COMPUTER SCIENCE AND ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Prof. Eshan Chattopadhyay, our distinguished alumnus and present Associate Professor at Cornell University, is co-awarded the prestigious Gödel Prize 2025.

Our esteemed Alumnus Dr. Mohit Bansal is the recipient of the prestigious PECASE award from the White House by the US Government in 2025.

Key Highlights

Convocation 2025

An inside view of our Faculty Research

Events, Activities & Programs

VOLUME: 1 ; ISSUE: 8 ; SEPTEMBER: 2025

A Message From The Head

As we progress towards the later half of the 2025, our Department of Computer Science And Engineering continues to advance with purpose and pride. Our recent progress reflects a strong commitment to advancing computing and research and education. Faculty achievements include prestigious recognition and dynamic research in the field of quantum communication, cryptographic hardware, AI for healthcare and Language Modeling. Labs such as INSIGHT and the IoT Vision Lab demonstrate our interdisciplinary work on real world-problems. New course offerings are designed to prepare students for future technological advancement. We are always proud of our students and Alumni, whose accomplishments were celebrated at the recent convocation. Programmes like ACM-W Grad Cohort to ACA Summer Projects promote inclusive mentorship to students, helping them to become the next generation leaders. Rajeev Alur's visit on the occasion of "Research Day" was something more than his homecoming for us. Our high-ranking and global partnerships stand as a testimony to our role as a leader in this field. This progress is supported by the ongoing engagement of our students, faculty, alumni and collaborators. Looking forward, we welcome your continued support as we work together to shape the future of our department.

Prof. Surender Baswana
HOD ,CSE ,IITK

NEW POSITION,AWARDS AND RECOGNITIONS

Prof. Sandeep K. Shukla has been appointed as the new Director of IIIT Hyderabad.

Prof. Debapriya Basu Roy has been awarded with the prestigious Fulbright-Nehru Academic and Professional Excellence (FNAPE). This six-month grant will support a collaborative research project at Villanova University in USA focusing on Hardware Security and Post-Quantum Cryptography.

Prof. Angshuman Karmakar is selected for the Scientific high level visiting fellowships (SSHN) 2025.

Prof. Subhajit Roy is the recipient of the prestigious Amazon Research Award (ARA) for the year 2025.

Prof. Urbi Chatterjee is the recipient of an International Exchanges Award from the Royal Society of London for the joint project "Securing Future Electronic Chips Against Side Channel Attacks" with Dr. Amit Kumar Singh (University of Essex).

Prof. Mainak Chaudhuri and Prof Urbi Chatterjee jointly has won the Qualcomm Innovation Fellowship (QIF) India 2025 .

New Courses Created

Course title: Cryptographic Protocols (CSXXX)
Proposing Instructor: Prof . Angshuman Karmakar

This course explores the design, analysis, and application of cryptographic protocols, which are essential for securing communication, authentication, and privacy in computer networks. Students will study fundamental cryptographic concepts such as encryption, digital signatures, hash functions, and zero-knowledge proofs, along with advanced protocols like secure multi-party computation. This course focuses on the constraints, security arguments, hard mathematical problems, and instantiations of cryptographic primitives. A student upon taking this course will be able to analyse the security of different cryptographic primitives and will also be confident to design new cryptographic primitives.

Course title: Foundations of Modern AI (CS778)
Proposing Instructor: Prof. Sayak Ray Chowdhury

This course examines the theoretical foundations behind the rapid rise of generative AI, particularly large language models (LLMs) such as ChatGPT, Gemini, Llama, and Claude, which have significantly integrated into daily life and are expected to continue reshaping the digital landscape. The course will focus on the fundamental machine learning principles behind these models, with an emphasis on preference-based learning—the backbone of the training pipeline of most LLMs. Moreover, many advanced models leverage RL and planning techniques for improved reasoning and decision making. Thus, in addition to understanding the core mechanisms of generative AI, the course will explore the growing role of reinforcement learning (RL) in enhancing AI capabilities, providing students with insights into cutting-edge developments in AI training. This research-oriented course is designed as an exploratory deep dive into the field, primarily facilitated through lectures and reading of research papers. Additionally, students will gain hands-on experience working with LLMs, enabling them to develop a practical understanding of these technologies and their broader societal implications.

