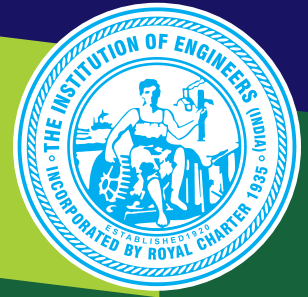


# IEI EPITOME



Volume 9 | Issue 12 | December 2024

*A Century of Service to the Nation*

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Er VB Singh

### Editor

Maj Gen (Dr) MJS Syali, VSM (Retd)  
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Website : <http://www.ieindia.org>

# Notification for IEI R&D Grant-in-Aid

Volume 9 | Issue 12 | December 2024

To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses. The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Every year, the Institution invites applications for funding industry-oriented R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions / Colleges / Universities. The application form and guidelines are available in our website <https://www.ieindia.org>. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FIE	Not Mandatory
2. UG (BE/BTech/ Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/ Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the proforma available on our website [www.ieindia.org](http://www.ieindia.org), should be sent through email to [research@ieindia.org](mailto:research@ieindia.org) and one printed copy of the same should reach the following address:

**The Deputy Director (Technical)**

The Institution of Engineers (India)  
8 Gokhale Road, Kolkata 700 020

Kindly go through the guidelines (visit link: <https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative>) before filling up the application.

# Members in the News

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**Er Pradeep Chaturvedi, FIE**  
Vice President  
Institute of Directors, India  
✉ pradeepc08@gmail.com

**Er Pradeep Chaturvedi**, Vice President of the Institute of Directors, India, has been elected Vice President of the Indian National Academy of Engineering (INAE) for 2025-2026. A distinguished graduate in Science and Mechanical Engineering, he is an international expert in energy, environmental policy, and corporate governance. Er Chaturvedi has contributed to landmark initiatives like India's Energy Conservation Act and the Electricity Act and has served on numerous global UN-backed projects. A Fellow of esteemed organizations, he has published 36 books and received accolades such as the World Food Day Award and the FEIAP Engineer of the Year Award, underscoring his commitment to sustainability and engineering excellence.



**Er Ashok Kumar Panda, FIE**  
Executive Engineer  
Military College of Electronics and Mechanical Engineering (MCEME), Secunderabad  
✉ akp.eme@gmail.com

**Er Ashok Kumar Panda** has presented a Technical Paper titled "Indigenization for Indian Defence Forces: Opportunities & Challenges of Smart Materials" during 1st International Conference on Advanced Innovations in Engineering, Science and Technology (AIEST-2024) organized by Abacus Institute of Engineering and Management (AIEM), Mogra, Hooghly during 28-29 October 2024 in association with IEEE Kolkata Chapter.



**Prof (Dr) Sundar Vallam, MIE**  
Advisory Consultant & Formerly Professor Emeritus  
Department of Ocean Engineering, IIT Madras, Tamil Nadu  
✉ vallamsundar@gamil.com

**Prof (Dr) Sundar Vallam** had been honoured with the prestigious Hamaguchi Award for the Enhancement of Tsunami and Coastal Disaster Resilience, presented by the Minister of Land, Infrastructure, Transport & Tourism, Japan on 30 October 2024.

## ANNOUNCEMENT

### Know-Your-Member (KYM)

**Is your mobile number & e-mail updated with us ? If not, then please forward your Know- Your-Member (KYM) form immediately for participating in IEI Election process.**

You are requested to forward your KYM along with the self-attested copy of photo ID proof to the address given below:-

**Deputy Director (Membership)**  
The Institution of Engineers (India)  
8 Gokhale Road, Kolkata 700020  
Email: datamemb@ieindia.org

The form is available on IEI Website or scan the code:

[https://www.ieindia.org/WebUI/ajax/Downloads/WebUI\\_PDF/HIGHLIGHTS\\_DOCUMENT-3332.pdf](https://www.ieindia.org/WebUI/ajax/Downloads/WebUI_PDF/HIGHLIGHTS_DOCUMENT-3332.pdf)



# Members in the News

Volume 9 | Issue 12 | December 2024



## Dr Sujoy Kumar Goswami, MIE

Senior Director  
NTT Data

✉ [sujoykumargoswami@gmail.com](mailto:sujoykumargoswami@gmail.com)

**Dr Sujoy Kumar Goswami** received the Degree of Honorary Doctor of Philosophy in the field of AI/Data Science on 02 August 2024 from the International University of Information Management, USA.

