INDIAN NATIONAL ACADEMY OF ENGINEERING

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INAE VISION 2020-2025

INAE VISION

To be the premier Engineering Academy of the World providing timely inputs to the national and international policy makers, and to extend appropriate assistance in developing engineered solutions for the challenging problems facing contemporary societies and the humanity as a whole.

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INAE Mission

To serve professionals in building and institutionalizing engineering and technological excellence in education, research and industry in India and support advancement of engineering profession globally

Technology Roadmap

We are living in exciting times. We will have to contend with the profound transformation of our society and our industry, because of two revolutions in the making – namely, the digital revolution and the impending transition to fossil fuel free energy globally.

The digital revolution is rapidly transforming the very nature of industrial enterprise today. Many disruptive transformations are maturing rapidly because of the advent of cloud computing and internet of things (IoT) and due to major advances and breakthroughs being made on several fronts such as artificial intelligence (AI) including machine learning (ML) and big data analytics, robotics, autonomy, drones, 3D printing, advance sensors and 5G technologies.

Another revolution in the making is the exciting possibility of fossil fuel-free generation of electricity in the coming decade. The availability of electricity based on renewable sources such as sun, wind and biomass, will cause a major disruption as well as an opportunity for creating a cleaner world, since use of fossil fuels (coal, oil or natural gas) currently, creates deleterious environmental consequences which need urgent attention.

While both these revolutions will cause major disruptions in how we live and work, the transition to the new world in the making is contingent upon the availability of new sources of critical raw materials.

Both digital hardware and generation of electricity from renewables (including the technological challenges associated with energy storage) require a host of new metals and materials for which the new value chains (also the appropriate global supply chains) will have to be established. Innovative processes for extraction of minerals and metals as well as recycling, which are more energy efficient and environment-friendly will have to be developed to produce these critical elements.

To facilitate this global transition, we need to create human resources with high level of domain expertise in different facets of engineering as well as the much needed engineering skill sets needed to deal with the problems of scalability, uncertainty, reliability, complexity, system engineering, ability to deal with variability and yet manufacture products and create solutions of uniform and reproducible quality, capability to design, develop and optimize engineering systems for a given set of inputs and for a desirable set of assured outputs of consistent quality.

Our engineering education has to be appropriately re-engineered so as to equip our future leaders with not only the domain expertise but also the skillsets to innovate continuously and consistently in the face of constant change and dynamic transformations. The human ingenuity and the preparing the well-trained minds, will be critical ingredients in responding to the challenges ahead.

It in this context, INAE has come up with the following areas for our focused attention in the next five years. We believe that these efforts will assist us in facilitating the smooth transition to the new world in the making.

1. **Accelerated Discovery, Development and Deployment of Novel Materials, particularly for strategic sectors like Defense, Atomic Energy and Space.**

We have an urgent need of materials (metals, alloys as well as composites) development for the following sectors – auto sector (both electric vehicles as well as IC engines based vehicles), aerospace, ultra-supercritical power plants, nuclear power plants, renewable energy sector (novel PV materials, rare earth magnets, battery materials for both large scale energy storage as well as for electric vehicles and other electronic appliances, thermoelectric materials for converting low temperature heat into electricity), novel sensors for healthcare industry, materials for the defense applications and space applications, to name a few.

These materials will have to engineered for India-specific applications. That means one must consider during the process of design & development itself, the kind of natural resources we have and the kind of supply chains we will be able to establish to source the starting raw materials, considering the complex geo-political scenario and vulnerabilities associated with dependence on raw materials from abroad.

The other important consideration is the speed of development. In order to remain globally competitive in this domain, we must leverage the state of the art digital platforms (equipped with advance modeling, simulation, data analytics and knowledge engineering tools) for accelerating the development cycle from conception to deployment in actual applications as well as the entire life cycle (cradle to cradle or cradle to grave in some cases), that is, even for the structural health monitoring of the structures where these materials will be deployed.

Another important consideration is the environmental impact of these materials, that is, we must undertake a life cycle analysis, both with respect to the environmental footprint as well as the energy efficiency (actual consumption as compared to the thermodynamic energy needed to accomplish the particular task), for every developmental effort.

It is now well established that integrated computational materials engineering (ICME) approach can help accelerate the materials development cycle.

INAE will work towards coming up with a national strategy to establish and institutionalize the ICME based approach for all material development efforts. The digital platform, thus created, must be equipped with knowledge engineering capabilities so that it can not only act as a knowledge repository of all past efforts made thus far but also continues to update the knowledge going forward.

2. **Strategies for Energy Transition to Fossil Fuels free Renewable Energy Sources**

It is inevitable that India, like several other nations of the world, will move away from fossil fuels as a source of energy. While we have made some headway in developing renewable energy sources like solar and wind, the necessary infrastructure to support the energy transition does not exist at the present time.

INAE plans to create an interdisciplinary expert group to study the whole energy transition comprehensively and holistically, keeping in mind the challenges inherent in such a massive transformation.

INAE will focus on the following important sectors which will be disrupted in the immediate future and/or the areas of concern which we require a strategy for, urgently to facilitate the transition

- Large scale energy storage solutions - Solutions other than Lithium Ion Batteries which do not seem to be appropriate for a country like India for a variety of reasons including the fact that we do not have the basic raw materials - Liquid Metal Flow batteries (for example, Vanadium Flow Batteries) is another attractive option which must be explored.
- Electricity Grid Infrastructure - current grid will not be able to cater to intermittent and distributed electricity inputs; the concept of smart grids which is adequately robust to cater to both supply side challenges (renewable energy sources) as well as demand management (dynamic pricing to take care of its peak loads).
- Transportation (electric mobility, both for people as well as for goods).
- Mining, Mineral Processing and Extractive Metallurgy Industry (which currently depends totally on fossil fuels not only as a source of heat but also as a reductant to convert metal oxides to metals).
- Recycling of waste by-products including municipal waste, tailings and smelter slags including steel slag, red mud and spent pot lining, electronic waste and hospital waste.
- Supply chains for raw materials needed for the transition - sourcing strategies from other geographies, urban mining, deep sea mining and space mining.
- Finding alternative technology options for the manufacture of steel and cement to reduce the environmental foot-print - currently these two materials which will continue to remain the backbone of the Indian economy for the foreseeable future and the consumption is likely to increase by an order of magnitude in the coming decade.
- Waste-water treatment and recycling.
- Water purification technologies including desalination

3. Excellence in Engineering Education

Several groups including other academies globally, are working on the new curricula for engineering education so that our young emerging leaders are adequately equipped with necessary engineering skill sets to face the challenges in the coming decades.

Various deliberations within India as well as abroad have emphasised the need of providing hands-on design experience, problem solving skills and exposure to the systems engineering concepts, tools and technologies to the engineering students. The curricula also need to be updated with the advancements in digital technologies.

All engineers must be familiar with the sustainability paradigm and must be able to do life cycle analysis for every engineering product. They must be equipped with knowledge and the experience with various digital platforms and modelling tools such as computational materials engineering (all the way from atomistic scale to macroscopic scale), computational fluid dynamics, structural analysis tools, life cycle analysis modelling tools, engineering scale up, robust design methodologies to take care of uncertainty and complexity, machine learning and data analytics tools and algorithms, multi-objective and multi-variate optimization tools and technologies.

It is important that the professional ethics is part of the engineering course curricula. A multi-disciplinary systems perspective to all engineers will certainly broaden their horizons – much needed to face the emerging world scenario. Good communication skills and ability to work in teams, are also prerequisites for engineers to succeed in the real life.

All engineers must possess basic IT skillsets and it is a given since digital technologies are transforming every aspect of our lives.

A multidisciplinary INAE Expert Group will critically examine the current status of engineering education, identify gap areas and strive to fill those gaps with appropriate action plans

4. World Class Infrastructure

INAE will come up with an action plan in consultation with all stake- holders to upgrade our national infrastructure within next few years. This will include

- Requirements, technology options and the investments needed to create a few smart cities in the country - including mobility, healthcare facilities, e-governance, access to affordable housing, utilities (electricity and water), waste collection, processing and recycle, education, communication, maintenance of infrastructural facilities, disaster management infrastructure including extreme events (for example, excessive rain and floods) etc.
- Requirements, technology options and the investments needed to create a rural infrastructure so that they can enjoy access to certain basic amenities where they are located - digital connectivity for example can provide them with access to healthcare, online education, information dissemination, financial inclusion, logistics warehousing and agriculture and farm productivity with engineering focus etc.

5. Cyber-physical Systems

Globally innovations are taking place at the interface of digital technologies and domain expertise. For example, manufacturing is being transformed as a consequence of the following - robotics and automation, Internet of Things (IoT), cloud computing, 3D printing, AI, machine learning and data analytics (Digital Twins), structural health monitoring of built structures and engineered products, drones, autonomy, data analytics based predictive asset maintenance systems, blockchain technology to facilitate complete traceability of the products, digital platforms for integrated design, development, deployment and monitoring of materials and products and knowledge engineering platforms for capturing, retaining and context sensitive retrieval of knowledge to solve challenging problems.

Similarly leveraging the advanced digital technologies, the infrastructure available in a given locality or a city can be upgraded for easy accessibility – for example, healthcare facilities, e-governance, utilities (electricity and water)

It is now possible to make most of healthcare facilities available to the citizens at their place ofresidence (particularly important for senior citizens living alone) through the intervention of digital connectivity, sensors and IoT solutions. Provision of healthcare and affordable Medicare facilities through technological interventions is a key focus area.

INAE will select certain areas for focussed attention during the next five years and develop strategies to create infrastructure to facilitate digital transformation for achieving a set of desirable objectives for example, higher productivity, higher efficiency, better quality of life and better quality of products, reduced cost of services, higher safety of workers, etc.

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ACADEMY ACTIVITIES

Academy News (Covering period from February 1, 2025 to June 30, 2025)

Joint activities with ANRF (erstwhile SERB), DST

I. ANRF (erstwhile SERB), DST-INAE Online and Digital Gaming Research Initiative

The SERB-INAE Online and Digital Gaming Research Initiative, was launched to leverage Digital Gaming Research and Industry in India and to achieve self-reliance in advanced Augmented Reality (AR)/ Virtual Reality (VR) technologies and INAE acts as an implementing agency for this initiative. Being a new area of research and development for the country, a pre-conclave and conclave was conducted following which, the call for proposal was launched in the following three categories:

Category I: R&D in Learning, Educational, and Leisure Online Gaming Platforms
Category II: Immersive Game Prototypes, with a focus on Indian Culture & Values
Category III: Collaborative Technical Design Process- Creation of SERB Game Labs

A total of Rs 25 Cr (recurring and non-recurring) was received initially from SERB for the initiative. In May 2024, the G-Hub project under Category III was withdrawn by ANRF. Currently there are 11 ongoing projects in Category I and II under his initiative and their project progress are monitored by the Program Management and Advisory Committee (PMAC) was constituted to evaluate, select, and review proposals. PMAC review meetings are conducted biannually wherein Principal Investigators/Co-PI/ Industry Partners presented their project progress and demonstration of the games developed. So far 3 review meetings have been conducted: two in March and November 2024, and one in April 2025. The next review meeting is planned to be held in November 2025.

