

FEBRUARY 2026

# 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) Dhanbad



“ The function of a good  
software engineer is to  
make himself obsolete. ”

— Doug Linder

## Foundations on Secure Communications Bootcamp

IIT(ISM) Dhanbad recently organised an intensive 7-day bootcamp on "Foundations of Secure Communication using Cryptography", held from 12th to 18th February 2026, by Department of Computer Science and Engineering. The program was sponsored under the ISEA Project Phase-III by the Ministry of Electronics and Information Technology (MeitY). It was designed to transition participants from foundational concepts to advanced cybersecurity defense. Lectures were held on the basics of cryptography and RSA algorithms, including common attack vectors, in-depth sessions on AES, Hash Functions, and Digital Signatures, training on packet capturing, SOC rules, and identifying web application vulnerabilities, specialised lectures on Denial of Service (DoS) attacks and secure communication protocols.

The bootcamp also emphasized on experiential learning through daily 3-hour technical sessions, practical coding of Symmetric(AES,ECC) and Asymmetric (RSA) cryptography, intensive training on industry standard tools including Wireshark for network analysis and Burp Suite for web security. It also included configuration and deployment of Kali Linux for vulnerability assessment. To wrap up, participants put their skills to the test in a high-stakes Capture The Flag (CTF) contest. This exercise challenged students to apply their knowledge of cryptography and tool configuration in a competitive, real-world environment. This initiative aims to enhance cybersecurity awareness and capacity building, preparing our students for advanced roles in both academia and the digital security industry.



## EchoPulse - Revolutionizing Cardiac Diagnostics through AI and Virtual Reality



At the intersection of Artificial Intelligence, Healthcare Analytics and Immersive Visualization lies the future of medical diagnostics. At the forefront of this evolution stands the transformative research led by Dr. Annavarapu Chandra Sekhara Rao, Department of Computer Science & Engineering, IIT(ISM) Dhanbad. His latest project EchoPulse, introduces a self-supervised, VR-enabled mechanism designed to transform the automated analysis of cardiac performance. This project is supported by a funding grant of around ₹47 lakhs from the Anusandhan National Research Foundation (ANRF).

Cardiovascular diagnostics heavily rely on echocardiography to assess heart health. However, analyzing this complex time-series data traditionally requires extensive manual effort and massive, perfectly labeled datasets. EchoPulse elegantly bypasses this bottleneck. By leveraging advanced self-supervised learning techniques, the system analyzes cardiac volume time series directly from echocardiographic data, autonomously identifying meaningful physiological patterns without the need for exhaustive prior labeling.

Under the hood, EchoPulse is powered by state-of-the-art transformer based architectures and masked volume modeling. By learning to reconstruct masked or hidden cardiac signals, the model develops a deep understanding of the heart's intrinsic temporal dynamics. This allows it to automatically and accurately estimate crucial clinical metrics, such as the Ejection Fraction (EF), which is a vital indicator of overall cardiac performance.

What truly sets EchoPulse apart from traditional diagnostic AI is its commitment to interpretability and user experience. Medical AI often faces the black-box problem, where the reasoning behind an AI's decision is hidden. Prof. A.C.S. Rao's project addresses this by integrating Explainable AI (XAI) techniques with Virtual Reality (VR) visualization. Clinicians and researchers can step into a 3D immersive environment to interactively explore cardiac dynamics and view exactly how the AI forms its predictions. This VR-enabled exploration not only enhances diagnostic confidence but also serves as a powerful tool for medical training and advanced research.

Ultimately, EchoPulse aims to become a foundational component of future clinical decision support systems. By making cardiac diagnostics more efficient, transparent and highly accessible, Prof. A.C.S. Rao's work paves the way for a new era of precision medicine and intelligent healthcare solutions

## Empowering the Edge: Dynamic Model Compression and Energy-Efficient Multimodal Scheduling on Edge Devices

As artificial intelligence extends its reach beyond the cloud and into the physical world, the demand for deploying advanced models directly onto edge devices such as surveillance drones, autonomous vehicles and wearable systems has surged. At the forefront of this critical technological shift stands the pioneering research of Prof. Tarachand Amgoth, Department of Computer Science & Engineering, IIT(ISM) Dhanbad. Backed by a ₹45 Lakh grant from the Anusandhan National Research Foundation (ANRF), his latest project explores Dynamic Model Compression and Energy-Efficient Multimodal Scheduling on Edge Devices.