FACULTY RESEARCH OVERVIEW

INSIGHT: Intelligent Scientific and Visual Computing of Big Data

By

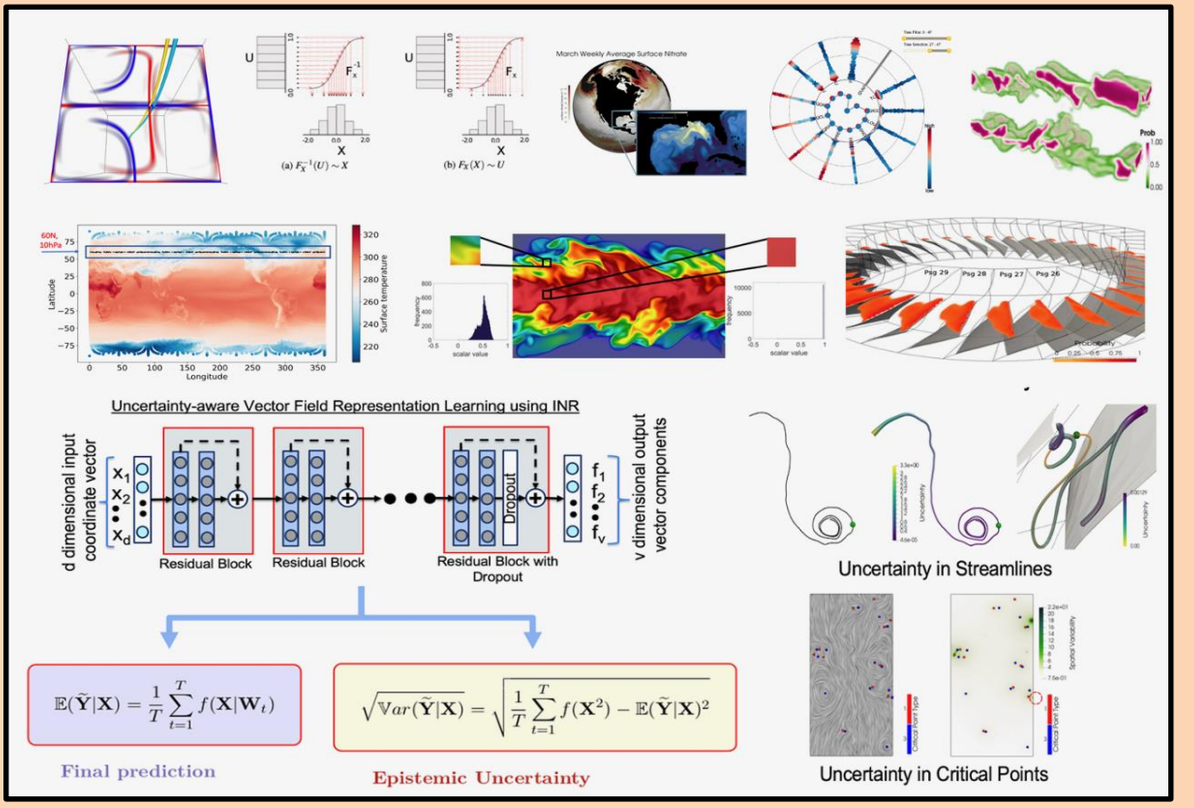
Prof. Soumya Dutta

The INSIGHT: **Intelligent Scientific and Visual Computing of Big Data research group** at IIT Kanpur was established in October 2022. Our research lies at the unique intersection of machine learning, visual computing, visualization, big data, and high-performance computing. We develop state-of-the-art data analytics, machine learning, and visualization techniques to accelerate data-driven discoveries across diverse application domains — ranging from fundamental sciences such as climate science, fluid dynamics, aerodynamics, cosmology to applied domains such as social media and business analytics. INSIGHT research group's broad-scale focus is on summarizing, extracting, and comprehending the essence of vast data streams and representing them visually and interactively in an interpretable, explainable, and scalable manner. A prime goal is addressing the challenges posed by the fundamental 5 Vs of big data: Volume, Velocity, Variety, Veracity, and Value. Currently, INSIGHT research group actively collaborates with several other IITs, Meta (USA), Oak Ridge National Laboratory (USA), and National Taiwan Normal University (Taiwan). The group has a strong publication record in top-tier journals and conferences such as IEEE Visualization, IEEE TVCG, CGF, EuroVis, IEEE PacificVis, IEEE Big Data, and Supercomputing.

INSIGHT research group currently has six Ph.D. students and seven M.Tech. students who are actively engaged in diverse research projects. The future paradigm of large-scale data analytics and visualization will increasingly rely on compressive, lightweight, machine learning model-guided frameworks, where surrogate models perform data prediction, visualization generation, and other fundamental analytical tasks.

FACULTY RESEARCH OVERVIEW

To address this paradigm shift in big data visual computing research, we are developing state-of-the-art compressive, uncertainty-aware deep learning frameworks that can efficiently learn representations of extreme-scale, complex spatiotemporal multidimensional datasets, enabling downstream analytics and visualization to be primarily driven by model-generated outputs rather than the original massive raw datasets, which has been the norm so far. Hence, building trustworthy, high-performance, compressive, and generative machine learning frameworks for large-scale spatiotemporal data analytics and visualization is a central research focus of the INSIGHT researchers. Research performed at INSIGHT group is kindly supported by the Govt. of India - ANRF, ISRO, IITK C3iHub, and IITK Initiation Grant, and Research-I Foundation of IITK CSE department.



Several funded collaborative projects are ongoing at the INSIGHT research group. A modern, secure data analytics and visualization portal is currently under development for URSC ISRO scientists to enable real-time monitoring and analytics of streaming satellite data. This project is funded by ISRO. A multi-institute collaborative project, funded by IITK C3iHub, is focused on developing proactive and generalized Deepfake defence mechanisms. Another IITK C3iHub-funded project aims to build an AI-enabled national portal for the efficient search of missing persons. Additionally, two more projects are underway with a broad-scale focus on developing intelligent, machine-learning-based extreme-scale data analytics and visualization frameworks to accelerate scientific discovery in the age of exascale computing.