The following corporate member was conferred with the **Professional Engineers (PE) Certificate** from IEI after successful completion of the assessment process and has been authorised to use the style and title of P Eng (I) by virtue of expertise in their field:



## Er Gaurav Sanjay Dambir, MIE & PE7007367 (Certified Professional Engineer, IEI)

Project Leader- Core Engineering- Dana Incorporated

✉ [gsdambir@gmail.com](mailto:gsdambir@gmail.com)

Field : Mechanical Engineering

Valid from: 28 November 2024

Valid up to: 30 November 2029

## ANNOUNCEMENT

### Elevate your status as a Certified Professional Engineers (PE) and International Professional Engineers (IntPE)

#### Professional Engineers (PE) Certification by IEI

##### Eligibility Requirement

To attain the Professional Engineers (PE) certification through The Institution of Engineers (IEI), you must meet the following eligibility criteria:

1. Hold a BE/BTech or equivalent degree recognized by a Statutory Authority or the Government of India.
2. Have accumulated five years or more of professional experience.
3. Be a member of a recognized professional engineering institution or association.
4. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link :

[https://www.ieindia.org/webui/IEI\\_PE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_PE_Certification.aspx)

#### International Professional Engineers (IntPE) Certification by IEI

##### Eligibility Requirement

To be eligible for IntPE Certification by IEI, candidates must meet the following criteria:

1. Hold a BE/BTech or equivalent degree recognized by the Statutory Authority or the Government of India.
2. Possess seven years or more of professional experience.
3. Have a minimum of two years of professional experience in a significant engineering activity.
4. Be a member of a recognized professional engineering institution or association.
5. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link:

[https://www.ieindia.org/webui/IEI\\_IntPE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_IntPE_Certification.aspx)

The eligible candidate can submit application in the prescribed format to: The Deputy Director (Technical), The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700020;  
For any query and assistance, please send email to: [pe@ieindia.org](mailto:pe@ieindia.org)



**Prof Balachandran Ruthramurthy, FIE**

Professor

Department of Electronics and Communication Engineering, School of Electrical Engineering and Computing, Adama Science and Technology University, P.O.Box No. 1888, Adama, Ethiopia

✉ [balachandran.ruthramurthy@ieec.org](mailto:balachandran.ruthramurthy@ieec.org)

**Title of Paper: A Review of Fabrication Technologies and Emerging Application of Carbon Nanotubes**

AIP Conference Proceedings, AIP Publishing, 3240(1), 2024, Online ISSN 1551-7616, Print ISSN 0094-243X

DOI: <https://doi.org/10.1063/5.0243047>

**Co-authors :** Bedilu T Ababu, Henok B Mezemr & Eshetu Tessema

**Abstract:** Nanotechnology allows the automation of tasks and greatly advances the industrial revolution. There are numerous applications of nanotechnologies in various industries. Some of them are in the electronics, pharmaceutical industries, packing papers and printing, food and beverages industries, paper and pulp industries, textile industries, and construction industries. In nanotechnology, there are so many different Nano devices like smart semiconductor nanocrystal, carbon Nano tube, graphene, nanoscale CMOS devices etc. In this review paper, fabrication technology of carbon nanotubes (CNTs) has been explained. Techniques for fabricating carbon nanotubes have been described. The advantages of Nano devices in the future manufacturing and industrial applications by automation of systems are elaborated.

**Keywords:** Nanotechnology Applications, Graphene, Nanocrystals, Nanotubes, Food, Pharmaceutical Industry, Review

**Title of Paper: Substituted Bi<sub>3.5</sub>Mg<sub>1.8</sub>Nb<sub>2.7</sub>O<sub>13.8</sub> Pyrochlores with Transition Metals (Zn, Ni and Cd): Doping Mechanism, Structure and Electrical Properties**

Processing and Application of Ceramics 2024, 18(3), pp 281-289, ISSN: 1820-6131, eISSN: 2406-1034

DOI: <https://doi.org/10.2298/PAC2403281T>

**Co-authors :** Tan Phei Yi, Tan Kar Ban, Khaw Chwin Chieh, Ananda Murthy H C, Chen Soo Kien, Lee Jew Oon, Chan Kah Yoong & Lu Ming

