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BYTE STREAM



COMPUTER SCIENCE AND ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY (ISM)
DHANBAD

MONTHLY NEWSLETTER

An Insight into the
Department of Computer
Science and Engineering,
IIT (ISM)

“ Don't worry if it doesn't
work right. If everything
did, you'd be out of a
job.”
— Mosher's Law of
Software Engineering

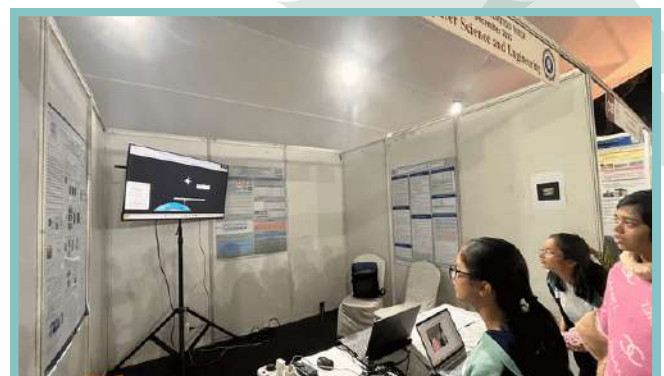
Jubilant Celebrations by the CSE department welcoming the Centenary year

The Indian Institute of Technology (Indian School of Mines), Dhanbad marked its historic centenary milestone (1926 - 2026) with a week-long series of academic, cultural, and outreach activities held from 3rd to 9th December 2025. Founded in 1926 on the model of the Royal School of Mines, the institute has grown into a comprehensive multidisciplinary IIT with a strong focus on research, innovation, and industry collaboration. The celebrations brought together eminent personalities from across the country, including Dr. P.K. Mishra, (Principal Secretary to the Prime Minister of India), Shri Gautam Adani (Chairman, Adani Group), Shri Saryu Roy (MLA, Jamshedpur West), Shri Atul Kumar Tiwari (IAS), and Prof. J.S. Rajput (Padma Shri). During the broader centenary year, the institute was also honoured by the presence of the Hon'ble President of India, Smt. Droupadi Murmu, along with several national leaders for the Convocation.

A major attraction of the centenary celebrations was the technical exhibition, where each department showcased their research and innovations. The Computer Science and Engineering department emerged as a key highlight, drawing sustained interest through its application-oriented demonstrations and interactive prototypes. Research areas on display included explainable AI, physics-informed neural networks, healthcare-focused AI systems, hardware-oriented security, and human-computer interaction.

Other notable exhibits included a Fleet Monitoring System for real-time vehicle tracking and analytics, an Air-Gesture Equation Solver enabling touchless mathematical input, a Gesture-Controlled Survival Game demonstrating low-cost vision-based interfaces, and a Smart Home (Ambient Intelligence) system featuring gesture-based control of lights and appliances. Together, these demonstrations reflected the department's emphasis on practical innovation and societal relevance.

As IIT (ISM) enters its next century, the centenary celebrations highlighted the crucial role of departments such as Computer Science and Engineering in advancing research excellence, driving technological innovation, and contributing meaningfully to the vision of Viksit Bharat 2047 through nation-building and societal impact.





Prof. Jaishree Mayank's Research Project: SANCHARI – A Unified Platform for Time-Sensitive Networks

The research project titled “SANCHARI: An Efficient Generic Software Tool for the Synthesis and Validation of Cost-Effective Time-Sensitive Networks” has been accepted under the ANRF – Advanced Research Grant (ARG) Scheme. The project is being led by Dr. Jaishree Mayank, Department of Computer Science and Engineering, IIT (ISM) Dhanbad, in collaboration with Dr. Arnab Sarkar of IIT Kharagpur and Dr. Arijit Mondal of IIT Patna. The project has received a total sanctioned budget of ₹1.7226 crore, with ₹81.9 lakhs allocated to IIT (ISM) Dhanbad.

Modern cyber-physical systems increasingly require communication networks that offer deterministic behaviour, high bandwidth, and strong reliability guarantees. Legacy networking solutions often struggle to meet these stringent requirements, particularly for real-time and mission-critical applications. Time-Sensitive Networking (TSN) addresses this need by enabling low-latency, fault-tolerant communication over Ethernet, making it a scalable and cost-effective option for advanced applications, especially within the Indian context.