FOR MORE DETAILS OF INSIGHT GROUP'S ACTIVITIES AND RESEARCH, PLEASE VISIT : https://soumyadutta-cse.github.io/

FACULTY RESEARCH OVERVIEW

IoT Vision Lab
By
Prof. Priyanka Bagade

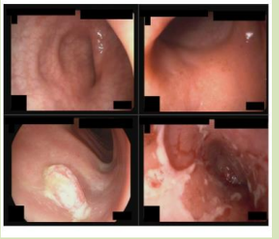
IoT Vision Lab's research philosophy focuses on application-oriented, industry-centric innovation, developing practical solutions through cutting-edge research. Through the research on Internet of Things (IoT) and Computer Vision, the lab aims to bridge the gap between theoretical advancements and real-world technological needs.
Here are some of the ongoing research projects from the IoT Vision lab ———

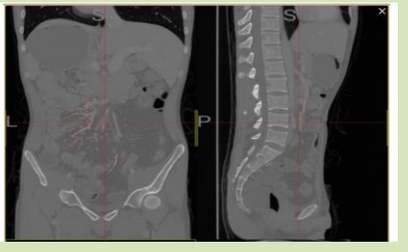
Smart Infrastructure with IoT

- **Leakage detection in water pipelines:** Undetected leakages in water distribution pipelines lead to a significant loss of freshwater supplies. Effective monitoring of these pipelines to curb water loss is a global concern. In this project, we use water flow meters and accelerometer sensors to collect water flow data and analyze the data using machine learning algorithms to detect and localize leakages. This project has been funded by Jal Jeevan Mission, Ministry of India. The developed solution will be deployed in one of the villages in India at the end of the project for testing for large scale deployment.

FACULTY RESEARCH OVERVIEW

- **Person tracking:** Person re-identification, tracking and activity monitoring are considered as one of the important techniques to monitor the disease progression for patients suffering from neurological diseases such as Alzheimer's and Parkinson's. To achieve this , we develop deep learning and machine learning based algorithms while using data from IoT sensors, radars and cameras. These algorithms not only track the patients for their safety but also monitor their activities such as gait to capture the minute changes in their movements. This research is being conducted while collaborating with researchers from Intel, UCSC, California, USA and La-Trobe University, Australia.
- **Cancer detection:** Early and accurate cancer detection is crucial for effective treatment, but current diagnostic methods are costly, require expertise, and often detect cancer at advanced stages. Point-of-care (PoC) biosensors offer potential but need improvement in sensitivity, specificity, and affordability. In this project, we will build a biosensor Bionic-Chip for different cancer types by changing the bio recognition unit. Machine learning algorithm will be developed and integrated to enhance prediction accuracy, displayed via a smartphone app to predict the type of cancer. This work is in collaboration with BSBE and EE departments in IITK and funded by the DST grant.
- **Digital forensics of Medical devices:** Malware attacks on medical devices represent a significant threat as these devices are critical for patient care. Due to the rise of the internet, many medical devices are connected to the networks and thereby provide the attack surface to malicious entities. Thus, it is essential to analyze the effect of malware on these devices to retrieve them to their original state. In this research, we focus on executing the highly evasive malware like rootkits on Linux operating systems, collect the corresponding memory dumps and analyze them to do memory forensics to study the effect of malware on the memory. This project has been funded by GE healthcare, India.



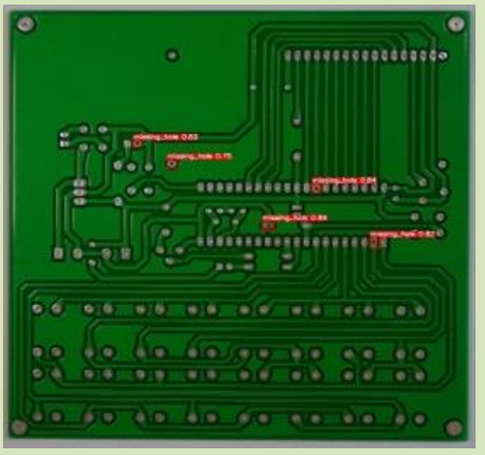


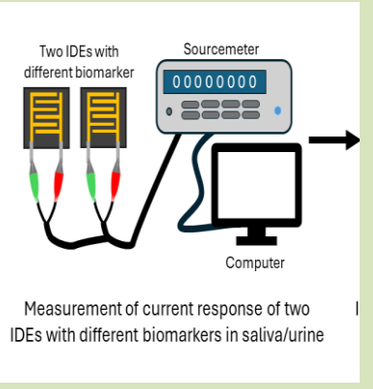
- **Tele-ambulance – a remote healthcare system:** Despite the advancement in medical science and technology, getting medical care at the right time during an emergency still remains a challenge. The delay in receiving the treatment can be due to the unavailability of the ambulance, tracking the ambulance or the time required to set up the required tests/equipment at the hospital when the patient in distress is in transit. In this project, we develop a reward-based system using reinforcement learning to track the ambulance time to patient and hospital, real-time patient monitoring during transit by remote experts using medical IoT devices and cameras and health predictions using machine learning algorithms and enable secure communication between the ambulance and remote doctors.

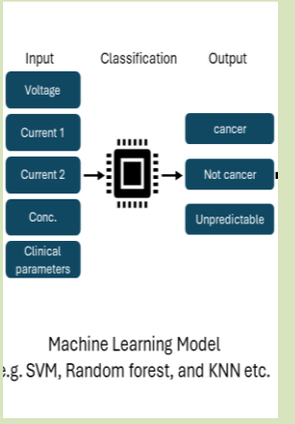
FACULTY RESEARCH OVERVIEW

Image Analysis

- **Medical image analysis:** Manual assessment of medical images is time-consuming and highly subjective, often leading to inconsistent diagnoses and treatment plans. This research, in collaboration with AIIMS Delhi, AIIMS Gorakhpur, and DMC Ludhiana, aims to develop algorithms using real patient data to accurately diagnose and classify gastrointestinal diseases like Crohn's disease, ulcerative colitis, and intestinal tuberculosis. We use CT scans, endoscopic, and histopathology images to support diagnosis and severity assessment. Funded by ICMR, the algorithms will be deployed in partner hospitals to improve diagnostic accuracy and patient monitoring.