**Abstract:** The influence of transition metals (Zn, Cd and Ni) on bismuth magnesium niobate (Bi<sub>3.5</sub>Mg<sub>1.8</sub>Nb<sub>2.7</sub>O<sub>13.8</sub>, BMN) pyrochlores was investigated. Considering the difference in their ionic radii, Cd was postulated to substitute Mg at the eight-fold coordinated A-site whereas Zn and Ni were to replace Mg at the six-fold coordinated B-sites of the host structure. Solubility limits in these substitutional pyrochlore solid solutions were determined to be 0.4, 0.1 and 0.3 for Zn, Ni and Cd, respectively. Upon introducing these divalent cation dopants, notable changes in the lattice parameters and grain sizes were observed with increasing dopant concentration. The high dielectric constants,  $\epsilon'$  of Zn, Cd and Ni doped BMN pyrochlores were discernible with their bulk values of 195-216, 173-195 and 153-195, respectively. The highest  $\epsilon'$  of 216 was recorded for the composition with Zn = 0.1 in contrast to the lowest value of 153 found in the composition with Ni = 0.1. Meanwhile, these highly insulating divalent cation doped BMN pyrochlores also exhibit low dielectric losses,  $\tan \delta$  whose values are in the order of 10<sup>-3</sup>. The excellent dielectric properties allow these novel pyrochlore phases to be potentially applied for the energy storage applications.

**Keywords:** Bi/Mg Niobate, Solid State Synthesis, Dielectric Properties, Impedance Spectroscopy, Capacitors

## Corporate Air Ticketing for IEI Members

Corporate Members may book Corporate Air Ticket through M/s EBIX Travels Private Ltd. For details please visit

<https://www.ieindia.org/webui/IEI-AirTickets.html>

# Publication by Members

Volume 9 | Issue 12 | December 2024



## **Dr Bangshidhar Goswami, MIE**

Former Assistant Professor

RVS College of Engineering and Technology, Jamshedpur

✉ [goswami.b8757@gmail.com](mailto:goswami.b8757@gmail.com)

### **Title of Paper: Geochemometric Assessment of Primordial Radionuclides and Trace Elements in Coastal Sediments: Environmental and Radiological Implications for South India**

International Journal of Mineral, STM Journals, 1(1), 2024, pp 33-37

URL: <https://journals.stmjournals.com/ijmi/article=2024/view=179183/>

**Abstract:** This study focuses on environmental radioactivity and trace element contamination in coastal sediments along the southern region of the Indian subcontinent, from the Palar River to Pulicat Lake. Utilizing gamma-ray spectroscopy with a NaI (Tl) detector, along with atomic absorption spectroscopy, the research examines the spatial distribution and activity concentrations of primordial radionuclides — namely,  $^{238}\text{U}$ ,  $^{232}\text{Th}$ , and  $^{40}\text{K}$ —as well as trace elements such as Ni, Pb, Mn, Zn, Cu, Co, Fe, and Cr. Gamma radiation levels were measured using a MiniTRACE CSDF survey meter, providing key data on the gamma dosage levels in the studied sediments. The concentrations of primordial radionuclides in the sediment samples ranged from  $\leq 3$  to 1953 Bq/kg for  $^{238}\text{U}$ ,  $\leq 3$  to 1180 Bq/kg for  $^{232}\text{Th}$ , and 41 to 753 Bq/kg for  $^{40}\text{K}$ . Among these,  $^{40}\text{K}$  showed the highest contribution to the dose rate, highlighting its significant radiological impact. Additionally, the study conducted geochemometric analyses to evaluate the radiological risks and calculate hazard indices associated with both naturally occurring radioactive materials (NORM) and toxic elements present in the environment. This comprehensive investigation provides valuable insights into the environmental impact of radionuclides and trace elements in coastal ecosystems. The findings carry important implications for radiation safety, environmental monitoring, and public health protection, particularly for coastal populations who may be exposed to elevated levels of radioactivity and trace metal contamination through various environmental pathways. Consequently, the study underscores the need for ongoing monitoring and regulation to mitigate potential health risks.