II. INAE - ANRF (erstwhile SERB) Abdul Kalam Technology Innovation National Fellowship

Abdul Kalam Technology Innovation National Fellowship, launched in 2017, recognizes, encourages and supports translational research by engineering professionals in public-funded institutions. Nominations for the 2024-25 fellowship were due by June 30, 2024. Abdul Kalam Technology Innovation National Fellowship does not celebrate the past academic achievements but the translational research leading to possible commercialized or deployable technology; pilot scale or field trial worthy technology; patent (filed/ sold/ commercialized); working model or prototype for demonstration and trial (in addition but not limited only to scientific publication). The inaugural cohort of six fellows was honoured by the then Honourable President of India, Shri Ram Nath Kovind, and the then Honourable Minister of Science and Technology, Dr Harsh Vardhan, during the Technology Day celebration at Vigyan Bhawan on May 11, 2018.

In March 2024, SERB informed about temporarily halting the scheme due to the transition to ANRF, followed by discussions about budget cuts for FY 2024-25 and 2025-26. It was further communicated that no extensions for existing nominations or new selections are permitted, resulting in a reduction in the budget as per official letter confirming this decision received on March 11, 2025. Consequently, no further extensions or new nominations will be entertained for this fellowship under its current framework.

Altogether, 57 professionals have been conferred this fellowship so far. The scheme was a great success and the translational research conducted under this scheme has resulted in 115 patent filings and the establishment of technology ventures through technology transfer and the creation of start-ups. The publication of 374 high-impact research papers, supporting the academic and practical validation of their innovations have been published so far.

Despite its discontinuation, the Abdul Kalam Technology Innovation National Fellowship remains a landmark initiative that successfully bridged the gap between academic research and industry-ready innovation, leaving a legacy of impactful contributions to India's scientific and technological advancement.

III. ANRF (erstwhile SERB), - INAE Collaborative Initiatives in Engineering:

INAE jointly with SERB had taken a new initiative in the year 2022 to conduct various events under SERB-INAE Collaborative Initiative in Engineering. As an outcome, the following four initiatives under the umbrella of 'Collaborative Initiative in Engineering' were organized during the period February 2025 to June 2025.

A. SERB-INAE Conclaves on *Atmanirbhar* Technologies - Engineering Secured Future
B. SERB-INAE Woman Engineers Program
C. SERB-INAE Outreach Programs for NE, J&K and Ladakh
D. SERB-INAE Innovation Hackathon

A. ANRF (SERB) - INAE Conclave on *Atmanirbhar* Technologies for Engineering a Secured Future

(i) Conclave on "*Atmanirbhar* Technologies: Engineering a Secure Future" at IIT Dharwad

The Indian Institute of Technology Dharwad (IITDh) successfully organized a one-day national conclave titled "*Atmanirbhar* Technologies: Engineering a Secure Future" on March 21, 2025. This prestigious event was conducted under the aegis of ANRF (SERB) – INAE Conclave on *Atmanirbhar* Technologies: Engineering a Secure Future. It served as a significant initiative in alignment with the national visions of Atmanirbhar Bharat and *Viksit Bharat*, aimed at fortifying the country's self-reliance in indigenous technology and engineering for a secure and sustainable future.

The conclave brought together a dynamic mix of participants from academia, research institutions, and industry. It served as a platform to foster dialogue, promote collaborative research, and showcase technological innovation across a range of critical sectors. The agenda was meticulously designed to bridge the gap between academic research and industrial application, thereby reinforcing the national objective of technological sovereignty.

The day commenced at 9:30 a.m. with an inaugural ceremony, marked by the traditional lighting of the lamp, symbolizing the illumination of knowledge and innovation. Eminent guests included Dr. Anushree Ramanath, Schneider Electric, USA; Mr Mahalingam Koushik, Founder, Chara Technologies, Bangalore; Dr. Ravi Guttal, CTO, Aequs Pvt. Ltd.; Dr. Karthik Sankaran, Bangalore-based entrepreneur and semiconductor expert; and Mr Ram Subramaniam, Hubli-based entrepreneur working in the strategic sectors of the economy. They were joined by senior faculty members of IIT Dharwad including Prof. Somashekara M A (Head of the MMAE Department), Prof. Dileep A D (Dean of Administration

and officiating Director of the Institute), Prof. Dhiraj V Patil (Dean of Faculty Welfare), Prof. Ramjee Repaka (Dean of Student Welfare), and Prof. Pratyasa Bhui (Dean of Research and Development).

The inaugural address was delivered by Prof. Amar Gaonkar, Associate Professor at IIT Dharwad, who emphasized the importance of nurturing indigenous engineering solutions and the critical role academic institutions play in this transformation. Following this, Prof. Dileep A D, serving as the officiating Director, presented the keynote address. He spoke on the importance of collaborative research and innovation, stressing the need for partnerships across academia, industry, and government sectors to realize the goals of a self-reliant India.

The conclave focused on four core thematic areas, each chosen for their relevance to India's strategic technological roadmap: Circular Manufacturing, Secure and Sustainable Electric Power, Indigenous Technology for Strategic Sectors, and Electronics, Semiconductors, and Chip Manufacturing. These themes formed the backbone of the technical sessions and discussions that unfolded throughout the day.

Lamp Lighting Ceremony

The morning session featured a series of thought-provoking technical talks. The first talk of the day, delivered by Dr. Anushree Ramanath, was titled “AI for Renewables: Enabling Smart, Scalable, and Sustainable Energy Solutions”. In her address, Dr. Ramanath discussed the transformative potential of artificial intelligence in the renewable energy landscape. Drawing from her international experience, she provided deep insights into how smart systems and predictive analytics are revolutionizing energy generation and management. Her talk inspired young researchers to adopt AI-driven approaches to address real-world challenges in energy sustainability.

Following this, Mr Ram Subramaniam presented a compelling session on “Indigenous Technology Development for Strategic Sectors in the Indian Economy”. His talk underscored the pressing need for innovation-led self-reliance in areas such as defense, energy, and critical infrastructure. The morning session culminated in a panel discussion, moderated by Prof. Abhijit Kshirsagar. This interactive session brought together experts from academia and industry to deliberate on key challenges, emerging trends, and future prospects in the development of self-reliant technologies. Topics such as artificial intelligence in education, sustainable industrial practices, and reforms in technology-enhanced learning were explored in depth.

All the Attendees gathered at the Event Hall

The conclave then transitioned into a lunch and poster presentation session where the students and researchers showcased their innovations and ongoing projects through detailed poster presentations. The exhibits reflected creativity, technical rigor, and a deep commitment to solving national challenges using indigenous resources and solutions. The afternoon session featured three more technical talks. The first, delivered by Dr. Ravi Guttal, was titled "Reliable Manufacturing Ecosystems". In his session, Dr. Guttal outlined the systemic requirements and challenges associated with building dependable and scalable manufacturing frameworks within India. Drawing on his industrial experience, he provided actionable insights into supply chain dynamics, quality assurance, and process innovation.

This was followed by a session by Dr. Karthik Sankaran on "Electronics, Semiconductors, and Chip Manufacturing in India". As a technologist and entrepreneur, Dr. Sankaran presented an in-depth overview of India's position in the global semiconductor landscape. He addressed current capabilities, strategic gaps, and the immense potential for India to emerge as a global hub for semiconductor design and manufacturing.

The final technical talk of the day was presented by Mr Mahalingam Koushik. His talk, titled "Rare-earth Free Solutions: Machines and Drives for Sustainable Transportation and Industrial Applications", focused on innovations in electric motor design that reduce dependency on rare-earth elements. His discussion highlighted the role of deep-tech startups in fostering environmentally sustainable industrial applications, paving the way for more self-reliant and ecologically conscious engineering.

The event concluded with a valedictory function in the presence of the organizing team, faculty members, and guest speakers. Prof. Somashekara M A felicitated all invited speakers with mementos as a token of appreciation. Awards were also announced for the best student poster presentations, acknowledging the creativity and effort put forth by the student researchers. The vote of thanks was delivered by Prof. Amar Gaonkar, who expressed his gratitude to the speakers, participants, sponsors, and organizing volunteers for their enthusiastic participation and valuable contributions.

The conclave on "*Atmanirbhar* Technologies: Engineering a Secure Future" proved to be a milestone event that not only provided a platform for knowledge sharing and collaboration but also reaffirmed the vital role of technology and innovation in building a secure, self-reliant India. It was a day marked by insightful discussions, inspiring presentations, and a shared commitment to national progress through indigenous technological development.

First Technical Talk by Dr. Anushree Ramanath

Second Technical Talk by Mr M Ram Subramaniam

Prof. Abhijit Kshirsagar moderating the Panel Discussion

Dr. Ravi Guttal delivering the Technical Talk

(ii) Conclave on ANRF(SERB)-INAE Conclaves on *Atmanirbhar* Technologies - Engineering Secured Future at NAIMT Ranchi

The ANRF (SERB) – INAE Conclave 2025 on *Atmanirbhar* Technologies – Engineering Secure Future was organized with great fervour at the National Institute of Advanced Manufacturing Technology (NIAMT), Ranchi during March 22-23, 2025 bringing together thought leaders, researchers, policymakers, academicians, and innovators from across the country. The two-day conclave focused on the vision of a self-reliant India through engineering innovation, technological growth, and strategic collaboration.

The conclave commenced with an inspiring inauguration ceremony, graced by distinguished dignitaries and a gathering of over 120 participants from various academic, research, and industrial domains. The event was formally inaugurated by Professor G. Satheesh Reddy, President of the Aeronautical Society of India and Distinguished Senior Professor at BITS Pilani. His presence as the Chief Guest added immense value to the occasion.

The Guests of Honor included Mr Rajesh Singh, Joint Secretary and Financial Adviser, Ministry of Electronics and Information Technology, Government of India, and Professor Sumit Kumar Ray, Professor at IIT Kharagpur. The ceremony was presided over by Mr Arun Kumar Jha, Chancellor of NIAMT. The event began with a warm welcome address delivered by Professor Partha Protim Chattopadhyay, Director of NIAMT Ranchi. He expressed his gratitude to the dignitaries and participants for their presence and emphasized the relevance of the conclave in today's rapidly evolving technological landscape.