- **Defect detection in PCBs:** Printed circuit boards (PCBs), integral to nearly all electronic devices, are becoming more compact and complex due to rapid advancements in the electronics industry. This complexity increases the likelihood of manufacturing defects, making accurate detection crucial. While existing computer vision models excel in general tasks, PCB defect detection presents unique challenges due to the tiny and varied nature of flaws. In collaboration with the MSE department at IIT Kanpur and supported by the STC, ISRO grant, this project aims to develop a robust model capable of identifying even subtle defects in real-world manufacturing settings.

Research Outcomes in recent times :

- *Received best paper award*, Jonna Likith Sai, Souptik Majumder, Rohit Verma, and Priyanka Bagade, NID-TGN: Spatiotemporal Intrusion Detection System for IoT Networks, Springer 14th International Conference on Security, Privacy and Applied Cryptographic Engineering (SPACE) conference, India, 2024.
- *Evaluation of algorithms* developed for distinguishing Crohn's disease and intestine tuberculosis in SGPGI Hospital, Lucknow.
- *Honored to represent India as an AI in healthcare expert* in Asian Women Researcher Conclave, Singapore, April 2024 (sponsored by DST).

Research And Development Mission

Debapriya Basu Roy

Project Title :Quantum Communication (NQM)
Funding Agency: DST

Project Title: Quantum Communication (NQM)
Funding Agency: Indian Institute of Technology

Project Title: Artificial Intelligence For Automated Detection And Measurement Of Endoscopic And Histologic Activity In Patients With Inflammatory Bowel Disease: A Prospective Multi-Center Cohort Study .
Funding Agency: ICMR

Priyanka Bagade

Amey Karkare

Project Title: Establishment Of 92 Atl In Govt Schools of Uttarakhand
Funding Agency: Samagra Shiksha Department of Education-Govt Of Uttarakhand

Project Title: Establishment Of Advanced Innovation (AI) Lab For Tribal Students.
Funding Agency: DST

Project Title: Automated Reasoning Amazon Research Award
Funding Agency: AMAZON RESEARCH AWARD(ARA)

Subhajit Roy

Research And Development Mission

Project Title: Microsoft Travel Grant
Funding Agency: MICROSOFT CORPORATION

Ashutosh Modi

Angshuman Karmakar

Project Title: Beyond Post-Quantum NIST Standardization : Addressing Practical Issues For Seamless Transition To A Quantum Secure Digital Ecosystem.
Funding Agency: ANUSANDHAN NATIONAL RESEARCH FOUNDATION

Project Title: Leveraging Offline Public Data In Online Differentially Private Policy Fine Tuning
Funding Agency: ANUSANDHAN NATIONAL RESEARCH FOUNDATION

Sayak Ray Chowdhury

Adithya Vadapalli

Project Title: Privacy Preserving Collaborations
Funding Agency : ANUSANDHAN NATIONAL RESEARCH FOUNDATION

MoUs signed in recent times

Non- CSR tie-ups and collaborations

MOU with Satish and Kamlesh Agarwal

Travel Grant for the department
Total Funding Rs. 5 lakhs

Satish and Kamlesh Agarwal have generously contributed Rs. 5 Lakh to establish a travel grant for CSE department. This grant will help the students and faculty to promote excellence, facilitate research, and act as a major factor in improving the academic ranking of the institute and getting the excellent opportunities to interact with eminent scientists and academicians.

Infrastructure Support to the department
Total Funding Rs. 10 lakhs

Satish and Kamlesh Agarwal have contributed 10 lakh towards the upgradation of Lecture Hall RM-101. This initiative aims to modernize the classroom infrastructure and significantly enhance the learning facilities available to students.

The Department of Ex-Servicemen Welfare, New Delhi launches a project titled "Data and processing re-engineering for health insurance claims processing, led by Prof. Nisheeth Srivastava.

The Directorate of Samagra Shiksha, Jammu & Kashmir (UT) Srinagar, has entered into an MoU with IIT Kanpur under the project *"AGHAAZ – An Indigenous Integrated Initiative."* Led by Prof. Amey Karkare, the project aims to enhance educational outcomes through locally rooted strategies.

IIT Kanpur signs a MoU with Alt Carbon Tech Pvt. Ltd. Having Co-PI as Prof. Sruti.S. Ragavan for launching *"Byomkesh Investigates"* in order to assess carbon credit viability in Sundarbans using carbon isotopes and advanced analytics, aiming to support sustainable climate finance through data-driven insights.

Under the leadership of Prof. Nitin Saxena, IIT Kanpur has signed an MoU with the Controller General of Accounts (CGA) to support CGA and PFMS with cutting-edge advancements in AI/ML, cyber security, and emerging technologies, fostering innovation in public financial management.

Feed Forward Technologies Pvt. Ltd. has issued Addendum 3 to its existing MoU with IIT Kanpur, amending the fee structure. The update is overseen by Prof. Ashutosh Modi, ensuring continued alignment with project goals.