Deploying powerful AI at the edge presents a unique set of challenges. These devices operate under strict constraints, requiring real time decision-making and ultra-low latency while navigating severely limited energy and computational resources. Prof. Tarachand Amgoth's research tackles these bottlenecks head-on by designing intelligent mechanisms capable of dynamically switching between optimized AI model formats on the fly. This ensures that a device's computational performance is continuously and intelligently balanced against its available energy reserves.

Beyond single-task optimization, the project addresses the complex reality of modern AI ecosystems, where multiple data streams must be processed simultaneously. To achieve this, the research will develop a smart, energy efficient scheduling framework designed to manage multimodal AI workloads. Whether an edge device is running video based object detection concurrently with natural language processing tasks, this framework will ensure seamless and efficient execution directly on the hardware.

By advancing runtime-aware AI deployment, this research lays the mathematical and engineering groundwork for the next generation of edge computing systems. From enhancing smart surveillance networks to driving the future of intelligent transportation and autonomous systems, Prof. Tarachand Amgoth's work promises to unlock the full potential of artificial intelligence in resource constrained environments, bringing smarter, faster and more resilient technology into our daily lives.



## Internet Safe Day at DAV School



Marking Safer Internet Day, the CSE Society of IIT (ISM) Dhanbad, in collaboration with C-DAC Patna, spearheaded a comprehensive workshop at DAV Public School, BCCL Koyla Nagar. The initiative aligned with the global theme of making smart tech choices and exploring the safe, responsible use of AI.

The event featured compelling addresses from distinguished IIT (ISM) Dhanbad representatives. Prof. Arup Kumar Pal cautioned students about the inherent vulnerabilities of social media platforms like Facebook, Instagram, and LinkedIn, emphasizing that compromised personal data can trigger severe emotional and financial repercussions. Building on this foundation, Master Trainer Deep

Narayan Das shared crisp, practical cyber hygiene strategies to safeguard digital identities. Furthermore, ethical hacker Kumar Harshdeep provided genuine insights into online operations, stressing the critical need for technical vigilance against evolving cyber threats.

Ultimately, the workshop successfully empowered students to navigate the digital realm securely, reinforcing IIT (ISM) Dhanbad's commitment to cultivating an aware cyber community.



## From Probability to Neural Networks: Highlights from SIG Seminars

### SIG: Theoretical Computer Science

The Theoretical Computer Science Special Interest Group (SIG) recently hosted its latest seminar, focusing on the probabilistic method - a cornerstone technique in combinatorics and computer science. Originally pioneered by Paul Erdős, this method is widely used to prove the existence of complex structures, often through nonconstructive arguments. With randomness now central to algorithm design and machine learning, the seminar highlighted the growing relevance of these ideas.

The inaugural session, conducted by Prof. Rahul Gangopadhyay, held on 18 February in the CSE department seminar hall, introduced students to the Kolmogorov axioms of probability. Building on these foundations, the discussion explored Boole's inequality, or the union bound, and demonstrated its application in establishing a lower bound on the diagonal Ramsey number. This provided participants with a clear example of how probabilistic reasoning can yield powerful insights in theoretical computer science.

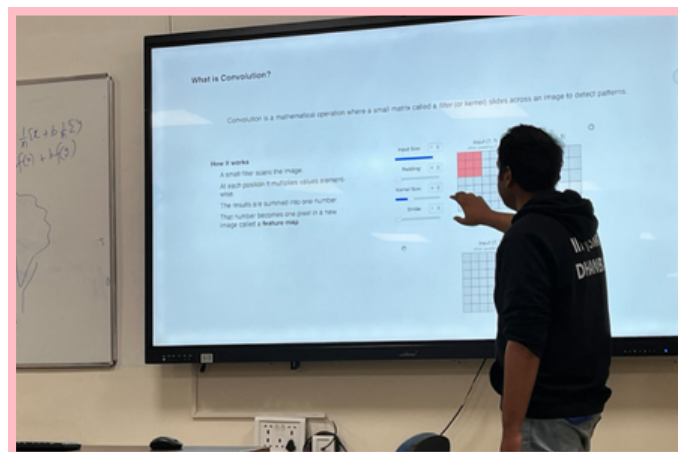
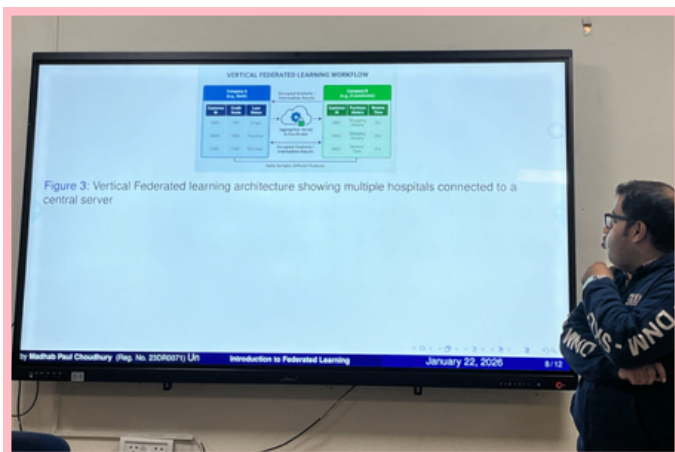
The SIG will continue to organize seminars on a biweekly basis, each delving into new techniques and applications of the probabilistic method. Students across the department are warmly encouraged to attend, engage in discussions, and explore how probability can illuminate some of the most challenging problems in computation.