Despite its advantages, the design and deployment of TSN systems continue to be challenging. Current TSN design methodologies are largely manual, fragmented, and domain-specific. There is no open, generic software platform that can automatically derive network topologies, schedules, and routing configurations from high-level system requirements. This limitation significantly restricts the adoption of large-scale and cost-effective TSN.

The SANCHARI project aims to bridge this gap by developing a unified and open software platform for TSN synthesis and validation. The proposed tool will automatically generate, validate, and adaptively reconfigure TSN designs from formal specifications, providing an integrated framework for reliable and scalable network deployment.

By enabling low-cost TSN adoption, the project supports national initiatives such as Make in India and Atmanirbhar Bharat. It is expected to enhance the reliability of smart infrastructure, promote the transfer of TSN technologies to industry, advance research in time-sensitive networking, and contribute to skill development in this critical area.



Prof. Pranay Kumar Saha's Research Project: DARSI

The research project titled “DARSI: Demand-Aware Rooftop Solar Mapping and Installation Optimization with Limited Satellite Data and Model Debiasing” has been accepted under the ANRF – Advanced Research Grant (ARG) Scheme. The project is being led by Dr. Pranay Kumar Saha of the Department of Computer Science and Engineering, IIT (ISM) Dhanbad, in collaboration with Dr. Pratik Mazumder from IIT Jodhpur. The project has been sanctioned a total budget of ₹95.27 lakhs, with ₹41.63 lakhs allocated to IIT (ISM) Dhanbad.

Solar energy adoption in India has been growing rapidly; however, a significant number of rooftop solar installations fail to deliver optimal performance. One of the primary reasons for this inefficiency lies in the way installation sites are identified. Existing approaches rely heavily on expensive, high-resolution satellite imagery or models that are not tailored to Indian building layouts and electricity consumption patterns. As a result, many installations do not fully utilize available rooftop potential or align with local energy demand.

The DARSI project aims to address these challenges by developing an intelligent, data-driven framework for the deployment of rooftop solar energy. The proposed system focuses on accurately identifying suitable rooftop locations for solar panel installation even when only limited or low-resolution satellite data is available. By reducing dependence on costly and hard-to-access data sources, the project seeks to make solar planning more accessible and scalable. A key aspect of the project involves training and debiasing AI models to better understand the unique structural patterns of Indian cities and villages. Rather than relying on datasets derived from foreign landscapes, the models are adapted to reflect local building characteristics and conditions. In addition, the framework integrates local electricity demand patterns to ensure that solar installations are aligned with actual energy requirements, thereby maximizing both energy generation and value. Through this approach, DARSI aims to enhance the efficiency and effectiveness of rooftop solar installations across the nation.



Recruitathon 2.0

WebCSE, the web development wing of IIT (ISM) Dhanbad's CSE Society, has designed something far more substantial than a typical recruitment drive in Recruitathon 2.0, a month-long individual hackathon that immerses participants in professional software development practices while providing structured support throughout the journey.



The framework mirrors a real tech company. Second-year students serve as mentors, offering one-on-one technical guidance during fixed working hours. Faculty members provide final oversight, functioning as VPs in a corporate hierarchy. Participants do not just write code. They experience the dynamics of a functioning tech team.

The process commenced with introductory sessions covering web development fundamentals. On December 1st, active development began. Since then, participants have been engaged with their projects, navigating challenges and building their projects brick-by-brick. With the mid-evaluations completed, the mentors provided an opportunity to present works-in-progress and receive constructive feedback.

The objective extends beyond creating a website. It is about delivering a deployment-ready product that demonstrates genuine technical proficiency. As Recruitathon 2.0 approaches its conclusion, the stakes are clear. For those who succeed, membership in WebCSE awaits.

Long Service Award for 25 Years - Prof. P. K. Jana

Prof. P. K. Jana has completed 25 years of dedicated service at IIT(ISM) Dhanbad. He joined the institute in 2000, soon after completing his Ph.D. in Computer Engineering from Jadavpur University (jointly supervised with ISI Kolkata), and has since contributed to teaching, research and academic administration.