CSR Projects initiated by the CSE department

The Wadhwani Charitable Foundation, in collaboration with the Indian Institute of Technology Kanpur, has inaugurated the Wadhwani School of Advanced Artificial Intelligence and Intelligent Systems (WSAIS). Launched in New Delhi in the presence of Honorable Prime Minister Narendra Modi, WSAIS will advance research and education in AI, cybersecurity, robotics, and policy.

Commencing in 2026, it will offer BTech, MTech, PhD, and postdoctoral programs. As a cornerstone of the Wadhwani Innovation Network, WSAIS aims to drive innovation, economic progress, and global leadership in AI.

Professor Nitin Saxena, the inaugural Dean, is pivotal to this initiative, leveraging his expertise in Computer Science and AI to lead the school. His leadership secured a considerable amount of grant from the Foundation, enabling cutting-edge research in AI, cybersecurity, robotics, and policy.

AlphaGrep

AlphaGrep Securities has renewed its CSR scholarship program at IIT Kanpur, supporting top-performing undergraduates. Selection involved applications, a quantitative test, and merit review. Bikramjeet Singh is one among the campus winners. Other top ten winners from the CSE department who backed this scholarship are

- Chilamakuri Kundan Sai
- Saksham Verma
- Srijani Gadupudi
- Kumar Shivam

MOU with ICICI Foundation Total Funding Rs. 34.16 Cr

ICICI Foundation has signed an MoU to transform Uttar Pradesh's public healthcare through an AI-driven digital infrastructure. Led by Prof. Nisheeth Srivastava, the project will enable telemedicine, diagnostics, disease surveillance, and data-driven workflows to enhance healthcare quality, efficiency, and accessibility across the state.

MOU with Citadel Securities India Markets Pvt. Ltd Total Funding Rs. 16.98 Cr.

Citadel Securities India Markets Private Limited has agreed to provide a funding of Rs.16.98 crore & partnered with IIT Kanpur to establish the Citadel Securities T3i Lab, aiming to strengthen research, education, and innovation in computational science, AI, and data analytics. Lead by Prof. Nitin Saxena, Prof Surender Baswana, Prof. Preeti Malakar, Prof. Mainak Chowdhuri & Prof. Sandeep Shukla this initiative aims to support cutting-edge academic and industry collaborations, promote India's leadership in technology, and contribute to national goals like smart governance, healthcare, and education, ultimately driving public welfare and innovation-led development.

CITADEL | Securities

THE CONVOCATION CHAPTER 2025

Dr. Pravesh Kothari as The Guest Of Honour

The Department of Computer Science and Engineering at the Indian Institute of Technology Kanpur celebrated its 58th Convocation Ceremony with great pride and enthusiasm.

The ceremony marked the conferring of degrees to a diverse and accomplished group of graduates, including recipients of BTech, MTech, PhD, and eMasters degrees. It was a celebration of academic achievement, innovation, and the enduring spirit of IIT Kanpur.

Dr. Kothari, acclaimed for his groundbreaking contributions to complexity theory and algorithms, delivered an inspiring speech to the graduating students. His message seamlessly blended intellectual depth with heartfelt encouragement, urging students to pursue excellence with integrity and imagination.

List of Convocation Awards

President's Gold Medal	Talin Gupta
Ratan Swarup Memorial Prize	Varun Tokas
General Proficiency Medals	Talin Gupta
IIT Kanpur Excellence in Community Services	Manasvi Jain
IIT Kanpur Excellence for leadership in students' affairs	Siddhant Suresh Jakhotiya
Professor Putcha Venkateswarlu Memorial Gold Medal	Aniket Suhas Borker
Kanta Devi Malik Memorial Award	Geetika
Chandra Prabha And Charan Dass Gupta Gold Medal	Apoorva Gupta
Proficiency Prizes/Medals	Chitwan Goel
Best Software Award	Himanshu Karnatak
Rajiv And Ritu Batra Student Award in Cyber-Security	Kriti Majumdar
Outstanding PhD Thesis Award	Sujit Kumar Mudali
Manas Mandal Best PhD Thesis Award	Koustav Bhanja

Sujit Kumar Mudali
(Outstanding PhD Thesis Award)

Talin Gupta (President's Gold Medal)

Recent Book Launch by Prof. Arnab Bhattacharya

SAMANVAYA

An Interlingua for Unity of Indian Languages

Language is a rich blend of meaning, structure, and culture. Natural Language Processing (NLP), a branch of Computer Science, explores how machines understand human language. While tools like ChatGPT and Gemini showcase NLP's potential, Indian languages lag behind English in development. Our work addresses this gap by drawing from India's deep grammatical tradition to inform modern linguistic models. We compile literary corpora, collect annotated data from native speakers, and integrate grammatical frameworks.

Currently, we're building a grammar correction system for Bangla and plan to expand to other Indian languages, alongside developing tailored language models. We've also contributed to this effort through a book.

The book "Samanvaya: An Interlingua for Unity of Indian Languages" explores the grammatical frameworks of Indian languages, grounded in the Paninian tradition of Sanskrit grammar. Building on the rich heritage of Indian linguistics, this book proposes a unified set of dependency relationship tags that define how words relate to one another in a sentence. Currently, it focuses on six key languages—Sanskrit, Kannada, Bangla, Marathi, Malayalam, and Hindi—but the unified tagging system offers a consistent framework for analysing sentence structures across other major Indian languages as well. Additionally, the book introduces the concept of "word groups", which enhances computational processing by creating a unified framework for semantics, morphology, translation, and syntactic relationships among Indian languages. It demonstrates that Indian languages are structurally more similar than commonly believed.