**Keywords:** Environmental Radioactivity, Coastal Sediments, Primordial Radionuclides, Trace Elements, Geochemometrics

### **Title of Paper: Nano-Adsorbents for Water Purification: A Focus on Nanoclays**

Journal of Water Pollution & Purification Research, STM Journals, 11(3), 2024, pp 38-44, eISSN 2394-7306

URL: <https://journals.stmjournals.com/jowppr/article=2024/view=181246/>

**Abstract:** Nanotechnology has emerged as a pivotal tool in addressing contemporary environmental challenges, particularly in water purification. This paper explores the use of nano-adsorbents, focusing on nano-clay materials, as effective solutions for the adsorption and removal of harmful pollutants from water. Nano-clays, owing to their large surface area and unique physicochemical properties, exhibit exceptional adsorption capacity for contaminants such as heavy metals, dyes, antibiotics, and various organic compounds. This review consolidates the findings from numerous studies on the development and application of nano-clays and their composites for water treatment, emphasizing their preparation techniques, adsorption mechanisms, and practical use in removing hazardous substances from wastewater. Additionally, ceramic membranes doped with halloysite nanoclay are investigated for their efficiency in treating industrial effluents, especially from textile industries. The promising results of these nanomaterials highlight their potential for advancing sustainable and cost-effective water purification technologies, providing an essential pathway for mitigating global water pollution.

**Keywords:** Adsorption, Ceramic Membranes, Nanoclay, Nanocomposites, Nano-Adsorbents, Nanotechnology, Water Purification

## **Discount at the Samsung e-store for IEI Corporate Members**

Exclusive access to the Samsung e-store for IEI Corporate Members. This shall enable the Corporate Members to procure the Samsung Products in a discounted rate. The Samsung e-store can be accessed at [www.samsung.com/in/multistore/iei](http://www.samsung.com/in/multistore/iei) using your Membership No. and email id/Mobile.

## **Title of Paper: A Review on Heavy Metal Removal Techniques in Water Treatment**

Journal of Water Pollution & Purification Research, STM Journals, 11(3), 2024, pp 15-28, eISSN 2394-7306

URL: <https://journals.stmjournals.com/jowppr/article=2024/view=181295/>

**Co-Author:** Rakshit Sanwal

**Abstract:** *The removal of heavy metal ions from wastewater is crucial for environmental safety and human health due to the toxic and persistent nature of these pollutants. This review comprehensively examines various water treatment methods, including adsorption, membrane filtration, chemical precipitation, electrochemical, and photocatalytic processes. Each technique is critically analyzed in terms of removal efficiency, operating conditions, and their respective advantages and limitations. Adsorption methods, particularly those using bioadsorbents, have gained significant attention for their cost-effectiveness and eco-friendliness. However, challenges like adsorbent regeneration, selectivity, and long retention times hinder their broader application. Membrane-based methods, while effective, face issues related to fouling and high operational costs. Even while chemical procedures are viable, they frequently produce enormous volumes of sludge that need to be treated further. Although less developed, electric and photocatalytic-based methods have promised advancement. Nanotechnology offers innovative solutions, with nanomaterials proving to be more efficient at heavy metal removal, although challenges remain concerning their stability, toxicity, and recovery. A key issue in many studies is the use of synthetic wastewater instead of real samples, which may not fully capture the complexities of industrial effluents. Future research should prioritize sustainable, eco-friendly materials and focus on industrial-scale implementation. Overall, a multidisciplinary approach is necessary to address the limitations of current technologies and develop more advanced, efficient, and cost-effective solutions for heavy metal removal from wastewater, ensuring the long-term protection of ecosystems and human health.*

**Keywords:** *Adsorption Techniques, Environmental Remediation, Heavy Metal Removal, Nanotechnology in Wastewater Treatment, Water Treatment Technologies*

## **Title of Paper: Synergistic Procurement and Molecular Characteristics of Full Grain Leather in Advanced Material Engineering**

International Journal of Advance in Molecular Engineering, STM Journals, 2(2), 2024, pp 8-13

