MAY 2025

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)

> Computer science empowers students to create the world of tomorrow."
>
> — Satya Nadella

MAY 2025

Welcoming Prof. Partha Pratim Roy to our Department

We are pleased to welcome Prof. Partha Pratim Roy to the Department of Computer Science and Engineering. He joined our department on 28th May 2025 as a Professor, following eleven years of service on the faculty of IIT Roorkee. Prof. Roy brings with him a distinguished background in pattern recognition, machine learning, biometrics, and human–computer interaction.

Dr. Partha Pratim Roy (Fellow, IETE; Senior Member, IEEE) received his M.S. (2006) and Ph.D. (2010) degrees in Computer Science from the Universitat Autònoma de Barcelona, Spain. He subsequently carried out post-doctoral research in France and Canada (2010–2013). Prior to his academic career, he spent four years in the industry with Tata Consultancy Services and Samsung R&D, where he led the Computer Vision Group.

Dr. Roy's accolades include the Best Student Paper Award at ICDAR 2009, Top 10% Paper Awards at ICIP 2014 and 2019, and the iHUB Divyasampark Faculty Fellowship (2022–2023). Since 2018, he has been a Visiting Researcher at Osaka Metropolitan University, Japan, and in 2024, he served as a Visiting Professor at Sookmyung Graduate School, South Korea. He has authored over 250 peer-reviewed publications in international journals and conference proceedings and regularly contributes as a member of program committees for major international conferences. His research interests encompass pattern recognition, machine learning, biometrics, and human–computer interaction.

Dr. Roy currently serves as an Associate Editor for the *IEEE Transactions on Circuits and Systems for Video Technology*, *ACM Transactions on Asian and Low-Resource Language Information Processing*, and *Neurocomputing*. He has led several research projects as Principal Investigator, supported by agencies such as DRDO, DST-SERB, MeitY, SPARC, NIC, and HP. In addition, he has co-founded two start-ups incubated at IIT Roorkee and its partner institutions.

New Faculty Member Joined the Department: Prof. Jaishree Mayank

We are thrilled to welcome Prof. Jaishree Mayank to the Department of Computer Science and Engineering at IIT ISM Dhanbad.

Prof. Jaishree Mayank has been an Assistant Professor in the Department of Computer Science and Engineering at IIITDM Kancheepuram, Chennai, since February 2022. She holds a Ph.D. in Computer Science and Engineering, with her doctoral research focusing on performance optimization strategies for Real-Time Cyber-Physical Systems. Before her tenure at IIITDM Kancheepuram, she was a Research Associate at IIT Kharagpur and worked as an Assistant Professor at IIIT Vadodara.

Prof. Jaishree Mayank joins us as an Assistant Professor and brings us a wealth of expertise within her research interests, including AI-driven algorithms for smart grids, electric vehicles, drone coordination, and in-vehicle system performance optimization. She has an extensive publication record in renowned journals and conferences and is actively engaged in teaching, research, and academic initiatives.

Dr. Dharavath Ramesh Recognized Among Top 0.5% of Scholars Worldwide by ScholarGPS

Dr. Dharavath Ramesh, Associate Professor in the Department of Computer Science and Engineering, was honored by being ranked among the top 0.5% of scholars globally in the 2024 ScholarGPS rankings.

This recognition is a testament to Dr. Ramesh's outstanding scholarly contributions, including a strong publication record, high research impact, and quality of work across the field of Computer Science. According to ScholarGPS, his ranking places him at #1,628 in Computer Science, #10,212 in Engineering and Computer Science, and #26,714 overall across all academic fields in the prior five years.

ScholarGPS, a globally reputed platform that ranks over 30 million scholars and 120,000 institutions based on quantitative metrics such as publication counts, citation impact, and h-index, acknowledged Dr. Ramesh's consistent academic excellence and influence. These rankings span 14 broad fields, 177 disciplines, and over 350,000 specialties, offering one of the most comprehensive views of academic performance worldwide.

Dr. Ramesh expresses his heartfelt thanks to his mentors, collaborators, students, and institutional leaders. He acknowledged the support and guidance of the Director of IIT (ISM) Dhanbad and Prof. Chiranjeev Kumar, Head of the Department of Computer Science and Engineering, for fostering a research-oriented environment and motivating participation in technical and academic platforms.

Dr. Ramesh's achievement not only reflects individual dedication but also highlights the culture of research excellence promoted at IIT (ISM) Dhanbad. His recognition highlights the global visibility and impact of Indian researchers in the rapidly evolving field of computer science.