Patent granted to Prof. Sandeep Shukla on Cyber Security & Risk Management

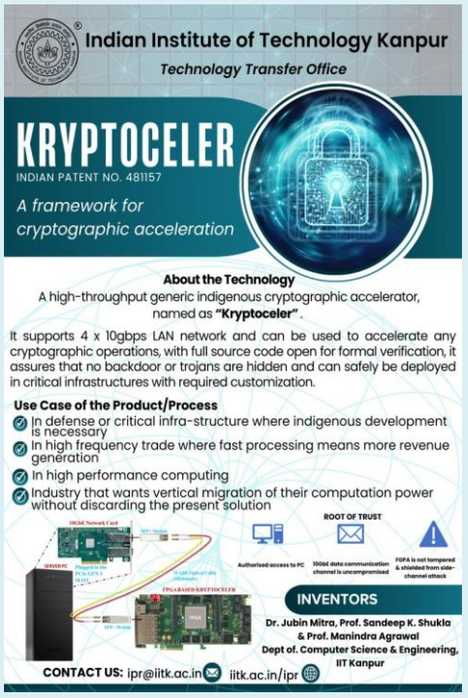
Effective cyber risk management is critical for organizations to ensure the continuity of their operations and protect their assets, reputation, and stakeholders. Our invention includes asset management, vulnerability management, risk assessment, and risk treatment. It takes into account several factors such as network architecture, business requirements, asset criticality, cyber security policy and performs the cyber risk assessment of the organization. Moreover, the model suggests suitable prioritized control recommendations to reduce the cyber risk to below the predefined threshold level. The invention also showcases the potential attack paths for an attacker before and after applying the aforementioned security controls.

Talks and Seminars hosted by CSE

- On 16th January, 2025 **Dr Nikhil Kumar**, a Postdoctoral Researcher from *University of Waterloo*, presented a talk on "**New Approximate Max-Flow Min-Cut Theorems**.
- **Nisheeth Vishnoi** , A. Bartlett Giamatti *Professor of Computer Science at Yale University*, presented a specialised talk titled "**College Admissions in the Presence of Biases**" on 17th January 2025.
- A talk on "**Adapting the Server less Platform for Emerging Application Patterns**" was given by **Dr. Vivek M. Bhasi**, Postdoctoral scholar at *Penn State University*, on 6th February 2025.
- An enlightening session on "**Reasoning about Trust**" was conducted by **Prof. Andreas Herzig**, **CNRS Research Director, IRIT (CNRS, Univ. Toulouse)** on 10th February 2025.
- **Dr. Piyush Kumar Sharma** currently a Postdoctoral Research Fellow, *University of Michigan*, delivered a presentation on the topic titled **"Hiding in Plain Sight: Enabling Metadata Protection with Mixnets"** as a faculty candidate on 21st February 2025.
- **Dr. Margaret Burnett** ,Distinguished Professor, **Oregon State University**, USA delivered a research presentation titled *"Mission: To enable diverse mere mortals to assess an AI agent's "goodness" for their own needs"* on 18th February 2025.
- **Prof. Jayant R. Haritsa**, a renowned researcher in Database System and a senior faculty of the of the *CDS and CSA departments at Indian Institute of Science*, Bangalore delivered a lecture on the topic **"Robust Query Processing: Where Geometry Beats ML!"** as part of his contribution to Eyes-on-Research Lecture Series held on 20th Februray 2025.
- On March 13, 2025 **Dr. Patrick Schaumont**, Dean's Excellence Professor and Joseph Samuel Satin Distinguished Fellow from the *Department of Electrical and Computer Engineering at Worcester Polytechnic Institute (WPI)*, delivered an insightful talk on **"Practical Security Models for Cryptographic Chip Design."**
- **Dr. Shubhangi Agarwal**, an independent researcher delivered a thought-provoking talk titled **"Towards Hybrid Graphs: Unifying Property Graphs and Time Series",** shedding light on the convergence of two powerful data paradigms on 5th June 2025.
- On 22nd August 2025 **Dr. Anshu Yadav**, an *expert in Theoretical Cryptography* presented an invited talk on ***"Designing Advanced Cryptographic Primitives in Distributed Settings"*** offering insights into the development of secure protocols tailored for decentralized environments.
- **Professor Udaya Parampalli** from the *School of Computing and Information Systems at the University of Melbourne* delivered an invited lecture titled **"Computer Science Perspective on Research in Quantum Computing and Quantum Machine Learning"** offering strategic insights into the intersection of quantum technologies and computational science on 8th July 2025.
- On 5th August 2025 the department hosted an invited lecture by **Prof. Diptarka Chakraborty** from the *National University of Singapore*, as part of its ongoing academic engagement series. The talk, titled ***"Rank Aggregation and Fairness",*** explored critical themes in computational social choice and algorithmic equity, drawing attention to the nuanced challenges of designing fair ranking systems in data-driven environments.
- **Damini Kusum**, an aspiring researcher at **Carnegie Mellon University** delivered a lecture as the first Sigtacs Talk of the semester on the topic *"Inductive Success on Random Sequences" on* 14th August 2025.