### SIG: Anvesh

ANVESH (AI-driven Neural and Visionary Exploration for Scientific Horizons), the Special Interest Group (SIG) for AI & ML at the CSE Department, IIT (ISM) Dhanbad, continues to make strides in building a vibrant research community. The latest seminar in the ongoing Thursday series was held on 12 February, marking the ninth session of the initiative.

This session featured insightful presentations by M.Tech students, each delving into core aspects of neural networks and machine learning. Md Rizwan Ansari spoke on Building and Visualizing Neural Classifiers in PyTorch: From Linear Model to ReLU Network. Arvind Kumar Arya presented on CNN and Logistic Regression, while Muthu Kumaran discussed Feedforward Neural Networks and Gradient Descent. Together, these talks offered participants a blend of theoretical foundations and practical implementations, enriching the collective understanding of modern AI techniques.

The SIG remains committed to fostering collaboration and exploration. Seminars are held every alternate Thursday at CR1, CSE Department, and all students are warmly encouraged to join this journey of innovation.



## CODESSHE 2.0

On 22nd February 2026, CodeISM organized Codesshe 2.0, a competitive programming contest conducted exclusively for female students of the CSE department. The competition allowed teams of two, provided that one participant was from the 1st or 2nd year of the B.Tech program, while the other could be from any senior batch. This format was intended to encourage juniors to work alongside seniors and to receive guidance and exposure throughout the contest.

The event was conducted in two rounds. The first round lasted 90 minutes, during which participating teams were divided into four pools and the top two teams from every pool

advanced to the second round. The second round was a 60-minute round with more challenging problems that required stronger programming and problem-solving skills. The contests followed standard competitive programming rules, but without any penalty for incorrect submissions, allowing participants to experiment with different approaches.

After a competitive final round, Team SheWins — Vansika Singhania and Kotha Shalini secured the 1st position. Team I don't Know — Kasam Pramodha and Ippili Chinmayi finished in 2nd place, while Team Mindflyers — Khushbu Khemchandini and Chandrima Biswas secured the 3rd position.

Congratulations to the winners for their excellent performance, and a big shoutout to all participants for making this event successful.



## Prof. P. K. Jana Appointed as Emeritus Professor

Prof. P. K. Jana has been appointed as an Emeritus Professor with effect from 1st February 2026, immediately after his superannuation on 31st January 2026.

This great academic honor to Prof. Jana comes with the recognition of his long and dedicated service to the Institute for nearly 26 years, during which he has made notable contributions to the academic growth and development of the Department.

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 9203 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. Jana has also served at the Birla Institute of Technology (BIT), Mesra, Ranchi, for 11 years before joining the Institute, thereby making his academic career a long and illustrious one spanning nearly four decades.

This academic recognition of Prof. Jana comes with the conferment of the title of Emeritus Professor, which acknowledges his long-standing contributions to teaching, research, and the broader academic community.

We congratulate Prof. Jana on this well-deserved honor and wish him the very best in his continued association with the Institute.



## Passing the Torch: CSES Welcomes Its New Leaders

The Computer Science and Engineering Society marked its annual leadership transition this February, a moment officially recognized during the ceremony by the competent authorities. With this, a new team steps forward to carry the society's vision, while the outgoing members gracefully pass on their responsibilities, remaining connected to the community as mentors and guides.