Forging Digital Frontiers: Dawn of Army-Academia Collaboration

In a momentous step towards nation-building, IIT(ISM) Dhanbad and the Indian National Army recently signed an MoU on May 19, 2025. This MoU aims to promote the competitiveness of both parties involved through the exchange of information, innovation, technological development and skill development in the field of Computer Sciences and Engineering.

The objective of the said MoU includes encouraging innovation in Research Projects, Software Development and Software Testing. IIT(ISM) Dhanbad also pledges to provide executive training in fields like AI/ML, Database Management, Image and Video Processing, Information and Network Security and IoT. A separate agreement for each activity under this MoU will be formulated through constructive consultation between both parties, keeping in mind mutual interests.

This is an epoch-making initiative by both parties to enhance national security by utilizing the incredible pool of talent available in IIT(ISM) Dhanbad. In turn, this initiative will also help ISM students to engage in internships, project and research work.

This collaboration marks the dawn of a new era of perfect symbiosis between the Army and Academia to reinforce nation-building.

Research Project under Prof. Tarachand Amgoth

Massil Technologies private limited, a technology service and product company, based in Hyderabad, Telangana in its recent collaboration with IIT ISM Dhanbad, has sanctioned a research project titled CREDIBLE: Collaborative and Intelligent Edge for Robust AI in Dynamic and Uncertain Environment—an increasingly critical area of research in sectors such as autonomous systems, smart surveillance, and adaptive infrastructure. The project is under the guidance of Prof. Tarachand Amgoth. The duration of the project is 36 months and the total cost of the project is Rs. 35,43,540. This collaboration reinforces IIT (ISM) Dhanbad's commitment to cutting-edge research and industry partnership, placing the institute at the forefront of technological advancements in AI and intelligent systems.

Prof. Saurabh Srivastava Receives TEXMiN Grant for Advancing Liquid Chemical Analysis in Mining

Prof. Saurabh Srivastava from the Department of Computer Science and Engineering, IIT (ISM) Dhanbad, has secured a Technology Development Project under the Technology Innovation in Exploration & Mining Foundation (TEXMiN). The project, titled "Application of Hyperspectral Imaging for Analysis of Liquid Chemicals in Mining and Industrial Practices," focuses on developing a portable hyperspectral imaging (HSI) system for real-time monitoring of liquid mixtures commonly encountered in mining processes.

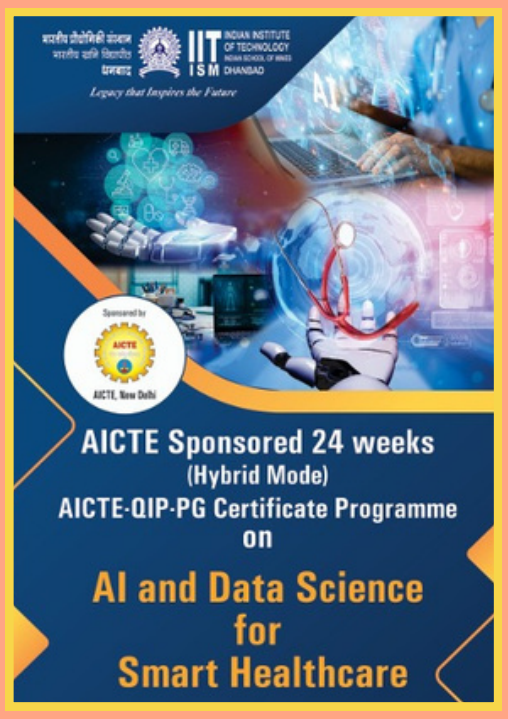
The proposed system integrates HSI technology with a web-based analytics portal to detect and quantify chemical compounds in leachates and coal bed methane (CBM) produced water. The aim is to ensure environmental compliance, resource recovery, and process optimization through non-invasive, high-resolution spectral analysis.

By creating a spectral library and predictive models, the system will help classify mixtures based on pollutant levels and support decision-making in field conditions. Deliverables include a field-ready portable device, a secure data portal, and validated estimation models for pollutants of industrial concern.

This multi-institute initiative is a collaboration between IIT (ISM) Dhanbad and IIT Indore, with Prof. Srivastava serving as the Principal Investigator, and Dr. Puneet Gupta (IIT Indore) as the Co-Principal Investigator. The total sanctioned amount for the project is ₹12.58 lakhs, of which ₹4.05 lakhs is allocated to IIT (ISM) Dhanbad.

The project represents a significant step forward in applying AI-integrated CPS (Cyber-Physical Systems) for mining safety, sustainability, and intelligent process control.

