray Diffraction (XRD), and Fourier Transform Infrared Spectroscopy (FTIR). Aqueous solutions of methylene blue (MB) dye were prepared for batch adsorption experiments, and decolorization was monitored using a UV-visible spectrophotometer. Various process parameters were optimized during the study. It was found that, for an initial dye concentration of 10 ppm, an optimal bioadsorbent dosage of 7 mg/mL achieved a maximum dye removal efficiency of 97%. Among the kinetic models tested, including the pseudo-first-order (PFO), pseudo-second-order (PSO), intraparticle diffusion (IPD), and Elovich models, the pseudo-second-order model provided the best fit with coefficient of determination R^2 = 0.98). Likewise, for adsorption isotherms, the Temkin model was found to fit the data better (R^2 =0.97) than the Langmuir and Freundlich models.

Keywords: Marigold flowers; Temple flower waste; bioadsorbent; methylene blue; optimization; kinetic model; isotherm model.

EFFECTS OF CHITOSAN-BASED NANO-ENHANCED BIONANOCOMPOSITE FILM IN POSTHARVEST PACKAGING APPLICATION

Shalinee Singh, Santosh Kumar*

Department of Chemistry, School of Basic and Applied Sciences, Harcourt Butler Technical University, Kanpur 208002, India
*Corresponding author: Email: santoshk@hbtu.ac.in (SK)

ABSTRACT

Chitosan (CS), a random linear chain polymer of D-glucosamine and N-acetyl-D-glucosamine units, is the second most abundant natural polymer after cellulose derived from chitin poly (1-4)-N-acetyl Glucosamine. Chitosan is an antifungal, biocompatible, biodegradable, bionematicidal, non-toxic and a potent candidate for sustainable post-harvest food packaging. In this study, CS/ PVA incorporated with graphene oxide nanoparticles (GrO NPs) based ternary bionanocomposite films were prepared by inexpensive solvent evaporation and solution casting method. Physical characteristics such as porosity of bionanocomposite films and weight loss of produce were studied. Lady fingers were used for food packaging application and self-life protection. Results of this study stated that the biocompatible CS/PVA/GrO based biocomposite films are promising candidate for food packaging and self-life protection of lady finger.

Keywords: Bionanocomposite; Films; Casting; Lady fingers.

ICAMMAIA_2025_048

INVESTIGATING USED CERAMIC TILES AS A SUSTAINABLE ALTERNATIVE TO FINE AGGREGATES IN HIGH STRENGTH CONCRETE

Maddikera Lokanath Reddy[1], Chakali Bala Hussainy[2], Maddikera Krishna Reddy[3], Banreddy Likhitha[4], Sodum Krishnaveni [5]

[1,2]Assistant Professor, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India.
[3,4]Assistant Professor, Department of Electronics and Communication Engineering, Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal, Andhra Pradesh, India
[3]Lecturer in Department of Physics, Sri Chaitanya Junior College, Kurnool, Andhra Pradesh, India.

[a)] Corresponding author: lokanathreddygpcet@gmail.com

ABSTRACT

The development among the construction industry has a positive correlation with infrastructures and between buildings industry. The industry grows at an annual rate of 8-10%, and will continue to do so in most of the foreseeable future. Thanks to the great advantages of concrete that makes building much easier, it is one of the popular construction materials. Nevertheless, rapid economic growth has prompted the unchecked extraction of river sand for construction, causing riverbank erosion and great damages to biodiversity. The growing need for housing and infrastructure is expected to increase demand for river sand even more. Thus, it becomes a mandatory step to look for replacement of river sand with other substitute material. The objective of the study was to evaluate the feasibility, acceptability and applicability of using leftover ceramic tile as a substitute for river sand in concrete. All ceramic tile waste progressive used as FA replacement which they used in concrete as FA replacement as 10%, 20%, 24%, 28%, 30% and 40% replacements. Different proportions of ceramic fine aggregate (CFA) are used to make up a design mix of M50 concrete to evaluate the effectiveness of conventional concrete (CC) in comparison to CFA concrete. Higher percentage of CFA can enhance ceramic material to cement bond and finally give stronger concrete. Also, the chemical resistant properties of CFA material make concrete more durable. It is found that among all tested mixtures, 20% replacement of FA with CFA gives the best results, while all results remain within the designed limits. It is also a way to reduce environmental impact caused by disposal sites.

Keywords: Environmental; Damages; Biodiversity; Strength; Concrete.

ICAMMAIA_2025_049

UNLOCKING SOCIAL SUSTAINABILITY TO ACHIEVE CIRCULAR SUPPLY CHAIN IN HEALTHCARE INDUSTRIES

Deepak Agrawal[1], Sumit Gupta[2], Manoj Kumar[3], M. L. Meena[1], G. S. Dangayach[1], Yashvir Singh[3], Deepak Singh[4], Irfan Mohammed[5]

[1]Department of Mechanical Engineering, Malaviya National Institute of Technology Jaipur, India

[2]Department of Mechanical Engineering, Amity School of Engineering and Technology, Amity University Uttar Pradesh, Noida, India

[3]Department of Mechanical Engineering, ABES Engineering College, Ghaziabad-201009, India

[4]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India

Infosys Limited, Gurugram, Uttar Pradesh, India

Infosys Limited, Ad Dharan, Al Olaya Dist, Al Khobar, 344483206

mky2011@gmail.com

ABSTRACT

In the present scenario as we know healthcare resources are depleting at much faster rate due to various man-made disasters like Covid-19 and other socio-political wars. So, there is a need to find out the ways to retard it for better facilitate the mankind and fulfil their healthcare needs in reasonable amount with minimum lead time. This can be achieved by using the concept of circular economy in the supply chain. Using circular economy methods, we can make the use of product such that it can be reused, reworked or recycled for further generations. There are three basic requirements/key parameters of sustainability i.e. environmental, economic and social. Many of the researchers gave emphasis on economic and environmental aspects of sustainability for achieving circular healthcare supply chain but social aspects need to be addressed in the study for human welfare. The circular economy principles can't be achieved by overlooking the stakeholders and their mutual benefits. In this paper we have identified and prioritize the different subthemes of role of social sustainability in achieving circular supply chain of healthcare industries using Fuzzy AHP, so it would be easier for policy maker to decide which social sustainability factor is more predominate on other to implement circular supply chain.

Keywords: Circular supply chain; Healthcare; Social aspects; Fuzzy AHP

ICAMMAIA_2025_050

MULTI-CRITERIA DECISION ANALYSIS FOR FOOD QUALITY IN ONLINE DELIVERY: AHP AND TOPSIS PERSPECTIVES

Manoj Kumar[1], Dsouza Prima Frederick [2], Yashvir Singh[3], Deepak Singh[4], Irfan Mohammed[5]

[1]Department of Mechanical Engineering, ABES Engineering College, Ghaziabad-201009, India
mky2011@gmail.com
[2]Department of Business Administration, Sahyadri College of Engineering & Management, Mangaluru, India.
drprimadsouza25@gmail.com
[3]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India

[4]Infosys Limited, Gurugram, Uttar Pradesh, India

[5]Infosys Limited, Ad Dharan, Al Olaya Dist, Al Khobar, 344483206

Abstract

Ensuring optimal food quality is essential in the dynamic realm of online food delivery services, as it directly impacts consumer satisfaction and provides a competitive edge. This study examines the utilization of Multi-Criteria Decision Analysis (MCDA) techniques, namely the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), to assess and prioritize online food delivery services according to different quality characteristics, with Food Temperature upon Arrival (FT) being identified as the most crucial component, followed by Freshness of Ingredients (FI), Presentation of Food (PF), Accuracy of Order (AO), and Portion Size (PS). The AHP research indicates that FT and FI have the most significant influence on customer satisfaction, whereas PF, AO, and PS have less significant impacts.