URL: <https://journals.stmjournals.com/ijame/article=2024/view=182565/>

**Abstract:** *This article explores the molecular characteristics and engineering processes involved in the production and application of full-grain leather, recognized for its premium quality due to its intact granular structure. Full-grain leather, undivided into split layers, maintains a robust and durable molecular composition, making it a preferred material in high-quality garment manufacturing. The study emphasizes the role of leather conditioners in restoring the molecular suppleness and moisture retention of leather, crucial for its long-term flexibility and resistance to wear. The research also investigates the effects of different tanning processes—chromium, semi-vegetable, and vegetable tanning—on the molecular properties of leather, influencing its suitability for various applications. Further, the article delves into the development of abrasion-resistant materials, such as staple-reinforced leather and heavy rubber, engineered to enhance molecular resilience in protective gear. The mechanical properties of leather, including tensile strength, air and water vapor permeability, and thermal resistance, are examined, highlighting the importance of molecular uniformity and stability in performance. The global leather value chain, intricately linked to the meat production industry, is analyzed with a focus on molecular modifications facilitated by advanced chemical agents and processing techniques. Additionally, the study explores bio-leather, derived from bio-based raw materials, as a sustainable alternative to fossil-derived leather, with a detailed examination of its molecular structure, composition, and performance. This research underscores the critical role of molecular engineering in advancing leather production, offering insights into the development of high-quality, sustainable leather products with enhanced durability, aesthetic appeal, and environmental compatibility.*

**Keywords:** *Full-grain Leather, Molecular Engineering, Tanning Processes, Bio-leather, Abrasion Resistance*

# Publication by Members

Volume 9 | Issue 12 | December 2024



## **Er Arun Kumar Mohanta, MIE**

Team Leader-cum-Senior,  
Water Supply Engineer, ARKITECHNO Consultants (India) Pvt. Ltd.  
✉ [mohanta76@gmail.com](mailto:mohanta76@gmail.com)

### **Title of Paper: Effect of Inappropriate Solid Waste on Microplastic Contamination in Balasore District and its Aquatic Environment**

Bulletin of the National Research Centre, Springer Nature, 48(120), 2024

DOI: <https://doi.org/10.1186/s42269-024-01278-z>

**Co-authors:** Chittaranjan Sahoo, Rajkumar Jena, Sthitaprajna Sahoo, Sunil Kumar Bishoyi, Biswajit Patra, Soumya Ranjan Dash & Biswajita Pradhan

**Abstract:** Microplastic infection is now one of the world's key environmental concerns. The most significant causes of microplastic contamination in aquatic ecosystems are coastal villages, coastal landfill sites, shipping activities and coastal dumping areas. Microplastic ingestion has been described in an inclusive assortment of aquatic ecosystems from different trophic levels. This paper provides scientific evidence of microplastic contamination in solid waste from various coastal sites in the Balasore district.

**Keywords:** Coastal Management, Ecosystem, Microplastic, Pollution, Solid Waste



## **Er Dattu Balu Ghane, MIE**

Lecturer  
Department of Mechanical Engineering, Government Polytechnic, Awasari (Khurd), Pune,  
Maharashtra  
✉ [dattu.ghane@gmail.com](mailto:dattu.ghane@gmail.com)

### **Title of Paper: Parametric Analysis and Design Considerations for Micro Wind Turbines: A Comprehensive Review**

Energy Engineering: Journal of the Association of Energy Engineering, 121(11), 2024, pp 3199-3220, ISSN: 0199-8595 (print); ISSN: 1546-0118 (online)

DOI: <https://doi.org/10.32604/ee.2024.050952>

**Co-author:** Vishnu D Wakchaure

**Abstract:** Wind energy provides a sustainable solution to the ever-increasing demand for energy. Micro-wind turbines offer a promising solution for low-wind speed, decentralized power generation in urban and remote areas. Earlier researchers have explored the design, development, and performance analysis of a micro-wind turbine system tailored for small-scale renewable energy generation. Researchers have investigated various aspects such as aerodynamic considerations, structural integrity, efficiency optimization to ensure reliable and cost-effective operation, blade design, generator selection, and control strategies to enhance the overall performance of the system. The objective of this paper is to provide a comprehensive design and performance review of horizontal and vertical micro-wind turbines. The study begins with an overview of the current landscape of wind energy across the globe and India in particular, highlighting key challenges and opportunities. Numerical and experimental studies were used to validate the designs. Horizontal Axis Wind Turbines (HAWTs) with ducts or shrouds are suitable for microscale and low-speed applications. Researchers investigated the position and location of the turbines to enhance their performance in urban settings. Airflow and airfoil noise produce aerodynamic noise, which is the most significant disadvantage of wind turbines. The findings provide valuable insights for stakeholders interested in advancing micro-wind turbine technology. The highlighted research opportunities may be pursued further to improve the efficiency, reliability, and overall performance of micro-wind turbines.