Over the years, Prof. P. K. Jana has made significant contributions. He has co-authored six books, including two publications with CRC Press, along with four book chapters and three edited volumes. He also published 219 research papers, including 94 journal articles and 125 conference papers. These publications have received a total of 9071 citations on Google Scholar. He has supervised 22 Ph.D. scholars and 59 M.Tech dissertations, contributing significantly to student research and development. He has successfully completed three R&D projects and one FIST(DST) project, resulting in important research and technological outcomes. Additionally, he has conducted seven short-term courses, sharing his knowledge with students, faculty, and professionals.

Prof. P. K. Jana has been honored with several prestigious awards in recognition of his academic and research achievements. He received the Canara Bank Research Publication Awards (2015 & 2017) and was counted among the Top 2% Indian Scientists in Artificial Intelligence in the Stanford University survey (2020-2025). He was also awarded the Academic Excellence Award 2025 by the University of Engineering and Management, Kolkata. Moreover, he has won Best Paper Award from International Conferences, including ICDCIT 2025, ICDCIT 2023, ICACCI-2018, CEECE-2017, ICECCS-2013.

His research areas include Cloud Computing, Fog Computing, Internet of Things, Machine Learning, Wireless Sensor Networks, and Parallel & Distributed Computing. In addition, his administrative contributions include serving as Chairman of the Department Faculty Screening Committee, Convener of the Department Post Graduate Committee, and Head of the Department twice.

Through his vision and mentorship, Prof. P. K. Jana has strengthened the institute and inspired generations of learners. His 25 years of devoted service continue to leave a lasting impression on the institute and its students.



Prof. Prasanta K. Jana Honored for Academic Excellence at RAAISA 2025

In a noteworthy recognition of academic excellence and research leadership, Prof. Prasanta K. Jana was recently conferred a prestigious award during a special felicitation ceremony at the International Conference on Recent Advances on Artificial Intelligence and Smart Applications (RAAISA-2025). The conference was organized by the University of Engineering and Management (UEM), Kolkata, bringing together eminent researchers and practitioners from across the globe.

Over the course of his distinguished career, he has authored 219 research papers including 94 journal articles and 125 conference publications, which have collectively earned over 9071 citations on

Google Scholar. Prof. Prasanta Jana's academic influence extends beyond research papers. He has co-authored six books, including two published by CRC Press and contributed to four book chapters and three edited volumes. Equally admired for his mentorship, he has guided 22 Ph.D. scholars and 59 M.Tech. dissertations, fostering the next generation of researchers and innovators. He has successfully completed three R&D projects and a FIST (DST) project, demonstrating a consistent record of collaborative research leadership. His editorial contributions include serving as Associate Editor for the International Journal of Communication Systems (Wiley), further underlining his influence in academic publishing.

Prof. Prasanta Jana's global standing is reflected in his inclusion among the Top 2% of Indian Scientists in Artificial Intelligence, as recognized by the Stanford University Global Ranking (2020-2025). His numerous accolades include the Canara Bank Research Publication Awards (2015 & 2017) and five Best Research Paper Awards at eminent international conferences such as ICDCIT-2025, ICDCIT-2023, ICACCI-2018, CEECE-2017 and ICECCS-2013. The honor bestowed at RAAISA 2025 celebrates not only his exceptional academic accomplishments but also his enduring influence as a mentor and researcher in the global scientific community.



Research Project on AI-Based Digitisation of Ecological Records to Prof. Partha Pratim Roy



IIT (ISM) Dhanbad and La Rochelle Université, France have entered into a new international collaboration. The research project is titled - "Unlocking the Vast Knowledge Held in Analog Long-Term Time-Series in Ecology Using Text Recognition and AI Methods", and aims to decipher valuable long-term ecological data, most of which remain largely undigitized, using artificial intelligence. A total of ₹7,05,600 has been sanctioned for the project. The project is led by Prof. Partha Pratim Roy from the CSE Department, IIT (ISM) Dhanbad.

The focus of the project is on marine ecological time-series records. Most of them span over more than 3 decades, and because they are handwritten or stored in printed tabular forms, they have remained undigitized. Long-term climate impacts, such as ocean warming and extreme marine events, can be studied with these historical datasets.

Specialised AI models which can accurately convert handwritten or printed ecological field records into structured digital datasets are proposed in this project. Basic OCR tools will be suboptimal for this task, as they require recognition of domain specific symbols, layouts and various annotations used by ecologists.