The research employs the TOPSIS approach to evaluate and prioritize three prominent online meal delivery platforms—Zomato, Swiggy, and Uber Eats—using a normalized decision matrix created from the selected parameters. The Weighted Normalized Matrix derived from TOPSIS analysis demonstrates that Zomato outperforms the other alternatives in most parameters. The results emphasize the need of giving priority to food temperature and freshness to improve the quality of delivery. This research enhances the field by showcasing a successful method for evaluating the quality of service in the online food delivery industry.

Keywords: Online food delivery, Freshness of Ingredients, Presentation of Food, Accuracy of Order, and Portion Size.

ICAMMAIA_2025_052

EXPLORING THE IMPACT OF WOOD ASH ON CONCRETE'S CHARACTERISTICS

Syed Afzal Basha[1], S Murthujavali[2], M Kousalya[3], BT Prathyusha[4] , S Khaja Basha[5], K Madhu[6], S Umair Basha[7]

[1]Assistant Professor, [2,3,4,5,6,7] Student, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India.

ABSTRACT

The increasing demand for sustainable construction materials has prompted researchers to explore alternative and eco-friendly solutions. Cement production is a major contributor to carbon dioxide emissions, driving the need for innovative materials that offer sustainability without compromising structural integrity. One such promising material is wood ash, a secondary product of biomass ignition, which has the potential to enhance characteristics. This project aims to know the influence of wood ash as a substitute for cement in concrete to determine its impact on strength. The primary objective to evaluate the perfect percentage of wood ash replacement that maintains or improves the mechanical characteristics of concrete while promoting sustainability. To achieve this, concrete mixes were prepared by changing cement with wood ash at different proportions of 5%, 10%, and 15% by weight. Several examinations were performed to find the results of modified concrete. Workability tests (slump cone and compaction factor) revealed that 5-10% wood ash maintains good workability, while 15% slightly reduces it. Compressive strength tests confirmed that 10% replacement yields the highest strength (33.69 MPa after 28 days). Split tensile test, flexure strength tests given improved performance at 10%, with a decline at 15% replacement. SEM analysis and XRD analysis given a denser microstructure and better pozzolanic activity at 10% replacement, while higher percentages led to increased porosity. Pullout tests showed that bond strength decreases slightly with increasing wood ash content, with a significant drop at 15%. Rapid Chloride Penetration Tests (RCPT) demonstrated lower chloride permeability at 10% replacement, improving durability. Freeze-thaw tests confirmed that wood ash does not negatively impact concrete’s resistance to temperature cycles. The found values indicate that an suitable percentage of wood ash changing of (10%) enhances mechanical properties while maintaining durability and workability, donating to the development of greener constructing items. This research provides valuable insights for future research on eco-friendly cement alternatives.

Keywords: Eco-friendly; Impact; Wood; Ash; Concrete.

ICAMMAIA_2025_053

AI TO MODULARITY: TRANSFORMATIONS IN FDM-BASED ADDITIVE MANUFACTURING

Suyash Awasthi[1], Snehanshu Chakraborty[1], Rohit Singh[1], Harvir Singh[2], Naman Jain[2], Yashvir Singh[3], Deepak Singh[4], Irfan Mohammed[5]

[1]Suyash Awasthi; B.Tech(M.E.), Diploma(M.E.); ABES Engineering College, suyash.22b0403004@abes.ac.in

[1]Snehanshu Chakraborty Awasthi; B.Tech(M.E.); ABES Engineering College, suyash.21b0401002@abes.ac.in

[1]Rohit Singh; B.Tech(M.E.), Diploma(M.E.); ABES Engineering College, rohit.22b0403001@abes.ac.in

[2]Department of Business Administration, Sahyadri College of Engineering & Management, Mangaluru, India.

drprimadsouza25@gmail.com

[3]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India

[4]Infosys Limited, Gurugram, Uttar Pradesh, India

[5]Infosys Limited, Ad Dharan, Al Olaya Dist, Al Khobar, 344483206

ABSTRACT

This paper presents a comprehensive review of advancements in Fused Deposition Modelling (FDM) additive manufacturing, focusing on modular instruments and machine learning (ML) optimization. Modular systems enable scalability and flexibility, while ML techniques revolutionize parameter control and defect detection. By analyzing 39 research studies, this review highlights the synergy between modularity and AI-driven processes in transforming FDM technology for diverse industrial applications. Future directions to enhance integration and overcome current challenges are also discussed. This paper's detailed exploration sheds light on the evolving landscape of FDM, making it an indispensable resource for researchers and practitioners aiming to push the boundaries of this technology.

Keywords: Modelling; Deposition; Optimization; Modularity, Artificial Intelligence

ICAMMAIA_2025_054

DEEP LEARNING-BASED SPORTS SHOT CLASSIFICATION SYSTEM

Dr.Vinmathi M S[1,a)] Dr Sangeetha K[2,b)] Dharshika S[3,c)] Hari Priya R[4,d)] Logeshwari S[5,e)], Dr. Kavitha Subramani[6, f)]

[1,2,3,4,5,6]Computer Science and Engineering, Panimalar Engineering College
Bangalore Trunk Road, Varadharajapuram, Poonamallee, Chennai, Tamil Nadu, India.

[a)]vinmathis@gmail.com
[b)]sangeethakalyaniraman@gmail.com
[c)]bsdi1246789@gmail.com
[d)]priyaranganathan2003@gmail.com
[e)] logeshwarisrinivasan5@gmail.com
[f)] kavitha.pec2022@gmail.com

ABSTRACT

This study presents an innovative deep learning architecture for sports shots classification, employing Convolutional Neural Networks (CNNs) developed using TensorFlow. Accurate shot classification is crucial for enhancing sports analytics, coaching methodologies, and broadcasting, as it yields critical insights into gameplay dynamics and athlete performance. Conventional techniques often rely on manual labeling or basic rule based system, which is insufficiently adaptable to complexities of different sports. We explore a range of CNN architectures specifically optimized for shot classification, enhancing model efficacy through strategies such as data augmentation, advanced deep learning techniques, and meticulous hyperparameter tuning. The use of TensorFlow ensures robust scalability and efficiency in both the training and deployment phases of the model. Our proposed framework shows significant promise for transforming sports analysis, broadcasting, and coaching practices, thereby enabling automated and sophisticated shot classification across diverse sporting contexts.