**Keywords:** Aero-Acoustics Behavior, Design Optimization, Micro Wind Turbine, Performance Analysis, Shrouded Wind Turbine; Wind Energy





**Dr Somnath Mahato, MIE**

Project Scientist III

Meteorological Training Institute, Climate Research & Services, Indian Meteorological Department (IMD), Government of India

✉ [somnathmahato1@gmail.com](mailto:somnathmahato1@gmail.com)

**Title of Paper: RTK Position Solution Performance of Compact, Low-Cost GNSS Receiver-Antenna Combinations**

Survey Review, Taylor & Francis, 2024, Print ISSN: 0039-6265 Online ISSN: 1752-2706

DOI: <https://doi.org/10.1080/00396265.2024.2429532>

**Co-authors :** Mrinal Goswami & Anindya Bose

**Abstract:** GNSS RTK provides precise positions in real time. This work presents a detailed performance analysis of five compact GNSS modules and four antennas used as GPS RTK Rovers over a medium baseline length. Better than 50 cm accuracy in 2- and 3-dimension is obtained within the hardware cost 200-400 USD, while sub-10 cm accuracy is achievable using dual frequency compact GNSS modules for around 1200 USD. This work also presents the comparable performance of the compact GNSS modules to their geodetic counterpart and strong antenna dependence on the solution quality. The results would be helpful for RTK popularisation.

**Keywords:** GPS, RTK, Compact GNSS Modules, Position Solution, Cost-Performance Analysis



**Er D Lakshmi Shireesha, AMIE**

Assistant Professor

Civil Engineering Department, Srinivasa Ramanujan Institute of Technology, Anantapuramu, Andhra Pradesh

✉ [d.sirisha123@gmail.com](mailto:d.sirisha123@gmail.com)

**Title of Paper: Advancing Monthly Rainfall Predictions: Multi-Step Forecasting with Hybrid ACO and GBDT Model**

Proceedings of 2024 International Conference on Intelligent Algorithms for Computational Intelligence Systems (IACIS), 23-24 August 2024, IEEE, 2024, Electronic ISBN:979-8-3503-6066-0, Print on Demand(PoD) ISBN:979-8-3503-6067-7

DOI: <https://doi.org/10.1109/IACIS61494.2024.10721823>

**Co-authors :** Pradosh Kumar Sharma, Prashantha Kumar K, Prashant A Patil, A K Shrivastav & S Kaliappan

**Abstract:** The process of determining when precipitation is likely is exceedingly complex. It may be challenging to model the reaction using conventional approaches for rainfall time series simulations because of the complexity of hydrologic processes and the participation of many fundamentally complex variables, such as meteorological and geomorphologic components. This approach consists of three stages, which are preprocessing data, training the model, and normalization. One way to approximate the original variables is by using the principal component analysis (PCA) method, which uses all of the original variables to obtain a smaller set of PCs. To make all of the climate parameters have the same value, we apply a normalization technique. During the entire process of training the model, we utilized an ACO-GBDT. With an average accuracy of 93.67%, this innovative approach surpasses GBDT and ACO.

**Keywords:** Rainfall Prediction, Ant Colony Optimization (ACO), Gradient Boosting Decision Trees (GBDT)

# Articles Published in latest issue of IEI Journals

Volume 9 | Issue 12 | December 2024



## Journal of The Institution of Engineers (India): Series C

|Aerospace, Marine, Mechanical & Production Engineering|

(Electronic ISSN: 2250-0553; Print ISSN: 2250-0545)

[CiteScore: 2.4; h5 Index: 24]

[SCOPUS Indexed & UGC-CARE (India) listed]

For download, use Membership ID through: [www.ieindia.org](http://www.ieindia.org)

### Volume 105, Issue 6, December 2024

Title: **Advanced Process Influenced by Holding Time in the ( $\alpha + \gamma$ ) Temperature Range, on the Mechanical Characteristics of Permanent Molded Toughened ADI**

Authors: **B. V. Padmini, K. Narasimhamurthy, P. Sampathkumaran, R. Seetharamaiah, R. Chandrashekar & S. Seetharamu**

Department of Mechanical Engineering, Sambhram Institute of Technology, Bengaluru, Karnataka, India

Department of Mechanical Engineering, Atria Institute of Technology, Bengaluru, Karnataka, India