The project is planned over two years. The project aims to produce complete digitisation pipelines, fine tuning, robustness testing, deployment and reusable tools, and to enable the recovery of nearly 17 years of previously inaccessible data. This monumental effort will be a baseline for climate research while preserving invaluable scientific records for future generations.

Prof. Dharavath Ramesh Recognized Among Global Elite Researchers



Prof. Dharavath Ramesh has been ranked in the top 0.75% of researchers globally by the 2025 ScholarGPS Ranking. This prestigious distinction places him ahead of 99.25% of his peers worldwide, highlighting an elite standing in the academic community. This recognition reflects Prof. Ramesh's significant contributions and high-impact research in critical technological domains. His work is particularly noted for excellence in Big Data, Machine Learning, Neural Networks, Mathematical Optimization, Informatics, etc.

Securing such a high rank is a testament to his dedication to advancing knowledge and innovation. It not only elevates his personal research profile but also opens new avenues for prestigious grants and high-level international collaborations. A hearty congratulations to Prof. Ramesh on this remarkable milestone and his continued leadership in the field of Computer Science.

Foreign Visit of Prof. Dharavath Ramesh

Prof. Dharavath Ramesh visited Da Nang University, Da Nang, Vietnam, to explore opportunities for international academic and research collaboration. During the visit, he presented his research ideas and engaged in detailed discussions focused on AI-based financial systems.

As a result of these interactions, Prof. Ramesh initiated potential research collaborations with Prof. Hong Nhung Nguyen from Gachon University in Seoul, South Korea, and Prof. Le Anh Ngoc from the Swinburne University of Technology's Vietnam Campus. The discussions covered key aspects of collaborative research, including research scope, methodological approaches, and future academic engagement.

This international visit marks a significant step toward strengthening global research linkages and fostering long-term collaboration in emerging areas of artificial intelligence and financial systems.



Recently accepted Research Work for publication

Title: Knee Osteoarthritis Detection and Categorization with Deep Learning Models.

Authors: Roy, G., Pal, A.K., Raj, M., Pradhan, J.

Accepted at: Proceedings of the Second International Symposium on Artificial Intelligence. ISAI 2025. Lecture Notes in Networks and Systems, vol 1536. Springer (Received Best Paper Award)

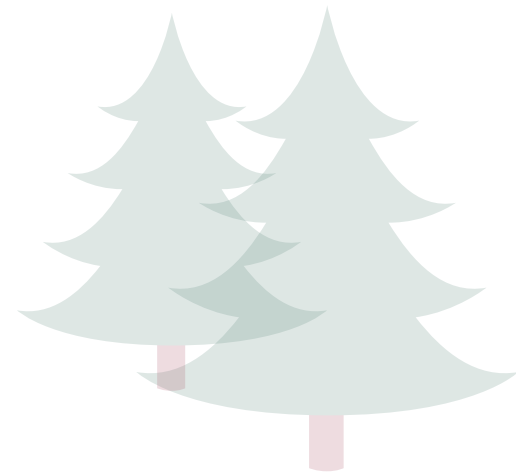
Title: A Reversible Fragile Watermarking Scheme for Tamper Localization and Content Recovery in Digital Images

Authors: D. Karmakar, S. Mukherjee, and A. K. Pal

Accepted at: 5th International Conference on Machine Vision & Augmented Intelligence (MAI-2025)

Title: Writer Authentication using Different Structural and Geometrical Features: An Application Towards Handwritten Document Forensics**Authors:** Prabhat Dansena, Akash Sinha, Soumen Bag, and Kousik Sarkar**Accepted at:** Workshop on Handwritten Document Forensics: Challenges, Advances, and Applications (HDF 2025) in conjunction with ICVGIP 2025, IIT Mandi**PhDs Awarded in the month of December 2025**

Awardee	Supervisor	Thesis Title
Mathada Mallikarjuna	Prof. Tarachand Amgoth	<i>DESIGN OF MOBILITY-BASED ALGORITHMS FOR WIRELESS SENSOR NETWORKS</i>
Tapan Kumar Nayak	Prof. A. C. S. Rao	<i>ANALYSIS, CLASSIFICATION AND INTERPRETATION OF MEDICAL IMAGING DATA USING DEEP LEARNING TECHNIQUES</i>

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