Keywords: Deep learning; CNN; AlexNet; LeNet; VGG16; Sports Shot images

ICAMMAIA_2025_055

OFFLINE SPEECH AND GESTURE-CONTROLLED SMART SYSTEM FOR ACCESSIBILITY AND SAFETY

Kavitha Subramani[1,a)] , Kalpana Devi M[2,b)], Kavya Sri N[3,c)] ,Arundhathi T[4,d)]

[1]Professor, Department of Computer Science and Engineering
[2,3,4]UnderGraduate (UG) Students, Department of Computer Science and Engineering,
Panimalar Engineering College, Chennai, Tamil Nadu - 600123

[a)] Corresponding author: Kavitha_bhskr@Yahoo.com
[b)] kalpusupreet@gmail.com
[c)] kavyasri.nlr2003@gmail.com
[d)] arundhathi.t2004@gmail.com

ABSTRACT

According to a survey census done by the World Health Organization (WHO) An estimated 1.3 billion people worldwide—approximately 16% of the global population—experience significant disability. Despite these substantial discussions surrounding the safety and support of individuals with disabilities often remain unresolved. To address this critical issue, we propose the development of a system that empowers disabled individuals to control electrical devices without the need for internet connectivity. This system will integrate speech and gesture recognition technologies, enabling users to operate appliances through natural interactions, thereby enhancing accessibility and independence. Additionally, the system will feature an emergency safety mechanism, allowing users to alert caregivers, family members, or neighbours in times of distress. By combining intuitive control interfaces with robust safety features, this project proposes a comprehensive and an efficient solution that aims to improve the quality of life for people with disabilities.

Keywords: Global; Population; Speech; Gesture; Quality.

ICAMMAIA_2025_059

AVIATION INDUSTRY IN INDIA: CHALLENGES, REFORMS AND ITS FUTURE

Srikant Panigrahi[1, a)] , Deepak Singhal[2, b)], Sushanta Tripathy[2,c)]
[1]School of Aerospace Engineering, KIIT University,Bhubaneswar,India.
[2]School of Mechanical Engineering, KIIT University,Bhubaneswar,India.

[a]srikant.panigrahifme@kiit.ac.in
[b]dsinghal.iiit@gmail.com (Corresponding author)

ABSTRACT

The world Civil Aviation industries directly contributed the world economy undoubtedly intended for its rapid growth after Covid Pandemic. India is also trying to grab its position in the world aviation sector consistently. According to International Air Transport Association (IATA), India is currently the placed 5th largest civil aviation market in the world and also is predicted that India will become the world's third-largest air passenger market soon. However, there are many airlines which could not sustain in the market. Moreover, the reach of airlines to the people of India in comparison to its population is very low. Therefore, this paper conducts a systematic literature review of various published articles and reports in various databases to find the challenges in the airline industries. The research also focuses on the reforms and future prospects in the aviation industry in India. The results show that inadequate infrastructure, high fuel prices, cyber security, inadequate skills, and disruptions are the major challenges faced by the Indian aviation industry. Further, this research highlights the reasons for the failure of few established airlines and also elaborates on the major reforms undertaken by government of India in airline industry.

Keywords: Aviation; Airline; Industry; Transport; Cyber Security.

ICAMMAIA_2025_060

EFFECT OF GRAPHENE REINFORCEMENT ON THE FLEXURAL AND THERMAL BEHAVIOR OF BIO-BASED EPOXY NANOCOMPOSITES

Vivekanand Singh[1, a)], Sanjay Mishra[1, b)], Sanjeev Kumar Singh Yadav[2, c)]

[1]Department of Mechanical Engineering, MMM University of Technology, Gorakhpur-273016, India.

[2]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur-208002, India.

[a)]Corresponding author: vivekasingh888@gmail.com

[b)]smme@mmmut.ac.in

[c)]sksyadav@hbtu.ac.in

ABSTRACT

The development of environmentally sustainable alternatives to petroleum-based resins has garnered significant attention, with bio-based epoxies emerging as a promising solution to mitigate ecological concerns and reduce the dependence on non-renewable resources. This study investigates the effects of incorporating graphene, ranging from 0 to 2.25 wt%, as a nanofiller in bio-based epoxy nanocomposites to enhance their mechanical and thermal properties. The flexural strength increased from 5.01 MPa (0 wt%) to 9.18 MPa (2.25 wt%), while the flexural modulus improved from 134.12 MPa to 301.60 MPa, demonstrating a significant enhancement in stiffness and load-bearing capacity. Thermal stability, evaluated by thermogravimetric analysis, exhibited a progressive increase in degradation temperatures corresponding to 10% weight loss (T_{10}), 50% weight loss (T_{50}), and residue at 600 ^{0}C with increasing graphene content. These findings elucidate the potential of graphene-reinforced bio-based epoxy nanocomposites for applications requiring superior mechanical performance and thermal stability, while promoting environmental sustainability.

Keywords: Flexural properties; TGA; Bio-based epoxy; Graphene; Sustainability; Ecopoxy.

ICAMMAIA_2025_061

OPTIMIZING THE RESIDENTIAL APARTMENT (G+5) WITH CAD AND STAAD PRO

Lokanath Reddy M[1], Vaishnavi N[2], Joseph Daniel Y[3], ManasaV[4], Vasanth D[5] and Karthik P[6]

Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India

[a)] Corresponding authors: lokanathreddygpcet@gmail.com b)namalivaishnavi@gmail.com

c) yalanatiges@gmail.com

ABSTRACT

In today's competitive and rapidly evolving market, structural engineers must optimize their workflow to enhance efficiency and accuracy. This project focuses on the planning, analysis, and design**o**faG+5 residential apartment covering 9,600 square feet**,** comprising a ground floor and five upper floors. AutoCAD is used for planning, while STAAD.Pro V8i is utilized for structural analysis and design. The key structural components considered include the plinth beams, staircase, slabs, beams, columns, footings, and lift**.** The framed structure is analyzed by considering a variety of loads, including as imposed, wind, dead, and live loads. Critical structural parameters such as shear force, bending moment, and deflection are evaluated, ensuring precise load considerations and reinforcement details. The structural members are designed using the substitute frame method based on the analysis results. The apartment layout comprises a lobby, three bed rooms, a dining area, a balcony, a kitchen, three bathrooms, and a pooja room**.** The integration of AutoCAD and STAAD Pro streamlines the design process, saving significant time while ensuring accuracy, efficiency, and suitability for high-rise building design**.**

Keywords: AutoCAD; STAAD Pro; Planning; Analysis and Design.

ICAMMAIA_2025_062

OPTIMIZATION OF CONCRETE MIXTURE WITH STEEL SLAG FOR ENHANCED WORKABILITY AND STRENGTH

Chakali Gudise Mohan Babu[1] Yellala Amrutha[2] Devarakonda Jhansi Rani[3] Varapaku Suresh[4] Kandula Dinesh Kumar[5] Parigala Shyam Sundhar[6]

[1]Assistant Professor, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India.
[2,3,4,5,6]Students, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool,
Andhra Pradesh, India

[a)] Corresponding author: mohanc.g116@gmail.com

ABSTRACT

In recent years, environmental degradation and global warming have emerged as the main concerns. Climate change is impacted by greenhouse gas emissions from companies. Adding mineral admixtures to concrete has emerged as a viable way to lessen this environmental effect. This experiment's primary goal is to ascertain the workability and mechanical characteristics of M25 grade concrete that has been mixed with different proportions of steel slag. The percentages of steel slag employed in this study to partially replace fine aggregate are 0, 10, 20, 30, and 40%. As a byproduct of the steel industry, steel slag is produced. The ecosystem is harmed by this steel slag, which is hard to decompose. When used in concrete, this substance affects the concrete's longevity as well as its mechanical and physical qualities. Through workability tests including slump and compaction factor, the project evaluates the concrete's new qualities. Compressive strength and tensile strength are measured at Seven, Fourteen, and Twenty eight days to assess strength attributes.

Keywords: Degradation; Environmental; Strength; Decompose; Concrete.