Events, Activities & Programs

CSE Researchers Unveil 'Kryptoceler': A Breakthrough in Cryptographic Hardware Acceleration



Researchers from the Department of Computer Science & Engineering at IIT Kanpur—Dr. Jubin Mitra, Prof. Sandeep K. Shukla, and Prof. Manindra Agrawal—have developed *Kryptoceler*, a pioneering hardware acceleration system titled *"Hardware Acceleration System, Device & Method for Cryptographic Transactions"*.

Designed to meet the rising demand for integrated cryptographic processing, Kryptoceler offers unmatched flexibility, allowing seamless customization and integration of diverse security functions. Its generic protocol interface enables rapid upgrades without exposing design complexity, significantly boosting server throughput and efficiency.

This innovation has garnered attention from national stakeholders including MeitY, DST, C-DAC, and Power Grid Corporation of India. Licensing opportunities are now open through the Dean of Research and Development at IIT Kanpur.

ISEA Boot Camp training programe for Cyber-Commandos

The ISEA Boot Camp for Cyber-Commandos was held from March 1 to March 6, 2025. The six-day event brought together leading experts in Hardware and Cyber Security to deliver high-impact tutorials aimed at strengthening India's cyber defence ecosystem. The boot camp featured sessions by distinguished faculty from top institutions, including:

Prof. Vireshwar Kumar, IIT Delhi; Prof. Sparsh Mittal, IIT Roorkee; Prof. Rajat Sadhukhan, IIT Roorkee; Soumyadyuti Ghosh, IIT Kharagpur; Kuheli Pratihar, IIT Kharagpur.

Organized by Prof. Urbi Chatterjee and Prof. Debapriya Basu Roy in collaboration with C3iHub, IIT Kanpur's cybersecurity innovation hub, the event received strong institutional support. Special acknowledgments were extended to Prof. Manindra Agrawal, Prof. Sandeep Shukla, and Dr. Anand Handa for their guidance and contributions.

The boot camp marked a significant milestone in advancing National cybersecurity preparedness through academic-industry collaboration.

Introducing Olympiad based admission routes for B.Tech programme

IIT Kanpur will now be admitting students into computer science B.tech degree programme through Olympiads.

3 seats through INMO/IMO

3 seats through INOI/ IOI

IKDD Uplink Internship Explores Generalization in LLMs Through Circuit Discovery

The IKDD Research Internship Program recently concluded its application cycle for the 2025 edition, drawing interest from students nationwide. One of the featured projects, led by Prof. Ashutosh Modi from IIT Kanpur, focused on investigating generalization capabilities in large language models (LLMs) through circuit discovery—a cutting-edge area in AI research.

The internship offered participants a chance to engage with advanced methodologies in machine learning, contributing to foundational insights in model interpretability and performance.

Beyond the Resume : A glimpse into Prof. Nitin Saxena's journey

In a recent exclusive interview, Professor Nitin Saxena, our distinguished alumnus and faculty member of the department, shared insights into his remarkable academic journey and his future vision for the technology in India. Internationally celebrated for co-authoring the seminal "Primes is in P" paper during his undergraduate years—a ground breaking contribution to theoretical computer science that earned him the prestigious Gödel Prize— Prof. Saxena still continues to make waves in academics. He is now leading a new initiative at the institution: the Wadhwani School of Advanced Artificial Intelligence & Intelligent Systems. Throughout this interview, Prof. Saxena emphasized his passion for mathematics and his role in mentoring students, marking a seamless transition from a brilliant student to a key academic leader thus shaping the future of technology in India

For watching this video click on the link: https://youtu.be/x7PLn5yhwX8?si=K4G7Zvu83Rq5f8JC

OR

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Events, Activities & Programs (contd.)

ACM-W India Grad Cohort 2025: Empowering Women in Computing

The ACM-W India Grad Cohort is a trailblazing initiative that unites women graduate students, senior researchers, and industry experts in a supportive, inclusive, and collaborative environment. The Department of Computer Science and Engineering at IIT Kanpur hosted the 7th ACM-W India Grad Cohort for Women in Research, a flagship mentoring event aimed at empowering women graduate students in computing. The two-day programme featured inspiring talks, hands-on workshops, and mentoring sessions led by distinguished academicians and industry leaders.

Inspiring perspective on career choices and growth by Aruna Rajan

Fireside Chat session of Nitin Saxena with Prof. Amey Karkare

Group photo of the ACM-W Grad Cohort Participants

Prof. Surender Baswana opened the event with a powerful message on women's achievements in IITs, followed by Dr. Aruna Rajan's reflections on purpose-driven careers. Speakers included Prof. Preeti Malakar, Dr. Aruna Rajan, Prof. Maya Ramanath, Prof. Nitin Saxena, Prof. Amey Karkare, Prof. Urbi Chatterjee and Prof. Rajat Mittal and experts from IBM, Microsoft Research, and IITs. Sessions covered research careers, quantum computing, communication skills, and navigating academia and industry. One key highlight of this event was the Fireside Chat Session of Prof Nitin Saxena. From Primes to Philosophy, Prof Saxena shared his incredible journey from choosing research over industry and thus navigating different challenges that came along the way. The event provided a nurturing platform for women researchers to network, seek guidance, and explore opportunities. Supported by CSE volunteers and modelled after the CRA-WP Grad Cohort (USA), the initiative continues to foster inclusive excellence in computing research across India.