AICTE-QIP-PG Certificate Program on AI and Data Science for Smart Healthcare



The AICTE-QIP-PG Certificate Program in AI and Data Science for Smart Healthcare, coordinated by Prof. Haider Banka of the Department of Computer Science & Engineering at IIT (ISM) Dhanbad, is set to commence on 16th June 2025. Under the expert guidance of Prof. Banka, this prestigious program aims to empower faculty members with cutting-edge skills in artificial intelligence and data science, specifically tailored for healthcare and Med-Tech applications. This six-month, hybrid mode program is meticulously structured to bridge the critical gap between technical proficiency and domain-specific healthcare knowledge, addressing the rising demand for AI-driven solutions that can enhance patient care, operational efficiency and healthcare equity.

The curriculum is thoughtfully designed, comprising 18 credits that blend theory, practical sessions and project-based learning. It begins with foundational modules on problem solving, computational thinking and programming fundamentals using languages such as Python, C or Java. Participants are introduced to essential data structures, algorithmic methods and statistical computing, laying a strong groundwork for more advanced topics. The course then delves into the core aspects of AI and healthcare data, covering the intricacies of electronic health records, medical imaging and the unique challenges associated with healthcare data preprocessing and feature engineering.

Ethical considerations and data privacy, particularly in the context of regulations like HIPAA and GDPR, are given significant emphasis, ensuring that participants develop a responsible approach to handling sensitive medical information.

A major highlight of the program is its focus on practical applications of machine learning and deep learning in healthcare. Participants explore supervised and unsupervised learning techniques, ensemble methods and evaluation metrics through real-world case studies such as disease risk assessment and predictive modeling. Deep learning modules introduce convolutional neural networks (CNNs) for medical image analysis, including tasks like segmentation and classification of X-rays and MRIs. The curriculum also incorporates natural language processing for extracting insights from clinical notes and medical literature, as well as time series analysis for patient monitoring and equipment maintenance. The importance of explainable AI is underscored, with hands-on sessions on interpreting complex models using tools like LIME and SHA.

In addition to theoretical instruction, the program places a strong emphasis on hands-on projects that encourage participants to apply their learning to tangible healthcare challenges. Project topics range from developing AI-powered medical chatbots and disease prediction systems to creating smart health monitoring devices and AI-assisted medical imaging solutions. These projects not only foster technical skills but also promote interdisciplinary collaboration and innovation, preparing participants to tackle real-world problems in healthcare settings.

The program offers an immersive learning experience, supported by advanced infrastructure that includes high-performance computing resources, essential software such as TensorFlow and medical imaging platforms and a wealth of healthcare datasets for hands-on experimentation. A robust learning management system ensures effective course delivery and active engagement, while experienced faculty and guest experts from academia and industry guide participants throughout. Collaborations with healthcare institutions and tech companies further enrich the program with real-world data, case studies and interdisciplinary opportunities.

Admission is open to full-time faculty from AICTE-approved institutions with at least five years of teaching experience in core engineering disciplines, ensuring a diverse cohort from various states and districts. The program is tuition-free, requiring only a refundable caution deposit and provides accommodation during mandatory on-campus sessions.

Upon successful completion, participants will receive a jointly certified QIP-PG Certificate from AICTE and IIT (ISM) Dhanbad, signifying their readiness to drive innovation in healthcare education and practice. Ultimately, this program empowers faculty to impart advanced knowledge to their students and contribute meaningfully to the transformation of the healthcare sector through technology-driven solutions.

Short Term Program on Blockchain and Cybersecurity for Cyber Threat Prevention under Malviya Mission Scheme Teachers' Training Programme

The Short-Term Course on Blockchain and Cybersecurity for Cyber Threat Prevention, coordinated by Prof. Arup Kumar Pal, focuses on the practical intersection of blockchain technology and cybersecurity. As digital systems scale, conventional security models are no longer enough. Blockchain, with its decentralized and tamper-resistant architecture, offers a better direction. When combined with present-day cryptographic techniques, it enables sturdy frameworks for data protection, access control, and system integrity.

The course covers key areas including symmetric and asymmetric cryptography, cryptanalysis, and blockchain fundamentals. It also delves into addressing applied use cases such as blockchain-based user authentication, data sharing, and multimedia protection—domains where classical security models are highly vulnerable.

Lectures are given by experts from India and abroad, ensuring exposure to both foundational concepts and current-day research topics. Along with these, hands-on sessions aimed at filling the gap between theoretical understanding and implementation.

Whether you're a student, researcher, or professional, the contents of this course will equip you with the tools to design and understand security-first systems, leveraging cryptographic protocols and blockchain infrastructure. Applying this knowledge would bring a real-world impact.