ICAMMAIA_2025_064

EXPERIMENTAL INSIGHTS ON SAWDUST REPLACEMENT IN CONCRETE

Syed Afzal Basha[1], S Parveen[2], T Pallavi[3], M Irfan[4], S Akil Navaz[5] & S Md Abdur Rahman Sudes[6]

[1]Associate Professor, [2 3 4 5 6] Students, Department of Civil Engineering, G Pullaiah College of Engineering and Technology, Kurnool,A.P,India

[syedafzal74@gmail.com, shaikparveen0624@gmail.com]

ABSTRACT

Traditional construction materials are increasingly difficult to obtain. Exploration of alternative materials to replace gravel, sand, and cement in concrete is necessary. Sawdust shows potential for a replaced material of sand in concrete mixture. Concrete mixture is essential for global infrastructure and is crucial in the modern world. Traditionally, it is made from binder, sand, and gravel, with OPC as the standard. River sand is becoming scarce and expensive. Replacement of some sand with sawdust is being investigated. This also reduces environmental waste and lowers construction costs. The project aims to experimentally evaluate portion of sawdust is replaced for sand in concrete mixture. Sawdust, composed of tiny wood particles, is a byproduct of sawing lumber and is readily available. Concrete mixes with 5%, 10%, and 15% sand replacement with sawdust are tested to study the resulting concrete strength.

Keywords: Binder material; Sawdust; Sand; Gravel; Strength.

ICAMMAIA_2025_066

TRIBOLOGICAL ANALYSIS OF GREEN COMPOSITES (POLYESTER+ NETTLE FIBERS + MARBLE DUST) USING TAGUCHI METHOD

Nandani[1], Vinay Pratap Singh[1], Nishant K. Singh[1], Virendar Kumar[2]

[1]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur-208002, India.

[2]Department of Mechanical Engineering, Madan Mohan Malaviya University of Technical, Gorakhpur- 307010, India

ABSTRACT

In this work, polyester composites reinforced with marble dust and nettle fibers were produced. Furthermore, studied were the physico-mechanical qualities and sliding wear characteristics of advanced polyester composites supplemented with nettle fibers and marble dust, developed utilizing the Taguchi technique. Different marble dust (3–9 wt%) and nettle fibers (5–15 wt%) were included into the polyester composite. At 30.23 MPa, an izod impact strength of 29.25 J/cm², and a hardness of 41.85 Hv, the composite including 15 weight percent nettle fibers and 9 weight percent marble dust showed the maximum tensile strength. The composite's thermal stability improved with increasing nettle fiber concentration. Using the Taguchi technique across several parameters—including sliding velocities (4.4–10.26 m/s), marble dust content (3–9 wt%), fiber compositions (5%wt–15%wt), normal loads (10–30 N), and sliding distances (2000 m)—the sliding wear rate of composite materials was examined. The sliding velocity, sliding distance, and normal load, which define the sliding wear rate—are the main control parameters, according to the study, in declining order of influence. At a fiber loading of 15 weight percent and a marble dust percentage of 9 weight percent the composite displayed a minimum abrasive specific wear rate of 0.2955 mm3/Nm. Analysis of variance allowed one to investigate the proportion of involvement of the several factors affecting the abrasive wear rate. Scanning electron microscopy of the damaged abrasive areas revealed, among other wear mechanisms, fiber disintegration, micro-ploughing, micro-cuts, and cracks. Not only show amazing mechanical strength but natural fiber-based polymer composites have many advantages over synthetic fibers. Because of their biodegradable character, low cost, and great performance qualities, natural fibers appeal greatly to many different sectors.

Keywords: Composites; Nettle fibers; Marble dust; Taguchi technique; Wear rate; Friction

ICAMMAIA_2025_068

Numerical Optimization of Slurry Erosion Wear in Right-Angle Elbow Using Mass Injection Method

Vivek Kumar Patel[a)], Latchupatula Ananya[b)], and Zainab Khatoon[c)]

Author Affiliations
Department of Applied Mechanics, MNNIT Allahabad, Prayagraj, India.

Author Emails
[a)]vivek@mnnit.ac.in
[b)] latchupatula.2021ram09@mnnit.ac.in
[c)]zainab.2021fe32@mnnit.ac.in

ABSTRACT

In the pipeline industry, erosion wear poses a significant challenge for slurry transportation systems. To address the increasing erosion problem, particularly in the bend section, a novel technique was developed to mitigate erosion rates. This study focuses on investigating the numerical effects of inserting a nozzle at various positions upstream of a bend, aiming to reduce erosion in the elbow section. The research examines different nozzle diameters, different nozzle velocities relative to the pipe velocity, and various nozzle angles to determine the optimal nozzle position, diameter, and inclination for the right-angle elbow pipe. The study used the Eulerian-Lagrangian model in conjunction with the Standard k-epsilon turbulence model. The erosion wear rate of pipe bends caused by the passage of solid-liquid slurry was calculated using the Generic erosive model. This study revealed that the most effective approach to reducing the maximum erosion rate in a right-angle bend pipe within the slurry transportation system involved using a 6 mm diameter nozzle. The nozzle velocity was set at 50% of the main velocity within the pipe, and the nozzle itself was positioned at a -10° bend relative to the pipe. Furthermore, the optimal location for inserting the nozzle was found to be at the origin position upstream of the bend.

ICAMMAIA_2025_069

TRIBOLOGICAL STUDY OF BIODEGRADABLE NANO LUBRICANTS - CHALLENGES & OPPORTUNITY- A REVIEW

Sanjay Chauhan[1], Nishant Kumar Singh[1], Vinay Pratap Singh[1], Yashvir Singh[1]

[1]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India
sanjaychauhan1@rediffmail.com

ABSTRACT

Emphasizing their use as environmentally benign alternatives for traditional lubricants, this review article investigates the tribological properties, difficulties, and future possibilities of biodegradable nano-lubricants. Along with possible performance and environmental compatibility across numerous industrial uses, the author looks at recent developments and research shortcomings to assess the effects of nano-additives on friction, wear, and biodegradability. Focus of tribology, the study of surface interactions, is friction, wear, and energy dissipation. Eco-friendly bio-lubricants have low volatility, high viscosity, and biodegradability among other very effective qualities. Although mineral oils are used widely as lubricants, creative solutions such nano-lubricants which incorporate nanoparticles improve performance. Making nano-sized bio-lubricants with improved qualities fits with environmental goals. Because of their biodegradability and improved performance with regard to lubricity, volatility, flash point, and viscosity, this study emphasizes the potential of bio-lubricants as sustainable alternatives for mineral oils. By including nanoparticles into bio-lubricants, wear resistance, thermal stability, and friction reduction are notably improved. Emphasizing their function as sustainable solutions for reducing friction and wear across many uses, this work clarifies the practical and environmental benefits of nano-enhanced bio-lubricants. Beyond only environmental issues, biodegradable nano lubricants have benefits. These lubricants could improve operational and financial efficiency, cut carbon emissions, and lessen industrial energy usage.

Keywords: Nanoparticles; Nano-lubricants; Biodegradable; Tribological performance; Lubrication mechanism.

ICAMMAIA_2025_070

KNEE OSTEOARTHRITIS DETECTION AT EARLY STAGE USING DEEP TRANSFER LEARNING

Prashant Gupta, Harsh Mali, Pranav Pawar, Rishit Ravichandran, Sujata Kamble
Department of Computer Engineering, SIES Graduate School of Technology, University of Mumbai, Nerul, Navi Mumbai, India

ABSTRACT

Kneumatic joint disorder is one of the most common types of this disease, and diagnosis can be difficult, especially at the early stages. Imaging methods such as x-rays are routinely used to identify arthritis, but analysis of these images is susceptible to subjective and inaccuracy, especially when it comes to recognizing subtle changes. The purpose of this study is to create a deep learning model that can classify knee x-ray images in five different categories. This study uses folding networks (CNNs) to classify multi-class image classifications. This makes the core model based on the CNN architecture trained on the dataset of knee x-ray images. The research examines the benefits of transfer learning using advanced CNN architectures such as reset and VGG nets. To address lesson imbalances, selective augmentation strategies have been implemented along with iterative training approaches for model optimization.