In his keynote address, Professor G. Satheesh Reddy shed light on the importance of Atmanirbhar Bharat (Self-Reliant India), aligning it with the broader national vision of *Viksit Bharat* 2047. He urged the audience, especially the youth and innovators, to channel their expertise and energy towards indigenous technological advancements that would strengthen the country's strategic autonomy. Following this, Mr Arun Kumar Jha spoke passionately about entrepreneurship as a viable and essential career path for students. He noted with concern the relatively low contribution of the manufacturing sector to India's GDP compared to other leading economies and encouraged academic institutions like NIAMT to play a transformative role in addressing this gap.

Mr Rajesh Singh delivered an insightful talk on the rapid pace of innovation and the burgeoning startup ecosystem in India. He emphasized the need for supportive policies and institutional collaboration to sustain this growth. Professor Sumit Kumar Ray contributed to the discussions by speaking on two key national missions—Semiconductors and Clean Energy. His talk underscored the vital need for research-driven solutions in these sectors to ensure energy security and technological independence.

The inaugural session concluded with a formal vote of thanks proposed by Professor Debdas Roy, Convener of the conclave, who acknowledged the contributions of the guests and expressed optimism about the deliberations to follow in the subsequent sessions.

The second day of the conclave culminated in a grand prize distribution ceremony. The occasion was honored by the presence of Mr Sanjay Seth, Hon'ble Minister of State for Defense, Government of India, who served as the Chief Guest. His presence marked a significant moment for the institution and the participants.

The Guest of Honor for the ceremony was Ms. Mohua Dutta, Director of MDS IndoCan Inc., Canada. The event was further enriched by the presence of several notable figures, including Mr Arun Kumar Jha, Chancellor of NIAMT, Professor Goutam Sutradhar, Director of NIT Jamshedpur, Dr. Suvrokamal Dutta, an international conservative political-economic and foreign policy expert, and Professor Sukumar Mishra, Director of IIT(ISM) Dhanbad.

The ceremony began with a welcome address by Professor Partha Protim Chattopadhyay, Director of NIAMT, who set the tone for the event by highlighting the institute's ongoing efforts in fostering innovation and self-reliance.

Professor Sukumar Mishra delivered a thought-provoking speech on the concepts of Technovate and Atmanirbhar. He encouraged the young generation to go beyond academic excellence and work towards converting knowledge and scientific research into viable engineering solutions that can drive India's journey toward self-reliance.

Following this, Dr. Suvrokamal Dutta presented a compelling vision of India's future as a global economic power. He outlined five core pillars essential for the realization of *Viksit Bharat*: Yuva (Youth), Nari Shakti (Women Empowerment), Gyan (Knowledge), Industry, and the combined strength of Kisan and Mazdoor (Farmers and Workers). His address provided both inspiration and direction for the gathered audience.

Professor Goutam Sutradhar emphasized the crucial role played by engineers, professors, and researchers in nation-building. He called for a united effort towards achieving independence in key sectors such as semiconductors and manufacturing, underlining the importance of academic-industry-government collaboration.

Ms. Mohua Dutta's address was particularly noteworthy for highlighting the collaborative potential between India and Canada. She shared insights into international partnerships and announced the signing of a Memorandum of Understanding (MoU) between MDS IndoCan Inc. and NIAMT to pursue joint futuristic innovation projects. Mr Arun Kumar Jha once again reiterated NIAMT's critical role in furthering the vision of Atmanirbhar Bharat, stressing the importance of academic institutions acting as catalysts in the transformation of the Indian economy.

The highlight of the event was the rousing speech by Mr Sanjay Seth, Hon'ble Minister of State for Defense. His words resonated deeply with the gathering as he spoke of the government's progressive policies and developmental efforts aimed at strengthening India's global standing. He urged students to cultivate a sense of patriotism and commitment towards building a strong, self-reliant nation. As part of the ceremony, he also conducted the Bhoomi Pooja (groundbreaking ceremony) for the upcoming Central Workshop Facility at NIAMT, marking a significant milestone in the institute's infrastructure development.

The prize distribution ceremony celebrated the winners of various competitions organized during the conclave, including Innovative Product Prototypes, Grand Ideas Challenge, and Start-up Ideation. Awardees received mementos and cash prizes in recognition of their creativity and technological ingenuity. The event concluded with a heartfelt vote of thanks by Dr. Vaishali S. Poddar, who acknowledged the support and contributions of all dignitaries, participants, organizing team members, and collaborators. The ANRF (SERB) – INAE Conclave 2025 successfully served as a platform to deliberate, ideate, and celebrate technological self-reliance. It reinforced the critical role of academic institutions in national development and fostered a spirit of innovation, entrepreneurship, and patriotic dedication among the future torchbearers of the nation.

Faculty members, dignitaries and participants gracing the event

Lighting of auspicious lamp by distinguished dignitaries on the dais during the Inauguration ceremony

B. SERB-INAE Woman Engineers Program

(i) Workshop on Women Leaders in a Tech-Driven World: A Transformative Workshop at MNIT Jaipur

In an era where technology is rapidly reshaping industries, empowering women in the tech sector is crucial for fostering innovation and inclusivity. Recognizing this need, Malaviya National Institute of Technology (MNIT) Jaipur organized a two-day workshop titled "Women Leaders in a Tech-Driven World" under the aegis of SERB-INAE Woman Engineers Program on February 7-8, 2025. The event brought together leading academicians, entrepreneurs, researchers, and professionals to discuss challenges, share insights, and inspire the next generation of women in technology.

The workshop aimed to identify the roadblocks at every stage of the professional career of women technologists, more so as they rise the ladder towards the top. Eventually, this aims to chalk out pathways for women professional towards the echelons of the technology world, so that they can have their fair share of recognition and growth.

The workshop was a pioneering initiative with an aim to inspire, empower, and connect women in technology and research fields. This two-day workshop provided a platform for women faculty, students, researchers, and professionals to explore current trends in technology, engage in thought-provoking discussions, and gain insights from industry and academic leaders to lead the developing Tech-powered India. The event also included state-of-the-art keynote lectures, interactive panel discussions, and activity-based sessions that focus on fostering leadership, promoting gender equality, and enhancing skills to thrive in the tech industry.

Targeted Audience:

- Female students from engineering, computer science, and other technology spectrums.
- Early-career researchers and academicians interested in technology and innovation.
- Professionals from the tech industry focused on research and development, innovation, and gender diversity.
- Faculty members and policymakers interested in gender inclusion.

The workshop began with a dignified inaugural ceremony, where the traditional lamp-lighting was led by the Director of MNIT Jaipur and the Chief Guest, Dr. Chandrika Kaushik, Director General (PC & SI), DRDO. Other esteemed guests included Mrs. Prabha Goyal, Executive Director, Bharat Electronics Ltd., and Mr. Rohit Bhakar, Registrar of MNIT Jaipur. Under the leadership of Dr. Swati Sharma, Metallurgy Department, MNIT Jaipur, the event was carefully structured to ensure meaningful conversations and valuable takeaways.

Dignitaries on the dais

The first day of the workshop focused on leadership, innovation, and entrepreneurship in the tech industry. Dr. Chandrika Kaushik, Director General (Production Coordination & Services Interaction (PC & SI), DRDO in her keynote lecture titled “Trailblazers of Technology: Women Leaders Shaping the Future,” highlighted the transformative role women play in technology and emphasized the importance of fostering leadership and resilience among aspiring female technologists. A panel discussion explored the evolving landscape of women in technology, addressing key industry trends, challenges, and the need for a more supportive ecosystem.

The discussions on the first day also addressed critical issues, with Dr. Vibha Tripathi leading a session on overcoming barriers faced by women in technology, including gender bias, lack of mentorship, and work-life balance challenges. Another dynamic panel featuring Dr. Vibha Tripathi, Founder, Boon, Ms. Anushree Srivastava, Director Grey Matterz, Managing Partner GOFI and Prof. D. Boolchandani, ECE Department, MNIT Jaipur explored how women entrepreneurs can leverage innovation to launch and sustain successful tech ventures. The day concluded with an insightful session on soft skills development by Prof. Sivaji Chakravorti, Vice President, INAE who underscored the significance of communication, leadership, and teamwork in advancing women’s careers.

Participants attending session during the workshop

The second day of the workshop shifted focus to holistic growth, mental well-being, and strategies for encouraging young women to pursue STEM careers. Dr. Aarti Chitkaria Chopra and Dr. Nidhi Bansal led a crucial discussion on stress management, burnout prevention, and maintaining a healthy work-life balance, acknowledging the pressures women often face in the fast-paced tech industry. This was followed by an engaging panel discussion on fostering diversity, equity, and inclusion in the workplace. Speakers including Prof. Hemlata Manglani, Dr. Aarti Chitkaria Chopra, Associate Professor, Poornima University; Dr. Swati Soni, Professor, Jaipuria Institute of Management; Prof. Rohit Bhakar, Professor, MNIT Jaipur emphasized the importance of workplace policies that actively support gender inclusivity.

A particularly impactful session focused on encouraging young girls from rural backgrounds to explore STEM careers. Experts Ms. Pallavi Tak, Vice President, Seed & Acceleration; Prof. Lava Bhargava, ECE Department, MNIT Jaipur; Ms. Alka Singh, Head of Policy and Strategic Partnerships; and Dr. Vartika Arora, Principal, Kanoria School of Law for Women, Jaipur shared insights on bridging the urban-rural divide in STEM education, addressing societal and infrastructural challenges that often deter young girls from pursuing opportunities in science and technology.

The workshop concluded with a valedictory session led by Dr. Shweta Sharma, MNIT Jaipur where certificates were distributed and closing remarks were shared. The event ended on a high note, leaving participants feeling empowered, inspired, and motivated to break barriers in the tech industry. The "Women Leaders in a Tech-Driven World" workshop at MNIT Jaipur was more than just an event—it was a step toward meaningful change. By fostering dialogue, mentorship, and collaboration, it encouraged women to embrace leadership roles, drive innovation, and contribute to a more inclusive technological future. Initiatives like these continue to pave the way for greater representation of women in STEM, ensuring that diversity remains a driving force behind technological progress.

To summarize, the workshop provided numerous benefits, both immediate and long-term, to its participants and the broader community.

Empowerment and Inspiration: Keynote lectures by accomplished leaders like Ms. Prabha Goyal, Dr. Vibha Tripathi, and Ms. Anushree provided real-world success stories and inspiration.

Networking Opportunities: Enabled connections with peers, mentors, and professionals from academia, industry, and entrepreneurship, fostering collaborations and mentorship opportunities.

Skill Development: Panel discussions on themes like entrepreneurship, innovation, mental health, and leadership offered practical tips and strategies for career advancement in STEM.