Research Day Celebration August 2025
A confluence of visionary minds and transformative ideas

The Department of Computer Science and Engineering at IIT Kanpur hosted CSE Research Day 2025 at the Rajeev Motwani Building, celebrating cutting-edge research and academic excellence. The event attracted faculty, students, and thought leaders nationwide and beyond. Faculty talks by Prof. Surender Baswana, Prof. Arnab Bhattacharya, and Prof. Mainak Chaudhuri explored fault-tolerant graph algorithms, Indian language modeling, and chip-multiprocessor architecture, tackling key computational challenges. Student presentations showcased diverse research, from cryptographic hardware to cancer genomics and satellite network design. A vibrant poster session, led by Prof. Purushottam Kar, highlighted over two dozen projects in AI/ML, theory, and systems, reflecting the department's interdisciplinary prowess.

Prof. Saha delivering a speech

Prof. Rajeev Alur with his insightful vision on learning symbols for trustworthy AI

Head addressing the audience

Felicitation of Prof. Alur by Prof. Manindra Agrawal (Director, IIT kanpur)

The event's highlight was the Prof. Hari Sahasrabuddhe Lecture series by Prof. Rajeev Alur, a distinguished IIT Kanpur alumnus and Zisman Family Professor at the University of Pennsylvania. In his talk, "Learning Symbols for Trustworthy AI," Prof. Alur introduced neuro-symbolic architectures, blending symbolic reasoning with neural networks to create interpretable, reliable AI for applications like healthcare and robotics. His insights, backed by awards like the Knuth Prize (2024), inspired attendees. CSE Research Day 2025 concluded with dinner and lively discussions, reinforcing IIT Kanpur's legacy as a hub of innovation.

Research Colloquium 2025

On 6th April 2025 The Department of Computer Science and Engineering at IIT Kanpur hosted its much-anticipated 2025 Research Colloquium, spotlighting cutting-edge advancements across artificial intelligence, cyber-security, theoretical computer science, and systems design. Organised jointly by Prof. Purushottam Kar and Prof. Piyush Rai, the event featured a dynamic convergence of ideas, featuring over 25 research presentations and an invited lecture by Prof. Rohit Budhiraja from the Department of Electrical Engineering. Prof. Budhiraja opened the colloquium with a lecture on next-generation wireless networks, highlighting how artificial intelligence and machine learning are reshaping the architecture of 6G systems.

For more details scan the QR code

From foundational theory to real-world applications, the colloquium showcased a rich tapestry of research across four major domains:

Cyber security & Cyber-Physical Systems :

- Timing attacks and reverse engineering
- Privacy-preserving authentication and zero-knowledge proofs
- Post-quantum cryptography and fault attacks
- LLMs in cyber security and hardware-software co-design

Theoretical Computer Science:

- CPU-GPU data structures and one-way functions
- Polynomial time dimension and factorization
- Graph-based resource allocation

Computer Systems:

- Cache coherence and dynamic sharing
- Optimizing large workloads and end-user programming

AI & Machine Learning:

- Hierarchical reinforcement learning and policy gradients
- LLM unlearning and orbital shifts
- Multi-person and through-the-wall localization
- Video stylization and sign language translation

ACA in Action: A Summer Snapshot

While many students left for summer break, The Association for Computing Activities (ACA), the Computer Science and Engineering society, kept its momentum alive with a season of innovation, mentorship, and celebration. The summer began with heartfelt farewells for the graduating UG and PG batches. ACA hosted a spirited send-off, complete with cultural performances and a commemorative merchandise drop that struck a nostalgic chord. Inspired by iconic campus landmarks like KD, RM, and the beloved CC Canteen, the designs blended vintage aesthetics with departmental pride, offering graduates a tangible piece of their journey. Prof. Debadatta Mishra was honored with the Best Faculty Award.

Best Faculty Award

Head addressing the students

Performance by the ACA members

Parallel to the celebrations, ACA launched its flagship Summer Projects initiative, engaging over 400 mentees and 80+ mentors across 22 cutting-edge tracks. From machine learning and block chain to quantum cryptography and ray tracing, students dove into hands-on explorations that bridged theory with real-world application. Highlights included: TRACE_IT: A ray tracer built from scratch in C++, rendering photorealistic scenes with shadows and volumetric effects. QUIPHER: A deep dive into cryptography and quantum computing, culminating in a Qiskit-based simulation of Shor's algorithm. Rebalance AI: Reinforcement learning applied to dynamic portfolio management, with agents trained to optimize financial metrics. SignVision: An AI-powered system to recognize American Sign Language gestures, blending deep learning with accessibility goals. Lost and Found Web App: A campus-wide solution built using React and PostgreSQL, streamlining item recovery through user-friendly design. Other tracks covered competitive programming, full-stack development, statistical computing in R, and Physics-Informed Neural Networks—each fostering collaboration, curiosity, and technical depth. ACA's summer efforts reflect a broader commitment to nurturing talent, preserving departmental legacy, and pushing the boundaries of student-led innovation. As the new tenure gains momentum, ACA continues to be a dynamic force within IIT Kanpur's academic and cultural landscape.

Faculty Directory

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Dr. Amitangshu Pal (AP)
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Dr. Angshuman Karmakar (AP)
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Dr. Arnab Bhattacharya (P)
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Dr. Rajesh K Gupta

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