Keywords: Osteoarthritis; CNN; VggNet; ResNets; Multi- class Image Classification; Transfer Learning; Selective Augmentation.

ICAMMAIA_2025_072

SYNTHESIS AND CHARACTERIZATION OF ZnO THIN FILMS DEPOSITED BY CHEMICAL REDUCTION TECHNIQUE

Dasari Teja Sri, Shaik Nihal Baig, G. Venkata Subbaiah, Bethapudi Sruthi
Electronics and Communication Engineering Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, India

tdasari293@gmail.com, gvs2904@gmail.com, bv1982004@gmail.com nihalbaigshaik786@gmail.com

ABSTRACT

ZnO thin films are well-regarded in nanotechnology for their excellent semiconductor and surface qualities. This study focused on creating these films through a chemical reduction and drop-coating process making use of zinc acetate as the precursor. The zinc acetate solution was prepared under nitrogen conditions and applied to glass substrate. To examine the impact of temperature on both the structure and composition they are annealed at three different temperatures 350 degrees Celsius ,450 degrees Celsius and 500 degrees Celsius. EDX study confirmed that the ZnO thin films were composed exclusively of zinc and oxygen. Cross-sectional SEM offered insights into the thickness and uniformity of the films. This research demonstrates that the annealing temperature significantly impacts the microstructure, surface area, and possible applications of ZnO thin films in fields like nano electronics and sensor technologies.

Keywords: Nanostructured ZnO thin films; Thermal evaporation; SEM; Crystallinity; Grain size.

ICAMMAIA_2025_073

INFLUENCE OF POCKETS ON THE PERFORMANCE BEHAVIOUR OF JOURNAL BEARING CONSIDERING CAVITATION EFFECTS

Santwana Mishra[1], Shipra Aggarwal[1*], B.M. Sutaria[2]
[1] Department of Mechanical & Automation Engineering, Indira Gandhi Delhi Technical University for Women, Kashmere Gate, Delhi 110006, India.
[2]Mechanical Engineering Department, Sardar Vallabhbhai National Institute of Technology, Surat-395007, India
[*]mesantwana10@gmail.com

ABSTRACT

Surface texturing is a feature of green tribology which is effective in reducing friction in the bearing. The effect of rectangular pocket on the journal bearing's performance has been numerically investigated in this paper. For analyzing bearing performance modified Reynolds equation incorporating JFO boundary condition is employed. Here, impact of pockets on performance behaviour of the bearing is computed both at lower and higher eccentricity ratios. The results have been computed by varying the depth and location of the pocket. It is seen that the best results are obtained at 0.3 lower eccentricity ratio by providing the pocket in the converging zone. An improvement in load carrying capacity in the range of 4% to 39% and reduction in coefficient of friction from 3% to 36% is seen.

Keywords: Hydrodynamic journal bearings; Pockets; Cavitation; Load carrying capacity; Friction

ICAMMAIA_2025_074

EFFECT OF PORE SIZE ON DENSIFICATION OF C_F/ZRC-ZRB_2 COMPOSITES

Satyendra Kumar[a*], Anand Kumar[b], Shailendra Sinha[c]

[a]Dr. APJ Abdul Kalam Technical University, Lucknow, India
[b]Department of Mechanical Engineering, Harcourt Butler Technological University, Kanpur, India
[c]Department of Mechanical Engineering, Institute of Engineering and Technology, Lucknow, India

[a)] Corresponding author: satyendrakumar0030@gmail.com
[b)] kranandhbti@gmail.com
[c)] shailendra.sinha@ietlucknow.ac.in

ABSTRACT

2D C_f/ZrC-ZrB_2 composites are fabricated using the reactive melt infiltration (RMI) process at temperature of 2000°C. To optimize porosity, 5% and 10% boron carbide (B_4C) are incorporated into the phenolic resin. Mercury porosimetry analysis determined the porosity of the C_f/C-B_4C preforms to be 19% and 35%. After RMI process, the composite density achieved is 3.16 g/cm³ for the composite with 5% B_4C and 2.20 g/cm^3 for the composite with 10% B_4C. X-ray imaging has confirmed successful densification of the zirconium-infiltrated composite, while phase analysis is confirmed using X-ray diffraction (XRD). Incorporating 5% B_4C into the C_f/ZrC-ZrB_2 composite proves more effective in achieving complete densification. This is due to the presence of number of open pores that facilitate sintering, resulting in higher density. Whereas 10% B4C incorporation may be less effective for complete densification. The higher B4C content leads to a larger number of closed pores, which impede zirconium infiltration. This incomplete infiltration results in a lower overall density of the composite.

Keywords: Ultrahigh temperature ceramic composites (UHTCs); C_f/ZrC-ZrB_2 composite; Reactive metal infiltration (RMI); Mercury porosimetry; X-Rays assisted comotography (X-ray CT).

ICAMMAIA_2025_075

EXPLORING THE BENEFITS OF SUGARCANE BAGASSE ASH IN CONCRETE

Syed Afzal Basha[1], B Thilak Naidu[2], P Laxmi Narasimha[3] Y Siva Mohan Reddy[4], A Shyam Prakash Reddy[5], N Siva Kumar[6], G Niranjan [7]

[1]Associate Professor, [2,3,4,5,6,7] Students, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, India, India

(syedafzal74@gmail.com, boyathilak@gmail.com)

ABSTRACT

This study examines the potential of sugarcane bagasse ash (SBA), a residue of sugarcane manufacturing, as a sustainable partial substitute for cement in concrete production. Owing to its elevated silica content, SBA demonstrates pozzolanic properties, enabling chemical reactions with calcium hydroxide in cement to improve strength and durability of concrete The research involved experimental trials wherein cement was changed out at percentages of 0%, 10%, 15%, and 20% with SBA. The concrete mixtures underwent evaluations for workability, compressive strength, and mechanical properties to assess the impact of SBA incorporation. Findings revealed that a 10% SCBA replacement yielded optimal improvements in compressive strength and resistance to degradation, attributed to effective pozzolanic activity. Conversely, higher substitution levels of 15% and 20% resulted in diminished performance, likely due to excessive ash content compromising the load-bearing capacity of the mix. Using SBA in concrete not only lessens reliance on cement, which is a major contributor to carbon dioxide emissions—but also facilitates the beneficial reuse of agricultural waste. These outcomes suggest that integrating SBA at a 10% replacement level offers a viable strategy for advancing environmentally sustainable and cost-efficient construction practices, while ensuring the requisite mechanical properties of concrete are maintained.

Keywords: Sugarcane bagasse ash (SBA); Sustainable concrete Strength enhancement; Waste reuse; Greener construction

ICAMMAIA_2025_076

EXPLORING THE IMPACT OF DOLOMITE POWDER AND STEEL SLAG ON PROPERTIES OF CONCRETE

Chakali Gudise Mohan Babu[1,] Tene Jhansi Rani[2,] Suragouni Charan Goud[3,] Chakali Supriya[4,] Aerukala Madhu Kiran[5,] Kamini Pavan Kumar[6]

[1]Assistant Professor, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India.
[2,3,4,5,6]Students, Department of Civil Engineering, G. Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India.