Awareness of Trends: Insights into current technological advancements and challenges for women in tech professions helped participants align their careers with future industry demands.

Mental Health Focus: Discussion on mental health and wellbeing addressed the unique pressures faced by women in STEM, encouraging resilience and balance. Session by Dr. Aarti Chitkaria was focused on the metal wellbeing.

Group photographs of the participants with Resource Person

(ii) Workshop on Empowering Women Professionals in STEM (EWPS-2025) at NIT Hamirpur

The two-day workshop on "Empowering Women Professionals in STEM (EWPS-2025)*"* was held from February 21-22, 2025, at NIT Hamirpur, under the aegis of the ANRF (SERB) - INAE Women Engineers Program. The workshop aimed to address the specific needs of women faculty in engineering education by enhancing their pedagogical skills, fostering leadership capabilities, building legal awareness, and supporting their academic growth and research initiatives. The workshop brought together 40 women faculty members and professionals from NIT Hamirpur and IIIT Una, focusing on equipping them with practical tools to advance their careers and contribute more effectively to academia and research.

The workshop commenced on February 21, 2025, with a registration session followed by a formal inaugural ceremony. The Chief Guest, Prof. H. M. Suryawanshi, Director, NIT Hamirpur, graced the occasion alongside Prof. Anoop Kumar, Dean Faculty Welfare, and Dr. Archana S. Nanoty, Registrar, NIT Hamirpur. Dr. Veena Sharma welcomed the participants and introduced the vision of the workshop, highlighting the roles of INAE and ANRF in supporting academic excellence and gender equity. The opening addresses by the Dean FW and Registrar reflected the administration's strong support for such faculty development initiatives. Director Prof. Suryawanshi's motivating speech emphasized the importance of fostering a supportive environment for women educators. The session concluded with remarks by Dr. Gargi Khanna, the Workshop Coordinator, who outlined the schedule and goals of the event.

Over the course of two days, the workshop featured expert-led sessions covering a diverse range of themes including pedagogy, leadership, legal frameworks, soft skills, research development, and policy awareness. The key sessions are outlined below:

Pedagogical Proficiency for Women Engineers

Dr. Archana S. Nanoty discussed innovative, interactive, and technology-enabled teaching methodologies to improve student engagement and academic outcomes, especially in the context of engineering disciplines.

Strategic Lesson Planning and Classroom Management

Prof. Rajeevan Chandel focused on effective lesson planning, structuring curriculum, and managing diverse classroom environments, with actionable strategies tailored for engineering faculty.

Legal Frameworks and Policy Awareness

Dr. Seema Kashyap covered key legal frameworks impacting women in academia, with particular emphasis on the Prevention of Sexual Harassment (PoSH) Act, creating awareness to promote safer, more inclusive academic environments.

Empowering Women Engineers through Effective Teaching Techniques

Dr. Meenakshi Sood introduced practical teaching strategies and shared inspiring examples of women engineers excelling in academia and leadership roles.

Soft Skills as the Backbone of Sustainable Human Capital

Prof. Sivaji Chakravorti, Vice President, INAE highlighting the importance of communication, adaptability, and critical thinking, shared real-life examples of soft skills being essential to career sustainability and leadership.

Leadership and Team Engagement

Dr. Gargi Khanna, NIT Hamirpur focused on cultivating leadership traits among women professionals, the session included hands-on team engagement activities facilitated by Dr. Veena Sharma and Dr. Bharti Koul.

Life Skills Development

Dr. Sunder Kala Negi and Dr. Rinshu through experiential activities helped participants develop interpersonal, cognitive, and stress management skills crucial for personal and professional well-being.

Advancing Research and Innovation in the Contemporary Landscape

Prof Sivaji Chakravorti, Vice President, INAE helped participants explore methodologies, innovation ecosystems, and funding avenues to promote active engagement in research.

Work-Life Balance for Women Engineers

Dr. Meenakshi Sood addressed challenges women faculty face in balancing career and family, with practical suggestions for achieving harmony through institutional and personal strategies.

Project Proposal Writing Skills

Dr. Anju Batta Sehga designed a session to help participants draft effective project proposals, understand funding agency requirements, and articulate research objectives clearly.

Implementation and Perspective of NEP 2020

Dr. Ravinder Nath Sharma, concluded technical session explored the opportunities and challenges introduced by the New Education Policy (NEP) 2020, particularly its implications for women educators and researchers.

The workshop concluded with a valedictory session presided over by Prof. Sivaji Chakravorti, Vice President, INAE, with the presence of Prof. H. M. Suryawanshi, Director, NIT Hamirpur, and Dr. Archana S. Nanoty. The workshop outcomes were presented, and the official proceedings of the workshop were released during the session. The EWPS-2025 workshop achieved its primary goals of building pedagogical capacity and promoting leadership among women in engineering education.

Major outcomes included:

- Enhanced awareness and adoption of student-centric teaching methodologies
- Improved leadership and team management skills among women faculty
- Increased understanding of legal protections and institutional policies
- Practical insights into writing competitive research proposals
- Development of soft skills and life management tools
- Strengthened academic networking and peer collaboration'

Receiving the Chief guest and others for Inaugural Ceramony at NIT Hamirpur

Inaugural Session in progress

Group Photograph of the Women Participants at NIT Hamirpur

C. SERB-INAE Outreach Programs for NE, J&K and Ladakh

(i) Workshop on Skill Development of Women at NIT Mizoram

The National Institute of Technology Mizoram, under the aegis SERB-INAE Outreach Programs for NE, J&K and Ladakh, successfully hosted a three-day workshop on "Skill Development of Women" from February 19 to 21, 2025. This workshop was a significant outreach initiative targeting women from the North-East region, Jammu & Kashmir, and Ladakh, with the objective of enhancing professional skills, leadership qualities, and entrepreneurial mindset among women through expert sessions, discussions, and a Women's Empowerment Hackathon.

The workshop commenced with a formal inaugural ceremony held at the Conference Hall, Administrative Building. The ceremony was graced by Prof. Sivaji Chakravorti, Vice President, INAE, who delivered an enlightening address on the importance of skill development and women's emowerment. Prof. Saibal Chatterjee, Dean R&C and the Coordinator of the Workshop, welcomed participants and emphasized the importance of the sessions, encouraging attendees to make the most of the learning opportunities.

DAY 1

Session I: "Cultivating Essential Soft Skills to Thrive in a World of Constant Change – Part I"
Prof. Chakravorti, Vice President, INAE emphasized the relevance of soft skills such as communication, patience, adaptability, and teamwork for women navigating professional environments. He discussed techniques like the Pareto Principle and STAR method for effective problem-solving and highlighted the role of observation, time management, and confidence in professional growth.

Session II Topic: "Cultivating Essential Soft Skills to Thrive in a World of Constant Change – Part II"
This session focused on Magnetic Resonance Imaging (MRI) as an example of scientific principles leading to engineering applications. Prof. Chakravorti elaborated on MRI's relevance to women's health and stressed the importance of encouraging more women to participate in STEM disciplines to foster inclusive technological advancement.

Hackathon Preparation Session Led by: Dr. Vijay Mandal, Assistant Professor, Dept. of ME, NIT Mizoram

The session included discussions on hackathon guidelines, prototype development, team finalization, poster presentations, and group dynamics.

DAY 2

Keynote Address: "Law and Women's Rights"

Prof. Dilip Ukey, Vice Chancellor, National Law University, Mumbai highlighted vital legal protections for women, including laws addressing workplace harassment, domestic abuse, and inheritance rights. He emphasized that legal literacy empowers women to make informed decisions and advocate for their rights in both personal and professional domains.

Session: Women Entrepreneurs of Mizoram

Speakers:

- Ms. Zosangzeli Chhakchhuak – Coffee Entrepreneur
- Ms. Lalhlupull Ralte – Perfume Entrepreneur
- Ms. Esther Laltanpull Khiangte – Software Professional

These women leaders shared real-world insights on entrepreneurship, financial support systems like the Mizoram Start-Up Policy, and the importance of innovation, product quality, and digital proficiency. They collectively emphasized mentorship, financial literacy, and strategic thinking for sustained success in the business and tech sectors.

Participants at the end of Day 2 toured NIT Mizoram's state-of-the-art 5G Laboratory, led by Dr. Anumoy Ghosh, Assistant Professor, ECE Department, who provided a comprehensive overview of cutting-edge wireless communication technologies. The session was attended by the entrepreneurs as well, showcasing the intersection of technical innovation and business potential.

DAY 3

Keynote Lecture by: Lieutenant Commander Aishwarya Boddapati, decorated naval officer and member of the *Navika Sagar Parikrama* – India's first all-women global sailing expedition. Her session focused on resilience, leadership, strategic thinking, and mental fortitude. She urged participants to step into leadership roles and embrace challenges as opportunities for growth. Her inspirational journey deeply resonated with the audience.

Group Discussions: A Women's Empowerment Hackathon was held, featuring six teams engaging in group discussions on various women empowerment topics assigned by the organizers. The session was highly productive, with participants showcasing insightful perspectives and innovative solutions. The discussions highlighted key issues like gender equality, financial independence, and leadership. The session was carefully monitored and evaluated by Prof. K. G. Singh and Dr. Shuchi of NIT Mizoram. The hackathon fostered teamwork, critical thinking, and confidence among participants, reinforcing the importance of empowering women through collaborative problem-solving and strategic thinkingSix teams discussed critical themes around women's empowerment, including gender equity, leadership, financial independence, and digital inclusion.

Team Presentations and Poster

Display: Eight teams presented innovative, tech-driven solutions addressing societal challenges faced by women. Proposals ranged from digital education platforms to financial management apps for women in rural areas. Judges evaluated teams based on creativity, feasibility, and societal impact. Chief Guest Prof. S. Sundar, Director, NIT Mizoram, along with Lt. Cdr. Boddapati and Prof. Saibal Chatterjee, felicitated the winners and distributed prizes for Group Discussions, Poster Presentations, and the Hackathon.

Prof. Saibal Chatterjee, Dean R&C and Workshop Convenor, offered the closing remarks by highlighting the enhancement of soft skills, legal awareness, technical know-how, and entrepreneurial capability among participants and the success of the Women's Empowerment Hackathon in driving collaboration and innovation. The Skill Development Workshop for Women was a landmark event that

brought together academia, industry, entrepreneurs, and defence personnel to inspire, train, and empower women from diverse backgrounds. Through a blend of technical sessions, leadership insights, and collaborative hackathons, the workshop reinforced the transformative potential of women in engineering, entrepreneurship, and leadership. It concluded as a resounding success, aligning with national goals of inclusive innovation and skill development.