The position of Vice President has been entrusted to Mr. Adi Nath Bhawani, while Mr. Udbhav Sai Kukkadapu takes on the role of Secretary, and Mr. Aravind Dwibhashyam joins as Joint Secretary.

The outgoing leaders continue to be part of the society's heartbeat. Mr. Karthik Mohan now serves as Senior Mentor to the Core Students' Team, while Mr. Aditya Vikram Chaudhary steps into the role of Mentor. Their presence ensures that the wisdom of experience remains close at hand, guiding the new team through challenges and opportunities.

Across the society's wings, transitions bring both continuity and renewal. WebCSE now has Mr. Vedaansh Lakhani as its Coordinator, with Mr. Pratham Aggarwal offering his guidance as Senior Mentor. In CSETimes, Mr. Prabidush Kumar Lal and Ms. Kasam Pramodha lead as Content and Design Heads, supported by Ms. Pragna Bitra and Mr. Monil Chandgadhiya as Senior Mentors. CSAI welcomes Mr. Arsh Raza and Ms. Sriyukthika Srighakollapu as Coordinator and Co-Coordinator, with Mr. Rudraksh Joshi and Mr. Alok Raj continuing to mentor the team. CodeISM sees Mr. Anuj Arora take charge as Coordinator, alongside Mr. Sohan Roy Chowdhury as Co-Coordinator, while the previous leaders, Mr. Pratham Todi and Mr. Amber Khare, remain as Senior Mentor and Mentor.

The society extends heartfelt gratitude to all its previous leaders. Their dedication, creativity, and zeal have left a lasting imprint, inspiring the next generation to carry forward their legacy. With this transition, CSES looks forward to another year of purposeful leadership, smooth collaboration, and the shared pursuit of excellence.



## Ph.D. Awarded

Awardee	Supervisor	Thesis Title
Gaurav Mohindru (18DP000359)	Prof. Haider Banka, Dr. Koushik Mondal, Principal System Engineer, Computer Centre, IIT(ISM), Dhanbad	DIFFERENT ANALYSIS TECHNIQUES FOR IoT DATA

## Publications

**Title: Network-Level Reorganization in Hearing-Impaired Brains: A Resting-State fMRI Graph Analysis**

**Authors: Sandipa Roy, Anjan Chowdhury, S. Senthil Kumaran, Kuntal Ghosh**

**Accepted at:** 6th International Conference on Image Processing and Capsule Networks, 2026

**Title: WBCovidVizTool: A Visualization and Analysis Tool for ICMR COVID-19 Testing Data from West Bengal (2020–2021)**

**Authors: Arittra Bag, Dr. Anjan Chowdhury, Dr. Chandra Das, Dr. Shubhra Sankar Ray, Dr. Kuntal Ghosh**

**Accepted at:** 6th International Conference on Image Processing and Capsule Networks, 2026

**Title: An Experimental Study to Analyze Social Behavior in Zebrafish through Deep Learning Algorithm**

**Authors: Barnini Bhattacharya, Shibsankar Roy, Diwakar Singh, Anjan Chowdhury and Kuntal Ghosh**

**Accepted at:** 7th International Conference on Computational Intelligence and Networks (CINE), 2026

**Title: SecureLearnChain: A Blockchain Framework for Privacy-Preserving Distributed Healthcare Learning**

**Authors: Ramesh D., K Sathvika, Malini Singh**

**Accepted at:** 10th International Conference on Information System Design and Intelligent Applications (ISDIA -2026), University of Wollongong, Dubai.

## Publications

**Title: GreenEdge AI: Sustainable federated learning for smart city air quality prediction**

**Authors: Dey, S. Raina, R. Mishra, S. Prasad, A. S. & Dharavath R.**

**Accepted at:** Journal of Industrial Information Integration, 50, 101081

**Title: Optimizing deep CNN architecture via hybrid Harris Hawks arithmetic algorithm for EEG meditation classification**

**Authors: Usgaonkar, S. S., Edla, D. R., & Ramesh D.**

**Accepted at:** Neuroscience

### Contact Us:

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

### Credits:

Prof Nikhil Tripathi (Faculty Coordinator)  
Shyam Sunder (22JE0945)  
Dakshita Wadibhasme (24JE0608)  
Aparva Arya (24JE0593)

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