[a)] Corresponding author: mohanc.g116@gmail.com
[b)] another author: tenejhansirani@gmail.com

ABSTRACT

The cement industry is a significant contributor to greenhouse gas emissions, with concrete production being a major culprit. The environmental impact of concrete usage is further exacerbated by the depletion of natural resources and energy consumption. Cost of concrete materials used in construction are also increasing day-by-day. This project aims to mitigate these issues by exploring the potential of industrial by-products as sustainable alternatives to traditional concrete materials. By incorporating waste material from steel industries i.e. Steel slag sand, it is created in steelmaking furnaces when molten steel is separated from impurities. Fine aggregate by optimum usage of steel slag is 30% by the weight of M25 grade of concrete. Dolomite powder has a high concentration of magnesium carbonate and a major percentage of calcium, which is obtained from sedimentary carbonate rock It is used as partial substitute at 10, 20 and 30% of cement weight in M25garde concrete. The impact of steel slag and dolomite powder on the workability, compressive, flexural & split tensile strength of the concrete were investigated. The results showed that concrete's workability, tensile and compressive strength were boosted by the inclusion of steel slag sand, dolomite powder replacement levels of 30% and 10% were optimal. By these replacement materials it offers a promising sustainable alternative that lowers carbon emissions while enhancing concrete performance.

Keywords: Compressive strength; Dolomite powder; Steel slag sand; Split tensile; Workability.

ICAMMAIA_2025_077

A REVIEW ON BIO-LUBRICANTS FEEDSTOCKS AND THEIR PROCESSING METHODS WITH ROLE OF ADDITIVES DURING TRIBOLOGICAL PERFORMANCE

Keshav Gupta[1], Yashvir Singh[1*]
[1]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh
[*]Corresponding author email: drysvingh21@gmail.com

ABSTRACT

To reduce environmental impact and improve industrial efficiency, the hunt for sustainable lubrication solutions has prompted substantial research into the creation of bio-lubricants that line up with green handling route for tribology. However, significant obstacles include competition from other foods for the same vegetable oil resources, the high cost of obtaining raw materials, and challenges with applying nano additions that have restricted bio-lubricant use. Recent developments in bio-lubricant manufacturing are examined in this study, emphasizing chemical changes that enhance vegetable oils' performance, oxidation resistance, and thermal stability. Employing nanoparticles as nano enhancers in bio-lubricants to lessen wear and friction is also investigated. Nano-enhanced bio-lubricants tribological performance is assessed, emphasizing how well they increase viscosity, lower friction coefficients, and increase wear resistance. Additionally, this research makes the case that their purity and dispersion must be improved to make bio-lubricants more economically viable for performance. Lastly, using environmentally friendly nanomaterials and substituting bio-lubricants for petroleum-based ones are proposed as ways to promote sustainable growth in the lubricant industry without sacrificing financial considerations.

Keywords: Feedstocks; methods; additives; friction; wear; biodegradation.

ICAMMAIA_2025_078

SUSTAINABILITY IN SOLAR PV WASTE MANAGEMENT: A COMPARATIVE REVIEW OF MECHANICAL, THERMAL, AND CHEMICAL RECYCLING TECHNIQUES

Praveen Kumar Rai[1,a)], Virendra Kumar[2,b)*] and Rajesh Kumar Verma[1,c)]

[1]Department of Mechanical Engineering, Harcourt Butler Technical University (HBTU), Kanpur 208002, India
[2]Department of Mechanical Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur 307010, India.
[b)] Corresponding author: vkme@mmmut.ac.in
[b)]praveenrai92@gmail.com
[c)]rkvme@hbtu.ac.in

ABSTRACT

Adopting solar photovoltaic (PV) technology has increased panel deployment globally. However, this growth presents a challenge in solar PV waste management. With the first generation of solar panels nearing their lifespan, sustainable recycling methods are urgently needed to mitigate environmental, economic, and social impacts. This study reviews three main solar PV recycling techniques—mechanical, thermal, and chemical—assessing their sustainability regarding material recovery efficiency, environmental impact, economic feasibility, and scalability. Mechanical recycling is simple and energy-efficient but yields lower material purity and recovery rates. Thermal recycling effectively removes organic materials and recovers metals but has high energy use and emissions. Chemical recycling achieves high purity and recovery rates but is costly and complex. Findings indicate that no single method is universally superior; each has specific advantages and limitations. Combining all three methods, a hybrid approach may provide a more sustainable solar PV waste management solution. Moreover, advancements in recycling technologies, supportive policies, and industry collaboration are necessary to address the growing solar PV waste volume. This research compares recycling techniques, identifies gaps in practices, and offers recommendations to enhance the sustainability of solar PV waste management, informing policymakers and industry stakeholders while promoting innovative and environmentally friendly recycling solutions in the renewable energy sector.

Keywords: End of life; Recycling; Sustainable.

ICAMMAIA_2025_079

EVALUATION OF EFFECT OF GEOMETRIC PARAMETERS ON HYBRID JOURNAL BEARING PERFORMANCE

Nisha singh[1, a)], Sanjeev Kumar Singh Yadav[2, b)] and Praveen Kumar Agarwal[1, c)]

[1]Department of mechanical engineering, Motilal Nehru National Institute of Technology Allahabad, Prayagraj, Uttar Pradesh, India.
[2]Department of mechanical engineering, Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

[a)] Corresponding author: nisha@mnnit.ac.in
[b)] sksyadav@hbtu.ac.in
[c)] pka@mnnit.ac.in

ABSTRACT

In this present world, changing technological is necessary for hybrid journal bearing to operate under severe conditions of heavy load and high speed. Revolutionary changes have been taken place in the applications of hybrid journal bearings, from very low-speed radar to very high-speed turbo-machinery and ultra-precision machine tools requiring high accuracy. The aim of this paper is to study the effect of geometric parameters of multiple hole-entry hybrid journal bearings on operating parameters and to analytically study the influence of various geometrical shapes on hybrid journal bearings. A 3-D computational fluid dynamics (CFD) model of a hybrid journal bearing is built and a method of response surface model is employed to determine the equilibrium position of the journal. Based on the response surface model, an optimization scheme is used to search around the equilibrium position to get a more accurate solution. The current analysis includes the hole geometry. Hydrostatic performances of symmetric and asymmetric hole-entry hybrid journal bearing configurations are studied. The computational results illustrated that geometry variation affects the performance of hole-entry hybrid journal bearing system quite significantly. In the present work, influences of the variation in geometry on the performance characteristics of non-recessed hole-entry hybrid journal bearing with symmetric and asymmetric configurations compensated with orifice restrictors have been investigated. The results suggest that hole shape is a dominant factor in hybrid bearing design.

Keywords: Hybrid journal bearing; Response surface; DOE; CFD; Structural; FSI.