Sambhram Institute of Technology, Bengaluru, Karnataka, India

Central Power Research Institute, Bengaluru, Karnataka, India

DOI: <https://doi.org/10.1007/s40032-024-01091-7>

Online Publication Date: 13 October 2024

Pages: 1401–1411

Title: **Mechanical and In Vitro Analysis of 3D Printed Silk Fibroin/ Bone/ Polycaprolactone/ Chitosan Composite Scaffolds**

Authors: **Ali Imran Ansari & Nazir Ahmad Sheikh**

Mechanical Engineering Department, National Institute of Technology Srinagar, Srinagar, India

DOI: <https://doi.org/10.1007/s40032-024-01096-2>

Online Publication Date: 15 October 2024

Page: 1413–1428

Title: **Extrusion Process Influencing Mechanical, Tribological Properties of Aluminum Beryl Composites**

Authors: **K. G. Sagar, P. M. Suresh, P. Sampathkumaran & S. Seetharamu**

Mechanical Engineering Department, Jain Deemed-To-Be University, Jakkasandra Post, Kanakpura Taluk, Ramnagara District, India

Vivekananda Institute of Technology, Bangalore, Karnataka, India

Mechanical Engineering Department, Sambhram Institute of Technology, Bangalore, Karnataka, India

NDRF, Bengaluru, India

DOI: <https://doi.org/10.1007/s40032-024-01097-1>

Online Publication Date: 06 November 2024

Page: 1429–1442

Title: **Loaded Vibration Characteristics of Large Statically Deformed Single Parabolic Leaf Spring**

Authors: **Sushanta Ghuku, Anirban Mitra & Prasanta Sahoo**

# Articles Published in latest issue of IEI Journals

Volume 9 | Issue 12 | December 2024

Department of Mechanical Engineering, Birla Institute of Technology, Mesra, Ranchi, 835215, Jharkhand, India

Department of Mechanical Engineering, Jadavpur University, Kolkata, 700032, West Bengal, India

DOI: <https://doi.org/10.1007/s40032-024-01101-8>

Online Publication Date: 13 October 2024

Pages: 1443–1456

Title: **Development and Test Validation of Energy Management System for Marine Hybrid Power System**

Authors: **Xiaojun Sun, Yingbo Gao & Chong Yao**

School of Automobile and Traffic Engineering, Liaoning University of Technology, Jinzhou, 121000, China

Yantai Research Institute, Harbin Engineering University, Yantai, 264000, China

DOI: <https://doi.org/10.1007/s40032-024-01103-6>

Online Publication Date: 26 October 2024

Pages: 1457–1466

Title: **Many-Objective Multi-Verse Optimizer (MaOMVO): A Novel Algorithm for Solving Complex Many-Objective Engineering Problems**

Authors: **Kanak Kalita, Pradeep Jangir, Sundaram B. Pandya, G. Shanmugasundar, Jasgurpreet Singh Chohan & Laith Abualigah**

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DOI: <https://doi.org/10.1007/s40032-024-01104-5>

Online Publication Date: 21 October 2024

Pages: 1467–1502

Title: **Sustainable Manufacturing Excellence: A Study of MSMEs' Operational Capabilities in Jammu & Kashmir's Geo-Political Environment**

# Articles Published in latest issue of IET Journals

Volume 9 | Issue 12 | December 2024

Authors: **Firdoos Afzal Bhat & Saad Parvez**  
Department of Mechanical Engineering, National Institute of Technology Srinagar, Srinagar, 190006, India

DOI: <https://doi.org/10.1007/s40032-024-01105-4>

Online Publication Date: 14 October 2024

Pages: 1503–1517

Title: **An Investigation of Chatter Reduction on Aluminum Alloy 6082-T6 in Turning Operations with a Multilayer Passive Damping (MLPD) Cutting Tool on CNC Machine**

Authors: **Jaimin Patel & D. H. Pandya**

Department of Mechanical Engineering, Kadi Sarva Vishwavidyalaya, Gandhinagar, Gujarat, 382015, India

DOI: <https://doi.org/10.1007/s40032-024-01111-6>

Online Publication Date: 17 October 2024

Pages: 1519–1530

Title: **Optimization and Characterization of 3D Bioprintable Alginate and Hydroxyapatite Based Biomaterial Ink**

Authors: **Kavita Kumari Thakur, Ramesh Lekurwale, Sangita Bansode & Rajesh Pansare**

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DOI: <https://doi.org/10.1007/s40032-024-01112-5>