Forging Global Research Ties: MoU with Warsaw University of Technology

On May 14, 2025, a Memorandum of Understanding (MoU) was signed between our institution and Warsaw University of Technology, Poland, marking a significant stride in expanding global academic collaboration. This partnership is designed to foster joint academic and research engagements, with a focus on key areas such as Cybersecurity, Digital Twins, and Probabilistic Machine Learning.

The MoU outlines various collaborative avenues, including joint research projects, student and faculty exchange programs, and co-hosting of international seminars, workshops, and conferences. These initiatives aim to facilitate knowledge sharing, encourage interdisciplinary research, and offer global exposure to students and researchers alike. The agreement also sets the stage for developing joint academic programs and co-authored publications, thereby strengthening scholarly cooperation.

A noteworthy aspect of this collaboration is the inclusion of affiliated institutions such as Politechnica and the Faculty of Mechatronics, Warsaw. Their involvement brings additional expertise in areas like Artificial Intelligence, Machine Learning, and Security, further broadening the scope and impact of the partnership.

This MoU represents a strategic move towards the internationalization of academic efforts and reflects a shared commitment to innovation, excellence, and global connectivity. It not only enhances research capabilities but also opens doors for students and faculty to actively contribute to a dynamic and interconnected global academic network.

IIT Dhanbad PhD Scholar Awarded Prestigious C-DOT STAR Program Scholarship

IIT Dhanbad proudly celebrates the achievement of Mr. Dipnarayan Das, a PhD scholar from the Department of Computer Science and Engineering, who has been selected for the renowned STAR Program scholarship by the Centre for Development of Telematics (C-DOT).

The STAR Program is designed to promote cutting-edge research in telecom R&D, focusing on areas of national importance, including rural and strategic sectors. As part of this award, Mr. Das will receive a monthly scholarship of ₹50,000 starting July 2025, for a duration of up to three years, based on satisfactory annual performance.

Beyond financial support, the scholarship also offers Mr. Das mentorship from C-DOT's leading research experts and access to advanced laboratory facilities, providing him with valuable resources to advance his work and contribute to India's growing telecom sector.

This recognition highlights both Mr. Das's outstanding research efforts and IIT Dhanbad's commitment to fostering innovation and excellence.

Congratulations to Mr. Das and the department for this well-deserved honor!

Writers' Pen

The Influence of Technology on Vehicles: A Modern Revolution

From steam-powered carriages to self-driving electric vehicles, the journey of automobiles reflects the rapid evolution of technology. In the early days, vehicles were purely mechanical — a combination of metal, wheels and engines. Today, they are intelligent systems packed with sensors, computers and software. This shift has completely transformed how we travel, commute, and experience mobility.

One of the most noticeable advancements is the move from manual to automatic gears, making driving smoother and more accessible. Electric Vehicles (EVs), once a distant dream, are now a reality on our roads. They reduce dependence on fossil fuels and promote sustainability. Brands like Tesla have redefined the concept of a car — not just as a vehicle, but as a smart device on wheels. With features like self-driving capabilities, touch-screen controls and over-the-air software updates, technology has brought a level of convenience unimaginable a few decades ago.

These innovations have undoubtedly made human life easier, faster and more efficient. Long drives are less tiring, parking is automated, and vehicles can now alert drivers to dangers before they occur. However, with great ease comes a subtle risk. Relying too heavily on machines can make us passive, and system failures or overconfidence in automation can lead to accidents. Still, technology is not blind to its own flaws. Traffic systems have evolved to include automated red lights, smart stop signs and zebra crossings with motion sensors. These tools work alongside vehicles to ensure a safer environment, especially in crowded cities. In addition, adaptive traffic management systems adjust signals in real time based on vehicle flow, helping to reduce congestion and minimize accidents. Pedestrian detection systems, road lane markings enhanced with sensors and AI-powered surveillance further contribute to maintaining order and safety on the roads. These innovations don't just complement smart vehicles — they act as a safety net, reminding us that while cars are becoming smarter, the environment they operate in must be just as intelligent.

The convergence of technology and transportation is one of the greatest achievements of our time. It enhances everyday life in ways we once only imagined. But as we continue to innovate, we must also stay responsible. Supporting technology means using it wisely — not replacing our judgment, but enhancing it.

— Ishika Acharya (24JE0623)

Contact Us:

Prof Chiranjeev Kumar
Head of the Department
Email: cse@iitism.ac.in
Phone: +91-326-2235273 (O)
Fax: +91-326-2296563

Credits:

Prof Saurabh Srivastava (Faculty Coordinator)
Kartik Lolla (24JE0633)
Dakshta Wadibhasme (24JE0608)
Muskan Bibhuty (24JE0659)

Share your ideas, stories, or articles by mailing us at bufferedreader@iitism.ac.in

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