ICAMMAIA_2025_080

TRIBOLOGICAL CHARACTERIZATION OF UHMWPE NANOCOMPOSITE FOR ADVANCED BIO-BEARING SYSTEMS

Parijat srivastava[1,*], Vinay Pratap Singh[1], Nishant Kumar Singh[1,] Yashvir Singh[1]

[1]Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, India

[*]Corresponding Author Email ID: parijatsrivastava59@yahoo.com

ABSTRACT

Ultrahigh molecular weight polyethylene (UHMWPE) is widely used in bone replacement implants due to its exceptional wear resistance and low friction coefficient. However, wear debris generated from abrasion between mating surfaces can lead to aseptic loosening of implants. To address this issue, researchers have explored reinforcing UHMWPE with various agents, including aluminum oxide and graphene. In this study, UHMWPE composites were fabricated using compression molding and characterized for their mechanical and tribological properties. The results show that the addition of 5% graphene reinforcement increased the hardness of UHMWPE by 21.875%. Moreover, the wear rate and coefficient of friction of pure UHMWPE were significantly reduced by 19.23% and 29.57%, respectively, with the addition of 5% graphene. However, the agglomeration of graphene at higher concentrations (10%) led to increased wear and friction. These findings suggest that optimizing the reinforcement composition can enhance the tribological properties of UHMWPE, making it a more suitable material for bone replacement implants.

Keywords: Polyethylene; Tribological properties; Bone; Implants; Graphene; Aluminium oxide.

ICAMMAIA_2025_081

A LIGHTWEIGHT DEEPFAKE DETECTION APPROACH USING EFFICIENTNET AND VIT-TINY

Kamendra Prakash Rahatwal[1], Sumit Pundir[1]

[1]Department of Computer Science and Engineering Graphic Era Deemed to be University

kamendraprakash1998@gmail.com, sumitpundir1983@gmail.com

ABSTRACT

The rise of deepfakes has introduced an emerg- ing threat to the authenticity of digital media such that the identification of AI-generated fake images has become a crucial issue. Most current models employed to identify deepfakes are built upon complex architectures that are highly efficient but computationally costly to incur, thus becoming less practical to deploy in real-world applications. This issue can be ad- dressed using our suggested lightweight method based upon EfficientNet and ViT-Tiny that leverages the strengths of both the convolution neural networks to accurately extract features and the transformer models to capture global structures within the image. The hybrid method offers an efficient but strong tool to distinguish real from fake images that are computationally efficient. Whereas other techniques are primarily based on global or local characteristics, our model bridges the gap to capture fine texture information along with long-distance dependencies within the image. Efficient Net provides a strong foundation to capture fine facial characteristics, but the integration of ViT-Tiny further enhances the model to recognize the spatial relationship amongst regions within an image. This enhances the detection mechanism to adapt to various techniques employed to generate deepfakes. To ensure its effectiveness, our approach is trained and tested on a widely used deepfake dataset to demonstrate strong generalization and reliability to detect AI- generated manipulation. Furthermore, our model possesses the trait of computational efficiency to be employed within real-time use cases and to be executed on resource-constrained devices. With the trade-off between precision, speed, and scalability, this work presents an innovative solution to the new challenges of deepfake detection to allow future fake image identification systems to be more accessible and robust.

Keywords: Vision Transformer; Self-Supervised Learning; Masked Autoencoder

ICAMMAIA_2025_082

COMPARATIVE STUDY OF MACHINABILITY OF TI-6AL-4V AND AL-TiB_2 DURING VIBRATION-ASSISTED ELECTRO DISCHARGE DRILLING (VA-EDD) PROCESS

Gaurav Kumar Pandey[1,a)], S.K.S Yadav[2,b)], Mayank Shekhar[3,c)], Atul Kumar Agnihotri[4,d)]

Author Affiliations
[1]Allenhouse Institute of Technology, Kanpur, India

[2]H.B.T.U, Kanpur, India

[3]Mandsaur University, M.P, India

[4]Pranveer Singh Institute of Technology, Kanpur, India

Author Emails
[b)] Corresponding author: sksyadav@hbtu.ac.in
[a)]gaurav.pandey12@gmail.com
[c)]shekhar10maya@gmail.com
[d)]dratulagnihotri@gmail.com

ABSTRACT

The present paper emphasizes the major benefits of including vibratory aid in to the Electrical Discharge Drilling (EDD) process. Machining difficult materials such as Ti-6Al-4V alloy and Aluminium Titanium Diboride (Al-TiB_2) is proven to be feasible and quite efficient using the VA-EDD process. A major development is the inclusion of vibration aids into the EDD process, which offers a competitive edge in precision machining of challenging-to-machine materials. VA-EDD found its applications in aerospace, biomedical, and automotive where component quality and surface integrity are critical. The surface roughness rises with Ip, but Al-TiB_2 hardness character causes more noticeable increase that produces more irregular and deeper craters.

Keywords: Electrical discharge drilling; Aluminium Titanium Diboride; Precision; Machining.

ICAMMAIA_2025_083

PRINTED CIRCUIT BOARD WASTE AS REINFORCEMENT IN POLYMER COMPOSITES: FABRICATION AND CHARACTERIZATION

Shyam Sunder [1], Dr. Vinay Pratap Singh [2*], Dr. J. Bhaskar [3]

[1, 2, 3] Department of Mechanical Engineering, Harcourt Butler Technical University, Kanpur, India

[*] Corresponding Author

E-mail address: vpsingh@hbtu.ac.in

Abstract

The feasibility of scrap printed circuit boards (PCRs) as reinforcing fillers in polymer composites is investigated in this work. Particularly with printed circuit boards, the growing amount of electronic waste causes significant environmental problems. This work looks at a sustainable approach of converting PCB trash into value-added composite materials. By compression moulding, PCBs were transformed into particle fillers and incorporated into a polymer matrix. The resulting composites were extensively characterized, including morphological study to look at PCB filler dispersion and interfacial adhesion within the polymer matrix. Mechanical testing to evaluate tensile strength, flexural strength, and impact resistance under influence of PCB reinforcement. The results show that the mechanical properties of the polymer composites can be much changed by using PCB waste. This work provides important new perspectives on the feasibility of recycling PCB waste as a reasonably priced, environmentally benign reinforcing material, therefore supporting resource recovery and sustainable waste management.

Keywords: Printed circuit boards; Electronic waste; Environmental; Matrix; Mechanical testing; Recycling

ICAMMAIA_2025_084

ANALYSIS OF FLOW DYNAMICS AND PARAMETER OPTIMIZATION IN ELECTROCHEMICAL MACHINING USING CFD AND TAGUCHI METHODS

Anamika Mishra Pandey[1,a], Abhay Dwivedi[1,b], Shresth Singh[2,c], P V Jadhav[3,d] and Jitendra Bhaskar[4,e]

Author Affiliations
[1]Research Scholar @ HBTU- Nawabganj-Kanpur 208002
[2]MTech Scholar@ HBTU- Nawabganj-Kanpur 208002
[3]Professor @ BVCOE- Pune 412115
[4]Professor @ HBTU- Nawabganj-Kanpur 208002

Author Emails
[a)] Anamikapandey1404@gmail.com
[b)] Abhayd.kviitkrk@gmail.com
[c)]Shresthsingh12121998@gmail.com
[d)] pvjadhav@bvucoep.edu.in
[e)] Jbhaskar@hbtu.ac.in

ABSTRACT

This study investigates the flow dynamics and process optimization in electrochemical machining (ECM) using computational fluid dynamics (CFD) and Taguchi methods. A hollow circular copper tool and stainless-steel workpiece were modelled in SolidWorks and simulated in ANSYS Fluent to analyze velocity, pressure, turbulence, and material removal rate (MRR) under varying electrolyte pressures (1.0–1.4 kg/cm²). Experimental validation employed an L9 orthogonal array to optimize voltage (12–18 V), feed rate (0.9–1.1 mm/min), and pressure. Results revealed that 1.2 kg/cm² pressure minimized turbulence, while Taguchi analysis identified 15 V, 1.0 mm/min feed rate, and 1.2 kg/cm² pressure as optimal parameters, yielding a peak MRR of 0.0735 g/min. ANOVA highlighted feed rate as the most influential parameter (33.48% contribution).