Online Publication Date: 21 October 2024

Pages: 1531–1543

Title: **Optimizing Green Machining Processes Using MCDM Methods in q-rung Orthopair Fuzzy Environment**

Authors: **Samriddhya Ray Chowdhury, Srinjoy Chatterjee & Shankar Chakraborty**

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DOI: <https://doi.org/10.1007/s40032-024-01113-4>

Online Publication Date: 28 October 2024

Pages: 1545–1569

Title: **Exploring Health Risks of PVC and Investigating Potential Alternatives Through Mechanical Analysis and Simulation**

Authors: **Utkarsh A. Patil & Pravin R. Kubade**

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DOI: <https://doi.org/10.1007/s40032-024-01117-0>

Online Publication Date: 17 October 2024

Pages: 1571–1580

Title: **Optimization of Laser Additive Manufacturing Process Based on XGBoost Algorithm**

Authors: **Xiancai Wang, Limin Wen & Rongxia Chai**

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School of Intelligent Manufacturing, Huainan Union University, Huainan, 232001, China

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DOI: <https://doi.org/10.1007/s40032-024-01119-y>  
Online Publication Date: 05 November 2024  
Pages: 1581–1590
- Title: **Quantitative Analysis of Frictional Forces and their Impact on Drilling Efficiency in Aluminum Alloy Machining**  
Authors: **Adarsh Patil, Varun Iranna Hebasur, Rayappa Mahale, Vijay Tambrallimath, G. S. Divya, Banakara Nagraj & Prasanna C. Kattimani**  
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Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune, 411018, India
- DOI: <https://doi.org/10.1007/s40032-024-01120-5>  
Online Publication Date: 06 November 2024  
Pages: 1591–1601
- Title: **Occupational Injuries in North Indian Agriculture: Product Development and Preventive Measures**  
Authors: **Sandeep Singh Kharb & Anup Malik**  
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- DOI: <https://doi.org/10.1007/s40032-024-01121-4>  
Online Publication Date: 05 November 2024  
Pages: 1603–1613
- Title: **Tribological Analysis of Aluminium-Based MMC Reinforced with Silicon Carbide & Magnesium**  
Authors: **Arun Kumar Sriram Pandey, Rajnish Singh & Akhilesh Kumar Chauhan**  
Department of Mechanical Engineering, KNIT Sultanpur, Sultanpur, Uttar Pradesh, India
- DOI: <https://doi.org/10.1007/s40032-024-01122-3>  
Online Publication Date: 02 November 2024  
Pages: 1615–1625
- Title: **On the Role of Shim Material to Reduce Chatter in CNC Turning**  
Authors: **Jaimin Patel & D. H. Pandya**  
Department of Mechanical Engineering, Kadi Sarva Vishwavidyalaya, Gandhinagar, 382015, Gujarat, India
- DOI: <https://doi.org/10.1007/s40032-024-01123-2>  
Online Publication Date: 04 November 2024  
Pages: 1627–1642
- Title: **From Concept to Market: Integrating Customer Needs in Product Development**

# Articles Published in latest issue of IEI Journals

Volume 9 | Issue 12 | December 2024

Authors: **Soumyajit Das, Bivash Mallick & Sourav Das**  
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DOI: <https://doi.org/10.1007/s40032-024-01127-y>

Online Publication Date: 15 November 2024

Pages: 1643–1652

Title: **Machine Learning and Artificial Intelligence Supported Machining: A Review and Insights for Future Research**

Authors: **Javvadi Eswara Manikanta, Nitin Ambhore, Amol Dhumal, Naveen Kumar Gurajala & Ganesh Narkhede**

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## ANNOUNCEMENT



### IEI-Springer Journals



Journal Title	ISSN Print	ISSN Electronic	CiteScore 2023	Google Scholar: h5 Index 2022
Journal of The Institution of Engineers (India): Series A	2250-2149	2250-2157	2.2	22
Journal of The Institution of Engineers (India): Series B	2250-2106	2250-2114	3.1	24
Journal of The Institution of Engineers (India): Series C	2250-0545	2250-0553	2.4	24
Journal of The Institution of Engineers (India): Series D	2250-2122	2250-2130	2.0	19
Journal of The Institution of Engineers (India): Series E	2250-2483	2250-2491	2.0	11



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(xi) Book Chapter Number	
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(xiv) Date of Publication (Date-Month-Year)	
(xv) Co-authors (if any)	
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