Prof. S Sundar, Director,felicitating Prof Sivaji Chakravorti

Winners at Hackathon Presesntation during Inaugural Ceremony

Participants at NIT Mizoram

(ii) Workshop on "Skill Enhancement Workshop in Teaching and Research" at IIT Guwahati

IIT Guwahati under the aegis SERB-INAE Outreach Programs for NE, J&K and Ladakh successfully organized a two days' Workshop on Skill Enhancement Workshop in Teaching and Research during Feb 28, 2025 and March 1, 2025.

The Workshop was a dynamic and impactful two-day initiative dedicated to strengthening the academic capabilities of faculty members and research scholars. Recognizing that faculty are the cornerstone of any higher education institution, the workshop aimed to equip them with the pedagogical, research, and professional tools necessary to inspire students and advance scholarly output in their respective fields. The modern academic environment demands that educators go beyond traditional methods and embrace innovative strategies and technologies that make teaching more interactive, inclusive, and impactful.

This workshop was designed to meet those evolving needs—blending practical learning with thought-provoking discussions and expert-led sessions. Focused on both teaching excellence and research innovation, the program provided an enriched platform for participants to explore cutting-edge methodologies, research tools, grant-writing techniques, and best practices in industry collaboration. By addressing both theoretical and practical elements of academic work, the event contributed meaningfully to participants' professional growth.

The primary goal of the workshop was to empower educators and researchers with the skills needed to thrive in a fast-evolving academic landscape. The specific objectives included:

1. **Enhancing Teaching Methodologies and Pedagogy:**
   The workshop introduced participants to learner-centric approaches, such as outcome-based education (OBE) and problem-based learning (PBL), helping educators make teaching more interactive and aligned with real-world applications.
2. **Developing Research Proficiency:**
   Sessions were held on formulating research questions, conducting literature reviews, designing research methodologies, and academic writing, enabling participants to produce more impactful scholarly work.
3. **Grant Proposal Writing and Funding Opportunities:**
   Participants were trained on how to identify funding agencies, write compelling proposals, and comply with submission guidelines—key steps in securing research grants.
4. **Improving Research Communication Skills:**
   Techniques for effective research presentations and public speaking were emphasized, with a focus on tailoring communication for academic conferences, journals, and interdisciplinary audiences.
5. **Fostering Industry-Academia Collaboration:**
   The workshop emphasized the importance of establishing partnerships with industry to align research with societal and market needs, bridging the gap between theoretical knowledge and practical application.
6. **Implementing Innovative Teaching Tools:**
   Sessions included the use of technology-driven tools like Learning Management Systems (LMS), digital assessment platforms, and classroom engagement apps to enhance student-teacher interaction.
7. **Promoting Wellness and Resilience in Academia:**
   Recognizing the challenges of academic life, a special session focused on maintaining mental well-being, building resilience, and creating supportive learning environments.

Key Themes Covered

- Effective classroom strategies and student engagement models
- Research ethics and academic integrity
- Collaboration with industry: pathways and best practices
- Emerging trends in engineering education and research
- Scholarly communication and peer-reviewed publishing
- Stress management and faculty wellness
- Strategies for continuous professional development

Outcomes

By the conclusion of the workshop, participants were expected to:

- Gain deeper insights into modern teaching methods and tools
- Enhance their research design and writing capabilities
- Build awareness of funding opportunities and proposal drafting techniques
- Improve their academic presentation and communication skills
- Establish initial links for cross-institutional and industry collaborations
- Be more resilient and aware of personal wellness strategies to sustain academic excellence

The Skill Enhancement Workshop in Teaching and Research served as a crucial platform for capacity building among faculty and scholars. With a well-rounded curriculum addressing both pedagogical and research-oriented competencies, the program successfully met its goal of preparing educators for the future of higher education. The event fostered collaboration, encouraged innovation, and reinforced the importance of continuous learning in academic careers. Participants left the workshop better equipped to engage students, contribute to research advancements, and take proactive steps in their own professional journeys.

Participants attending the session during the workshop

Group Picture of the Attendees with the Resource Persons

(iii) Workshop on "Modern Pedagogical Techniques for Student-Centric Learning in Engineering Education" at IIT Jammu

In response to the growing need for transforming engineering education through student-centric learning approaches, the Centre for Essential Skills (CES), IIT Jammu, organized a two-day workshop titled “Modern Pedagogical Techniques for Student-Centric Learning in Engineering Education” from February 24 to 25, 2025. The workshop was conducted under the aegis of ANRF (SERB) - INAE Outreach Programs aimed at empowering educators and aspiring faculty from the Northeast, Jammu & Kashmir, and Ladakh regions.

Rooted in the principles of the National Education Policy (NEP) 2020, the program aimed to enhance pedagogical effectiveness by equipping participants with modern teaching methodologies, digital integration strategies, and a comprehensive understanding of student learning processes. It particularly addressed the lack of formal pedagogical training among Ph.D. scholars and early-career faculty, providing a structured platform for collaborative learning, knowledge exchange, and practical skill development.

The workshop welcomed 35 participants, including faculty members and research scholars from Government Degree Colleges (GDCs) of Srinagar, Sopore, Pulwama, Doda, Ramnagar, and Jammu, alongside representatives from the Islamic University of Science & Technology (IUST), Kashmir, and IIT Jammu. This diverse representation laid the groundwork for a regional pedagogical network that promotes best practices, collaboration, and sustainable growth in engineering education across the region.

The inaugural ceremony was graced by a distinguished panel of academicians and leaders, including Prof. Sivaji Chakravorti, Vice-President, Indian National Academy of Engineering (INAE), Prof. Manoj Singh Gaur, Director, IIT Jammu, Prof. C. S. Upadhyay, IIT Kanpur, Prof. Shyam Narayan Lal, Visiting Professor at IIT Jammu, and Prof. Abhay Sharma, Dean of Education and Outreach at IIT Jammu.

The workshop was structured into expert-led sessions, breakout discussions, and group presentations, all of which were aimed at enhancing both theoretical understanding and practical application of teaching strategies. The first day commenced with an enlightening session by Prof. C. S. Upadhyay, IIT Kanpur who introduced the concept of various teaching-learning styles and how recognizing different learner types can help educators tailor their instruction to maximize engagement and retention. His session laid the foundation for exploring how flexible and adaptive teaching can significantly improve learning outcomes.

Following this, Prof. Sivaji Chakravorti delivered an inspiring talk on the role of soft skills in education and professional life. His session highlighted essential interpersonal and communication skills that every educator must cultivate, such as empathy, active listening, adaptability, and clarity in delivery. This was followed by a thought-provoking lecture by Dr. Sanchita Srivastava, IIT Jammu on learners' development and educational psychology, where she emphasized the need to understand the cognitive and emotional development of students to foster inclusive and psychologically safe learning environments.

Later in the day, Dr. Gaurav Ashok Bhaduri, IIT Jammu conducted a session on the effective use of teaching aids. His interactive approach allowed participants to explore the strategic use of digital and visual tools to enhance clarity and engagement in classroom instruction. The most interactive component of Day 1 was the breakout session, where participants were divided into groups to discuss practical teaching issues, including student assessment methods, hybrid learning challenges, maintaining student attention, and the cognitive underpinnings of effective pedagogy. These sessions, moderated by faculty from IIT Jammu, encouraged peer learning and experience sharing, creating a collaborative platform for solving real classroom challenges.

Day 2 of the workshop began with an engaging session on leadership in pedagogy, delivered by Prof. Bijoy Boruah, IIT Jammu. This session encouraged participants to view educators not only as transmitters of knowledge but as mentors and leaders capable of shaping students' aspirations and academic trajectories. Following this, Prof. Shyam Narayan Lal, IIT Jammu addressed the topic of inclusive and equitable education. His session focused on overcoming regional, cultural, and socioeconomic barriers that hinder student participation and performance, especially in underserved and marginalized communities. He stressed the need for equity-driven curriculum planning and culturally responsive teaching.

The concluding segment of the workshop was designed to reinforce the knowledge gained by participants. It included a group presentation session, during which attendees synthesized their insights from the various discussions and expert lectures. Each group shared actionable strategies for improving pedagogy in their respective institutions, covering aspects such as curriculum design, classroom management, use of educational technology, and fostering inclusive environments. By the end of the two days, the workshop had made a significant impact on all participants. It not only increased awareness

of student-centric and active learning strategies but also provided a rare opportunity for educators from geographically diverse institutions to collaborate, reflect, and grow together. Importantly, the workshop aligned with NEP 2020's recommendation that all future faculty, including Ph.D. scholars, should undergo formal training in pedagogy.

Looking ahead, the workshop highlighted the urgent need for continued faculty development. Participants expressed a strong desire for follow-up programs that delve deeper into specific teaching tools and digital platforms, as well as opportunities for hands-on teaching simulations. There was also a consensus on the importance of establishing a regional pedagogical network, which could serve as a hub for sharing best practices, mentoring young faculty, and driving innovation in curriculum design and delivery. In conclusion, the workshop on "Modern Pedagogical Techniques for Student-Centric Learning in Engineering Education" was a major success. It addressed key gaps in engineering pedagogy, empowered faculty with actionable tools, and created a strong foundation for regional collaboration in higher education. Hosted by IIT Jammu and supported by INAE and SERB, the event reinforced the critical role that effective teaching plays in shaping the future of technical education in India.

Lamp lighting ceremony at Inaugural function

Prof Sivaji Chakravorti delivering talk

Group Photographs of the participants with the resource persons

Engaging session on leadership in pedagogy

Group Photographs of the participants

D. SERB-INAE Innovation Hackathon

(i) *AVINYA* 2025 at MVJ College of Engineering (MVJCE), Bangalore

In a spirited celebration of creativity, problem-solving, and technological innovation, MVJ College of Engineering (MVJCE), Bangalore, hosted AVINYA 2025, a 30-hour continuous hackathon on March 19 - 20, 2025. The event was conducted in collaboration with the Indian National Academy of Engineering (INAE), under the aegis of ANRF (SERB) as part of the ANRF (SERB) – INAE Innovation Hackathon.

True to its Sanskrit namesake, *"Avinya,"* meaning innovation, the hackathon sought to inspire and engage the brightest young engineering minds from institutions across the country. The event focused on creating impactful technological solutions under three major themes: Healthcare and Management, Smart Vehicles, and Cybersecurity & Blockchain.

The two-day event commenced on March 19, 2025, with an opening ceremony held at MVJCE's Smt. Rajalakshmi Seminar Hall. Dr. Ajayan K.R., Principal of MVJCE, delivered the welcome address, expressing his enthusiasm for the partnership between MVJCE and INAE. He proudly highlighted the recent Memorandum of Understanding signed between the two institutions, which had already yielded two successful events in a short span of one month. Dr. Ajayan emphasized the importance of such collaborations in fostering innovation and providing students with exposure to real-world engineering challenges.