Keywords: Flow; Dynamics; Optimization; Taguchi; Analysis of Variance

ICAMMAIA_2025_085

DESIGN AND ANALYSIS OF BEETLE-INSPIRED STRUCTURES WITH IMPROVED MECHANICAL BEHAVIOUR FOR CRASHWORTHINESS APPLICATIONS

Abhay Dwivedi[1,a], Anamika Mishra Pandey[1,b], Shresth Singh[2,c], Dr Jitendra Bhaskar[3,d] and Dr Anand Kumar[3,e]

Author Affiliations
[1]Research Scholar @ HBTU- Nawabganj-Kanpur 208002
[2]MTech Scholar@ HBTU- Nawabganj-Kanpur 208002
[3]Professor @ HBTU- Nawabganj-Kanpur 208002

Author Emails
[a)]Abhayd.kviitkrk@gmail.com
[b)]Anamikapandey1404@gmail.com
[c)]Shresthsingh12121998@gmail.com
[d)] Jbhaskar@hbtu.ac.in
[e)]Anandk@hbtu.ac.in

ABSTRACT

Structures and materials of biological creatures are source of inspiration to design new age materials and structures for engineering applications. Among small creatures, beetle has extraordinary performances due to unique features over its elytra. The elytra of beetles are very lightweight and at same time very tough also to withstand high-energy impacts. Beetle inspired to design engineering crashworthy structures for automotive and protective applications. This research aims to design new structures with elytra inspired unit cells with nodes & ribs for crashworthiness applications. The variation in structures is provided with inspiration from Bamboo Inspired hollow Internodes and Mantis Shrimp Inspired Twisted Bouligand Structures. Finite element simulations were performed to analyse the stress - strain behaviour under dynamic load. The design features on elytra such as ridges, nodes, hollow internodes, channels, and curved shapes are very useful for designing new lattice-based structures for improving the performance structures by managing the parameters. With the results obtained from FEM simulations various indicators of Crashworthiness are calculated and then they are collated with each other's on different parameters. It was observed that Hexagon and Octagon based structures are better than Circular & Square based structures under impact loads. Hexagonal Structures with the addition of hollow internodes have shown even better improvement than any other structure. Hexagonal Structure with Twisted Ribs has even better Crashworthiness Indices than any other Structures. In conclusion, the strategic incorporation of twists and hollow internodes in beetle-inspired structures presents a promising pathway towards innovative, efficient, and adaptive solutions across diverse fields.

Keywords: Structure; Material; Biological; Bamboo inspired; Ribs

ICAMMAIA_2025_086

HIGH-PERFORMANCE AUXETIC METAMATERIAL WITH TUNABLE NEGATIVE POISSON'S RATIO AND OPTIMISED ENERGY ABSORPTION.

Shresth Singh[1, a], Jitendra Bhaskar[2, b] and Anand Kumar[2,c]

Author Affiliations
[1]MTech Scholar@ HBTU- Nawabganj-Kanpur 208002
[2]Professor @ HBTU- Nawabganj-Kanpur 208002

Author Emails
[a)]Shresthsingh12121998@gmail.com
[b)]Jbhaskar@hbtu.ac.in
[c)]Anandk@hbtu.ac.in

ABSTRACT

Exhibiting remarkable mechanical properties such as energy absorption and impact resistance auxetic materials, ideal for advanced engineering applications, are defined by a negative Poisson's ratio (NPR). This work presents a new auxetic structure inspired by hexagonal re-entrant geometry with asymmetric cell walls, but modified to achieve enhanced energy absorption through a specific two-step deformation mechanism. The proposed structure's mechanical behavior is analyzed through Finite Element Method (FEM) seamless simulations of its response under compressive loading, and the theoretical validation is performed by computing the Poisson's ratio from the constituent geometric parameters of the structure to prove existence of direct causality between its design and auxetic nature. The results reveal the para-physical modes of sequential deformation – initial elastic buckling of cell walls followed by densification – make it possible for the candidate structure to achieve dual energy absorption. While theoretical calculations support the NPR values confirmed through geometric relationships, FEA modeling validates enhanced energy absorption of the structure compared to typical hexagonal re-entrant configurations. This work not only advances the knowledge of auxetic structures but also offers a framework for creating next-generation materials with customised energy absorption characteristics for uses in protective systems, automotive safety, and aerospace engineering.

Keywords: Mechanical; Properties; Energy; Absorption; Impact

SPONSORS

Pinnacle Pelt

Pinnacle Pelt is a premium leather accessories brand based in Ahmedabad, with a state-of-the-art production unit in Gurgaon. We specialize in crafting luxury handbags and accessories, including belts, wallets, and clutches, designed for those who appreciate quality and sophistication. Our production facility is equipped with advanced machinery such as post-bed and cylindrical-bed sewing machines, skiving, embossing, and other specialized tools that ensure precision and durability. We use only premium, high-quality leather sourced meticulously to maintain the highest standards. At Pinnacle Pelt, skilled artisans bring each piece to life, blending traditional craftsmanship with modern techniques. Every product is a testament to our commitment to excellence, offering a perfect balance of luxury, functionality, and timeless style.

AUTOFINA ROBOTICS

Established in 2013 in Cambridge, UK, Autofina has carved a niche in developing innovative robots that are revolutionising the field of industrial automation. We specialise in setting up Industrial Robotics Labs and take pride in our robots being installed in over 50 labs across India. Initially, our robots were produced under license by a Tata Motors subsidiary until 2022.

Today, they are manufactured at our own facility in Pune, under the Make In India program, showcasing our commitment to domestic production and growth. As we stand on the brink of a new era of user-friendly robots, our industrial robot arms are making a mark.

They offer payloads up to 10kg, reach up to 800mm, provide a remarkable repeatability of <50 microns, and a Mean Time Between Failures (MTBF) of 20,000 hours. By enabling the commoditisation of industrial robots, Autofina is driving the future of automation forward.

Your Partner in Materials Analysis Excellence

At Metatech, we're not just a provider of Metallography solutions – we're your trusted partner in materials analysis and innovation. With over 38 years of industry experience, we've honed our expertise to offer a comprehensive suite of services and facilities that empower our clients to achieve their goals with confidence.

Cutting-Edge Solutions to Empower Your Projects

Our state-of-the-art facilities boast cutting-edge equipment and technology, including abrasive and diamond sectioning, hot/cold mounting, manual/automatic polishing/grinding, automated electrolytic polishing, microscopy, advanced image analysis, microhardness testing with image analysis capability, and in-situ metallography kits.

Pushkar Techno Pvt. Ltd.

Specializes in bulk material handling and automotive components.

Pushkar Techno Pvt. Ltd. specializes in bulk material handling and automotive components. The company was established in the year 1965 by the Late Dr. B.N. Roy, B.Sc. Engg. (Elect.& Mech.), FIE (India), DIC (London), Ph.D. (London), an eminent academician and technocrat in the industrial town of Jamshedpur, India. The company began its engineering activities with a small infrastructure set up and a vision to grow with strong ethical values. Thereafter, the company has developed resources, expertise, and infrastructure to manufacture a diverse range of products which include automotive components, bulk material handling equipment, agricultural equipment and various engineering products.