The Presidential Address was delivered virtually by Mr. J.D. Patil, President, INAE. In his speech, Mr. Patil elaborated on the history and mission of INAE, underscoring its role in promoting excellence and innovation in engineering across India. He emphasized the transformative power of hackathons in identifying real-life challenges and cultivating innovative, entrepreneurial thinking among students. His remarks highlighted how such platforms contribute not only to national development but also to job creation and sustainable technological growth.

Following this, the Inaugural Address was presented by Prof. Sivaji Chakravorti, Vice President, INAE. Through an engaging and story-driven narrative, Prof. Sivaji emphasized the importance of thinking differently. He encouraged the participants to embrace teamwork, curiosity, and resilience throughout the hackathon. The ceremony concluded with a heartfelt vote of thanks by Dr. M. Brindha, Dean of Affiliation & Accreditation at MVJCE and the Coordinator of AVINYA 2025, who expressed her gratitude to all dignitaries, participants, evaluators, and organizing members for their commitment and contributions.

Hackathon Highlights and Activities

The hackathon was structured as an intense, uninterrupted 30-hour innovation sprint, where student teams from various engineering institutions worked on domain-specific problem statements. These problem areas were distributed across three thematic tracks:

E. Healthcare and Management
F. Smart Vehicles
G. Cybersecurity & Blockchain

Each team worked under continuous mentorship and assessment from domain experts, who provided real-time feedback and guidance. Participants demonstrated exceptional ingenuity and technical skill in tackling diverse real-world challenges. Notable projects included:

- AI-powered smart glasses for early glaucoma detection
- Non-invasive hemoglobin monitors for patient care
- Blockchain-enabled platforms for secure welfare scheme management and decentralized medical equipment rental
- Smart accident detection and response systems integrated into autonomous vehicle prototypes
- Expose Net, a browser extension to improve online transparency and accountability
- Little Imaginators, a youth-oriented initiative that encouraged younger students to dream big and innovate early

These projects reflected a blend of technical depth and social impact, showcasing how student-led innovation can influence both industry and society.

AVINYA 2025 also featured inspirational keynote addresses by renowned industry leaders:

- Mr. Subbaraja Sirasala, Senior Enterprise Solutions Architect at GE Aerospace, addressed participants on the "Role of Technology & Its Impact on Cybersecurity". He discussed the ever-evolving nature of digital threats, the growing role of AI and machine learning in cyber defense, and the urgent need for resilient systems and proactive defense strategies.
- On Day 2 (March 20, 2025), Mr. Shravan S. Naidu, Principal Architect and Director at Alegeus, delivered a talk titled "Engineering Beyond the Classroom: The Journey of Lifelong Learning." He encouraged students to embrace a mindset of continuous learning, adaptability, and personal growth — traits that are indispensable in a rapidly changing technological world.

Thematic Competitions and Judges

The hackathon's competitive segment was divided into three thematic tracks, each evaluated by eminent experts from academia and industry:

1. Healthcare and Management (10 teams)
   Judges:
   - Mr. Vasantha Kumar, Engineering Manager, Alegeus, Bangalore
   - Mr. Shravan S. Naidu, Principal Architect & Director, Alegeus, Bangalore
2. Smart Vehicle (9 teams)
   Judges:
   - Dr. Raghavendra, Professor, IISc, Bangalore
   - Mr. Bejoy John, Senior Director, OWS Manufacturing Shops, GE Aerospace, Bangalore
3. Cybersecurity & Blockchain (8 teams)
   Judges:
   - Mr. Navdeep Agarwal, Senior Security Architect, GE Healthcare, Bangalore & Director, ISC2
   - Mr. Subbaraja Sirasala, Senior Enterprise Solutions Architect, GE Aerospace, Bangalore

The projects were assessed based on criteria such as innovation, feasibility, scalability, teamwork, presentation, and alignment with the chosen theme.

To offer a well-rounded experience and celebrate the spirit of creativity, a cultural program was held on the evening of March 20. Organized by MVJCE's student-led clubs, the RaagAbhinaya Club presented a stage play and short films, while the Saahitya Club conducted an expressive slam poetry session. These cultural showcases added an artistic and reflective dimension to the highly technical event.

The hackathon concluded with a final evaluation and announcement of results, marking the end of 30 hours of brainstorming, coding, designing, and problem-solving.

AVINYA 2025 proved to be an outstanding example of how collaborative academic-industry initiatives can nurture future-ready engineers. By combining intensive hands-on experiences, inspirational thought leadership, and vibrant student participation, the event cultivated a fertile ground for ideation, learning, and innovation.

This landmark event reaffirmed the role of engineering education in addressing national and global challenges. As AVINYA 2025 came to a close, it left behind a legacy of inspired minds, new connections, and a renewed drive to innovate for a better future.

Mr. J D Patil, President, INAE addressing students on 19th March 2025 at Dr. M V Jayaraman Auditorium

Judges of Cyber Security & Block Chain Theme evaluating the students'

New Initiative of INAE

The Centre of Engineering Education Excellence (CEEE) Program

Summary: The Centre of Engineering Education Excellence (CEEE) Program, launched through CSR funding from the Infosys Foundation in partnership with the Indian National Academy of Engineering (INAE), is a transformative initiative aimed at elevating the quality of engineering education in India. Recognizing the pressing need to bridge the skills gap among engineering graduates, particularly from Tier 3 and 4 institutions, the ₹38.35 crore, four-year program (2024–2028) focuses on upskilling faculty members who teach core engineering subjects during formative undergraduate semesters. By leveraging the mentorship of INAE Fellows, domain experts, and senior faculty from premier institutions, the program delivers a blended model of physical and virtual training across five key engineering domains. With a goal to mentor nearly 3,750 faculty members through 125 mentors by its conclusion, CEEE seeks to indirectly impact thousands of engineering students, enhancing their employability and innovation capacity. A robust governance structure ensures accountability and quality, while competitive financial support enables widespread participation. This initiative exemplifies a powerful collaboration between industry and academia, advancing national goals such as Skill India and contributing meaningfully to the vision of a Viksit Bharat by 2047.

Background, Genesis and Details of the CEEE Program

India, despite being one of the fastest-growing economies and currently the fifth largest in the world, faces numerous developmental challenges as it charts its course toward becoming a *Viksit Bharat* (developed nation) by 2047. Critical sectors like energy, environment, infrastructure, transportation, security, defense, and healthcare require innovative engineering solutions to address pressing national needs. Given India's demographic advantage - having the largest and youngest population globally - there lies a tremendous opportunity to harness this human capital by equipping it with the right knowledge, skills, and competencies, especially in engineering and technology.

Currently, over one million seats are available for admission into engineering degree programs every year across more than 3,000 institutions approved by statutory bodies like AICTE, UGC, and the Ministry of Education. However, a persistent concern within this ecosystem is the wide disparity in the quality and competence of engineering graduates. While a small percentage of students emerge as highly capable and industry-ready, a large majority often lack the essential technical skills, professional preparedness, and innovation capacity necessary for meaningful contribution to national projects and industrial growth.

A core reason behind this uneven quality of graduates is the variation in the standard of engineering education delivered, particularly in Tier 3 and 4 institutions. Many of these colleges face infrastructural constraints, limited access to contemporary resources, and significant challenges in attracting and retaining highly qualified faculty. It is well recognized that the quality of an educational system is deeply influenced by the quality of its teachers. Enhancing the teaching capabilities of engineering faculty, especially those in foundational and core subjects, is therefore essential to uplifting the overall standard of engineering education in the country.

In this context, the Indian National Academy of Engineering (INAE) — India's premier engineering body comprising nearly 1000 Fellows from academia, industry, and R&D organizations — identified a critical opportunity to intervene by upskilling and mentoring engineering faculty. Recognizing the need for corporate participation in nation-building, INAE registered under CSR (Corporate Social Responsibility) provisions, enabling it to collaborate with the private sector for programs promoting engineering education excellence.

Following extensive discussions and advocacy a proposal to collaborate under CSR provisions was presented to the Founder of Infosys. The proposal received an encouraging response, and the Infosys Foundation, the philanthropic arm of Infosys Ltd., agreed to partner with INAE to support strategic educational initiatives.

Indian National Academy of Engineering (INAE) and Infosys Foundation have signed a four-year Memorandum of Understanding (MoU) to transform engineering education in India. Backed by an investment of over INR 38 crore from Infosys Foundation under CSR funds, the initiative named **Centre for Engineering Education Excellence** in collaboration with prestigious engineering education institutions will focus on upskilling educators and promoting project-based learning for students. Leaders from both organizations emphasized the initiative's potential to refresh teaching methodologies, and prepare a future-ready engineering workforce in India. The formal press release was released on 19th December 2024 and link for the same is:

https://www.infosys.com/newsroom/press-releases/2024/collaborate-transform-engineering-education-india.html

The program focuses on faculty engaged in teaching core, fundamental courses during the second, third, and fourth semesters — a critical stage where students acquire essential engineering concepts. The five domains covered under the initiative include:

- Computer Science and Information Technology (including Data Science and AI/ML)
- Electrical, Electronics, and Instrumentation Engineering
- Mechanical, Aerospace, and Energy Engineering
- Materials, Chemical, and Biomedical Engineering
- Civil and Environmental Engineering

For each domain, five strategically selected core subjects have been identified. The faculty selected for this program (mentees) will undergo a combination of intensive physical mentorship and virtual training

annually. The physical mentorship will be a two-week program conducted during the summer months (May-July), followed by a two to three-week virtual mentorship program till December.

The mentorship pool comprises INAE Fellows, domain experts, Young Associates, and experienced faculty members from reputed Tier 1 engineering institutions across five geographic regions: North, East, Central, West, and South. Each region will be coordinated by a designated **Centre Coordinator**, responsible for overseeing the mentorship activities and ensuring consistency and quality in content delivery. These mentors will work closely with faculty from Tier 3 and 4 institutions to impart contemporary knowledge, introduce modern teaching aids and assessment practices, and share case studies, practical demonstrations, and new-age learning resources.

A comprehensive governance framework has been established to ensure effective management and execution of the program. The INAE Governing Council will exercise strategic oversight through an Advisory Committee, including industry experts, and a Board of Management, with representation from INAE, AICTE, Infosys Foundation, and other stakeholders. Additionally, a Selection and Evaluation Committee will supervise the identification of mentors and mentees, monitor program progress, and review outcomes. Operational execution will be managed by a dedicated Project Management Team.

The financial structure of the program ensures competitive honorariums for mentors and stipends for mentees to support their participation. Mentors will receive ₹1,76,000 for each mentorship cycle, covering honorariums for physical and virtual sessions and travel allowances. Mentees will be provided upto ₹50,000 during the complete mentorship, including travel, accommodation, food and related expenses.

Program Highlights

1. Signing of MoA between AICTE and INAE – 28th April 2025.
2. Signing of MoUs between INAE and IIT Kharagpur, Madras, Bombay, Kanpur and Delhi completed.
3. The registration of applicants commenced on 29th April 2025.
4. Inaugural Program was held on 5th June 2025 at IITD with Mr NR Narayana Murthy, FNAE as the Chief Guest.
5. As the CEEE program was formally announced by signing of MoA between AICTE and INAE on 28th April 2025 with the following broad structure:
   (i) 2 weeks of physical mentoring in summer (between 15th May-15th July).
   (ii) 2-3 weeks of online mentoring by 31st December 2025.
6. The course has been planned to be conducted at five centres as under:
   - East Zone (IIT Kharagpur)
   - South Zone (IIT Madras)
   - West Zone (IIT Bombay)
   - Central Zone (IIT Kanpur)
   - North Zone (IIT Delhi)
7. The course is being conducted in following Domains in each centre with each having 5 subjects of semester 2 to 5 of undergraduate course:
   (i) Computer Science and Information Technology (including Data Science and AI/ML),
   (ii) Electrical, Electronics, and Instrumentation,
   (iii) Mechanical, Aerospace, and Energy,
   (iv) Materials, Chemical, and Biomedical Engineering
   (v) Civil and Environment Engineering
8. Each centre has 1* Centre Coordinators (total 5), 5* Domain Coordinator for each Domain (total 25) and 25* Mentor for each subject (total 125).
9. The Mentee per domain has been fixed to 250 overall (total 1250).

Glimpses of Important landmarks of CEEE Program

CEEE Signing of MoA with AICTE: 28th April 2025

Signing of MoA
for
Centre for Engineering Education Excellence (CEEE) Program
for Engineering Teachers
between

All India Council for Technical Education (AICTE)
&
Indian National Academy of Engineering (INAE)

Indian National Academy of Engineering (INAE) and Infosys Foundation initiative on CEEE through Corporate Social Responsibility, in collaboration with IITs and AICTE

CEEE Inaugural Function: 5th June 2025

INAE Events

39th Foundation Day of Indian National Academy of Engineering (INAE) Celebrations on 20th April 2025 at IIT Delhi

Each year, among other calendar events, INAE celebrates its Foundation Day on 20th of April as a landmark day to rededicate itself to the professed goals with an aim to promote excellence in Engineering and Technology (E&T) in the country. The 39th INAE Foundation Day celebration was held on 20th April 2025 (Sunday) at IIT Delhi. The theme for this year's celebration was **"**Quantum Technology". Mr JD Patil, President, INAE delivered an inspiring Welcome Address wherein he highlighted the importance of the Foundation Day celebrations of INAE and summarized the technical events held on this occasion in the past few years. Dr. L. Venkata Subramaniam, Head, IBM Quantum India and Prof. Susmita Sur-Kolay, FNAE, Visiting Professor, Dept of Computer Science, Ashoka University and former Professor (HAG), Advanced Computing and Microelectronics Unit, Indian Statistical Institute Kolkata eminent expert in the chosen field delivered technical talks on "Quantum Decade: India's" and "Design Automation for Quantum Computing Systems" respectively. Prof. Abhay Karandikar, Secretary, Department of Science and Technology, Government of India graced the occasion as the Chief Guest and delivered an enlightening Key-Note Address. INAE released the Inaugural issue of INAE TechFrontier, launched on April 20, 2025, during INAE's 39th Foundation Day celebrations at IIT Delhi and this quarterly e-magazine is envisioned as a platform to showcase the technological accomplishments of newly elected Fellows, Young Associates, and Members. The event was attended by over 150 delegates from the Fellowship and other invitees from IIT Delhi and other engineering institutions, Government Departments and Organizations.

The video recording of the proceedings of the event may be viewed at the link
https://www.youtube.com/watch?v=oxFothBpSBc

Glimpses of INAE Foundation Day Celebrations 2025

Mr JD Patil, President, INAE Delivering Welcome Address Felicitation of Dr Abhay Karandikar, Secretary ,DST


Felicitation of Prof Susmita Sur-Kolay and Dr L Subramaniam by Mr JD Patil, President, INAE

Backdrop of the Foundation Day 2025 Celebrations at IIT Delhi

Inaugural Function: Centre for Engineering Education Excellence (CEEE) -5th June 2025 (Thursday) at IIT Delhi

The Inaugural Function of the CEEE (Centre for Engineering Education Excellence) Program was held on 5th June 2025 at IIT Delhi. CEEE is an historic initiative of INAE and Infosys Foundation targeted towards enhancing the quality of Engineering Education in India in association with All India Council for Technical Education AICTE and top five Indian Institutes of Technology (IITs). This program is being fully funded by Infosys Foundation through CSR funding and being executed by Indian National Academy of Engineering (INAE) across India divided in five Zones with support of IITs, Kharagpur (East Zone); Bombay (West Zone), Madras (South Zone); Kanpur (Central Zone) and Delhi (North Zone), It is targeted at mentoring of faculty members in Tier III/IV AICTE accredited engineering colleges and institutions. Mr. NR Narayana Murthy, Founder, Infosys and an eminent Fellow of the Indian National Academy of Engineering (INAE) was the Chief Guest for the function. A short film on the CEEE program, highlighting its objectives, vision, and the exciting journey ahead was featured during the function along with an enthralling Technical Talk on a very pertinent topic "Some Thoughts on Purposeful College Education" by Prof Surendra Prasad, *FNAE*, Former Director, IIT Delhi. The function was also graced by Mr JD Patil, President, INAE and Former Whole Time Director – Defence & Smart Technologies, Larsen & Toubro Limited; Prof Indranil Manna, Immediate former President, INAE and National Coordinator, CEEE Program; Prof (Dr) TG Sitharam, *FNAE*, Chairman, AICTE; Prof Rangan Banerjee, *FNAE*, Director, IIT Delhi, Prof Santanu Chaudhury, Vice-President, INAE and Ms Manisha Saboo, Vice President, Infosys, Head, Infosys Foundation each of whom delivered an enlightening address during the event.

Chief Guest -Mr NR Narayana Murthy, FNAE, Founder, Infosys Lighting the Lamp

Dignitaries on Dais: Left to Right: Prof Surendra Prasad, FNAE, former Director IIT Delhi; Prof Rangan Banerjee, FNAE, Director, IIT Delhi; Mr JD Patil, FNAE, President, INAE and Former Whole Time Director – Defence & Smart Technologies, Larsen & Toubro Limited; Chief Guest - Mr NR Narayana Murthy, FNAE, Founder, Infosys; Prof Indranil Manna, FNAE, former President, INAE and Vice-Chancellor of the Birla Institute of Technology, Mesra; Prof (Dr) TG Sitharam, Chairman, AICTE and Prof Santanu Chaudhury,Vice-President, INAE

Introduction to CEEE Program by Prof Indranil Manna, FNAE, former President, INAE and National Coordinator, CEEE Program

Prof Indranil Manna, FNAE, former President, INAE and National Coordinator, CEEE Program in his address shared his thoughts on the genesis of the CEEE program and its realization. He highlighted that the journey of engineering began with innovations for betterment of the lives of mankind. Engineering is all about finding solutions to societal challenges and human aspirations. He mentioned that India is not only a large country with diversity, but happens to be the most populated and youngest country in the world today. In the early 18th Century India was known for its wealth as well as wisdom and is striving to be a developed Nation –a *Viksit Bharat* by 2047 and many of the issues being faced today are of engineering origin which is the translation of fundamental knowledge into applications. Engineering solutions are also never unique and evolves with time. In present times technology covers every facet of our lives. Even entertainment, sporting activities, medical treatment and warfare etc are designed based on latest technological interventions. Engineering education has also changed with adoption of digital platforms and interventions. Many of the challenges require to be addressed and INAE felt it should play a role in this juncture. In recent times, INAE was also faced with different challenges and this gave an impetus to address the entire gamut of engineering by devising a program to train the trainers. It is targeted to bring 4000 engineering teachers under the gamut of this program to change the culture of engineering education in the country, so as to bring them to a level to inspire the next generation of engineering professionals. It was planned that the mentees from lesser endowed engineering colleges and institutions shall be mentored by teachers from top engineering institutions to make this a harbinger of change and transformation. On behalf of CEEE, he expressed his deep appreciation and gratitude to Mr NR Narayana Murthy, Founder, Infosys and to the leadership of Infosys - Mr Salil Parekh, Chairman of Infosys Foundation and his colleagues especially Ms Manisha Saboo, Vice President, Infosys, Head, Infosys Foundation; Prof (Dr) TG Sitharam, Chairman AICTE and the Directors of the five oldest IITs at Kharagpur, Mumbai, Bombay, Kanpur and Delhi for their support in realizing of this program.

Mr JD Patil, FNAE, President, INAE and Former Whole Time Director – Defence & Smart Technologies, Larsen & Toubro Limited delivering Presidential Address

Mr JD Patil, President, INAE in the Presidential Address highlighted some of INAE's contributions to enhance the quality of engineering education in the country and spoke regarding the erstwhile joint schemes with AICTE especially the Distinguished Visiting Professors scheme, Travel Grant scheme and Teachers Research Fellowship scheme and mentioned that efforts to revive some of these schemes now that INAE is on the way to financial autonomy. He further spoke that INAE is a member of International Council of Academies of Engineering and Technological Sciences (CAETS); a premier non-governmental international organization comprising of 33 Member academies contributing to the advancement of science & technology and sustainable economic growth and participates in the Annual meetings. He brought out Prof Indranil Manna, former President, INAE is Chair of the CAETS Engineering Education Working Group working on revision of curriculum and the contributions made by INAE in this regard are well appreciated. He briefed regarding some of the flagship events of INAE viz the Engineers Conclave, National Frontiers of engineering symposium and Annual Convention all of which bring a large number of engineers together and have deep impact. This year, it is also planned to conduct a Technology Conclave which shall be a platform for Members and Fellows to come together and debate on a specific theme. INAE is an organization dedicated to the cause of engineering and he had no words to express his gratitude to Infosys Foundation and to Mr Natrayana Murthy himself and the entire staff of Infosys Foundation to stand behind INAE at this time, and create a historic initiative which shall make an enormous start, beginning from the first batch and shall hopefully become a spiralling movement to go forward in making India as a *Viksit Bharat*.

Chief Guest, Mr NR Narayana Murthy, Founder, Infosys delivering Distinguished Address

The Chief Guest -Mr NR Narayana Murthy, *FNAE* delivered a thought provoking address on "The Importance of Quality in Engineering Education and Research for India" which covered pertinent issues to enhance the quality of engineering education in the country. He highlighted that the CEEE initiative organized by the premier educational institutions like the Indian Institutes of Technology, is about learning the best from everybody in the globe to become #1 in STEM areas in the world. It is not just a training program. It is a national mission. It is a step towards transforming how engineering is taught, learned, used, improved and lived in institutions across the country that serve as the backbone of India's higher education landscape. He remarked that we are in the era of the Fourth Industrial Revolution - a time of rapid change driven by AI, IOT, quantum computing, and biotechnology and therefore engineers must be future-ready, equipped not just with technical knowledge, but also with adaptability and lifelong learning habits. Engineering education must evolve to include emerging technologies, sustainability, and social impact. Through this initiative, IITs will provide their expertise to uplift institutions across the country by building bridges of knowledge, mentorship, and collaboration. He was pleased to note that this program is more than just a faculty development initiative. It is a nation-building exercise. IITs have set the stage, but the true change will have to come from the mentees when they return to their institutions not only with new skills, but with a renewed purpose. The address was well received and enthused the august gathering. The function was also attended by about 400 participants in person and 500 online through live streaming on YouTube who are distinguished Fellows of INAE; invitees; eminent faculty from IITs and other engineering colleges and institutions, faculty enrolled as mentees under the CEEE Program from across the country; research scholars and students. Positive response has been received from the mentors, mentees and all stakeholders in the program.

Indian National Academy of Engineering (INAE), established in 1987 as a Society under the Societies Registration Act 1860, is an autonomous Professional Body and comprises India's most distinguished engineers, engineer-scientists and technologists from academia, industry, R&D, and strategic sectors covering the entire spectrum of engineering disciplines. INAE has played a vital role in engineering policy-making, launching initiatives, promoting engineering education, forecasting technologies, and mentoring the engineering ecosystem. INAE recognized that though over 1 million students enter engineering colleges every year across more than 3000 institutions, yet, many engineering colleges & institutions, which are lesser endowed need to be enhanced, to keep pace with evolving global standards and modern pedagogy and mentorship. INAE therefore took cognizance of the need to bring world-

class opportunities to Indian engineering educators and envisioned a structured mentorship program, designed to transform teaching and learning in core engineering domains. Towards this, INAE reached out to Infosys Foundation—a name synonymous with nation-building through education and social impact to launch the Centre for Engineering Education Excellence (CEEE) program for Engineering Teachers through Corporate Social Responsibility (CSR) for which an MoU was signed between Infosys Foundation and INAE on December 16, 2024 and the program has since commenced.

The CEEE program aligns with India's vision of *Viksit Bharat* 2047 by enhancing the pedagogical skills of faculty teaching fundamental engineering subjects and promoting modern teaching practices, resource development and active mentoring at the first stage by INAE Fellows and eminent faculty of IITs viz IIT Kharagpur, IIT Bombay, IIT Madras, IIT Kanpur and IIT Delhi as Regional CEEE Centres has commenced in an efficient and planned manner. The mentoring of engineering teachers is being carried out in five major domains viz Computer Science and Information Technology; Electrical, Electronics and Instrumentation; Mechanical, Aerospace and Energy; Materials/Chemical/Biotechnology and Civil and Environment Engineering. The key highlights of the program are focused on core engineering domains; hybrid format (on-site and virtual mentoring modes) and aspiring to provide training to emerging and developing educational institutions in the first phase of three years' duration. With a strong governance framework, phased implementation, and comprehensive funding, this initiative will foster innovation in pedagogy, elevate teaching standards nationwide, and enhance the quality of engineering graduates and thereby the technological progress of India. INAE is indebted to Infosys Foundation signing an MoU and allocating CSR funds for the Program and deeply acknowledges the support of AICTE and commitment of the directors of the five IITs as Regional CEEE Centres to take this initiative forward.

Group Photograph of Dignitaries on Dais: Left to Right: Prof Surendra Prasad, FNAE, former Director IIT Delhi; Prof Rangan Banerjee, FNAE, Director, IIT Delhi; Chief Guest- Mr NR Narayana Murthy, FNAE, Founder, Infosys; Prof Indranil Manna, FNAE, former President, INAE and Vice-Chancellor of the Birla Institute of Technology, Mesra; Prof (Dr) TG Sitharam, Chairman, AICTE; Ms Manisha Saboo, Vice *President, Infosys, Head, Infosys Foundation and Prof Santanu Chaudhury, Vice-President, INAE*

Group Photographs of Dignitaries and INAE Fellows at the Inaugural Function

Local Chapter Activities and Webinar Series held during February 2025 to June 2025

The following Webinars/activities/meetings/Technical Lectures were conducted during February 2025 to June 2025 by INAE and Local Chapters.

INAE Bhubaneswar Chapter

(i) The 53rd lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Dr. Prasanta K Mishra on 10th February, 2025 on "An Ounce of Practice Values More Than Tons of Preaching".

Key Points: "The most startling advances have their origin at the boundaries of the specialties, where the techniques developed in one field are applied with fertile effect, to the subject matter of another... If this cross-fertilization dwindles, the rate of scientific advance will almost surely dwindle as well, and so anything that encourages cross-fertilization is all to the good…", said the great Philosopher, Isaac Asimov.

Bio-Data: Born in Cuttack, Orissa in 1945, Dr Prasanta Kumar Mishra schooling from P M Academy, Cuttack in 1959, joined Ravenshaw College and graduated in Mechanical Engineering (BSc Engg), 1966 batch from Regional Engineering College (presently NIT), Rourkela. He obtained his Master of Mechanical Engineering (MME) degree in Machine tools and Production Engineering discipline in 1969 and PhD in Engg (Spark-erosion) in 1974 from Jadavpur University Calcutta. His main interest lies in Advanced Manufacturing Science (Process innovation with Design and Prototype Machine Development), including developing new hybrid manufacturing processes and propagate the knowledge of microsystems) technology to manufacture value-aided products that changes the economy in rural - sectors in India.

You Tube Video Recording Link : https://youtu.be/yEElCXUQpUs
People Participated: 52

(ii) The 54th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Prof. Susmita Sur-Kolay, Visiting Professor, Dept. of Computer Science, Ashoka University.on 18th February, 2025 on "Design Automation for Quantum Computing Systems".

Key Points: "The two major drivers for the paradigm of quantum computing have been to overcome the limitations of classical deterministic digital computers in terms of both computational complexity and fabrication technology.

In this talk, she introduced the basic model of quantum computing. Next, she gave a snapshot of algorithms for certain problems for which remarkable speed-up over classical computing has been achieved by quantum computing. Then, with a brief sketch of the progress in technology, she presented specific challenges in design automation for quantum circuits comprising a cascade of error-prone gates. While error correction is indispensable for quantum computing, classical error correction codes are not applicable. Hence, quantum error correction codes are required. However, this demands more quantum resources which are very expensive, which calls for algorithms to optimize the quantum circuits for obtaining reliable outcomes of a quantum computing system.

Bio-data: Prof. Susmita Sur-Kolay received the B.Tech.(Hons.) degree in Electronics and Electrical Communications Engineering from Indian Institute of Technology Kharagpur and the Ph.D. degree in Computer Science and Engineering from Jadavpur University India. She has been a faculty member in the Advanced Computing and Microelectronics Unit of the Indian Statistical Institute, Kolkata, India since 1999 and retired as a Professor in 2024, She is now a Visiting Professor of Computer Science at Ashoka University. During the period 1993-99, she was a Reader in the Department of Computer Science and Engineering of Jadavpur University. Prior to that, she was a postdoctoral fellow at University of Nebraska-Lincoln, and a Research Assistant at the Laboratory for Computer Science in Massachusetts Institute of Technology. She was also on sabbatical at Princeton University and Intel Corp., USA. She is presently a KIT International Excellence Fellow. Her research contributions are in the areas of algorithmic design automation for VLSI physical design, fault modeling and testing, synthesis of quantum computers, and graph algorithms. She has co-authored several technical papers in leading international journals and refereed conference proceedings, a chapter in the Handbook on Algorithms for VLSI Physical Design Automation and co-edited three books. She was the General Co-Chair of the 29th International Conference on VLSI Design (2016), the Technical Program Co-Chair of the 18th International Conference on VLSI Design (2005), the 11th Symposium on VLSI Design and Test (2007), and ISVLSI (2011) and has served on the program committees of several international conferences. She was on the editorial board of the IET Computers and Digital Techniques, and IEEE Transactions on VLSI Systems. She was a Distinguished Visitor of IEEE Computer Society (India), and is a Fellow of Indian National Science Academy and of Indian National Academy of Engineering, Senior Member of IEEE, Member of ACM, IET and VLSI Society of India. Among other awards, she was the recipient of the President of India Gold Medal (summa cum laude) and Distinguished Alumnus Award at IIT Kharagpur, IBM Faculty Award and Women in Technology Leadership from VLSI Society of India.

You Tube Video Recording Link : https://youtu.be/3DbvQkImXs0
People Participated: 55

(iii) The 55th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Prof. Sarit K. Das, Institute Professor, Indian Institute of Technology Madras, Chennai on 25th February, 2025 on **"**Revitalizing Nanofluids: Three Decades of Evolution, Challenges, and Breakthroughs in Thermal Management and Beyond*"*.

Key Points: At the beginning of the century nanofluid came with a huge promise in the arena of thermal management technologies. This included electronic cooling, cooling of laser equipment and material processing. However, some controversies regarding stability and the magnitude of property enhancement put breaks on its progress towards full potential of its usage. Nanofluids, which are dilute suspensions of nanoparticles in Newtonian liquids has got very different natures concerning stability, transport properties and dispersion dynamics. However, the above phenomena critically depend on the preparation of the nanofluid and the lack of standardization in the method of preparation is the root cause of this controversy. Of late, nanofluids have made a strong comeback proving its decisive edge over usual cooling fluids in as diverse fields such as cooling of electronics, BTMS, and even drug delivery and hyperthermia treatments in healthcare. This lecture traced the development of nanofluid over the last three decades indicating the applications in which it is making a rapid progress.

Bio-data: Professor Sarit K. Das is an Institute Professor at the Indian Institute of Technology Madras, Chennai. He is the first occupant of the V. Balakrishnan Chair Professorship and a Professor of the Mechanical Engineering Department of the Institute. He is the former Director of the Indian Institute of Technology Ropar. He is also the former Dean (Academic Research) of IIT Madras. Prof. Das studied at the Jadavpur University (BME 1984,MME 1987), NIT Rourkela (PhD 1994) and the Helmut Schmidt University of Hamburg, Germany(PDF). His research group works on various aspects of thermo fluidics like heat and mass transfer in industrial equipment such as heat exchangers and fuel cells, multiphase flow and energy conversion. The group focuses explicitly on Micro-Nano scale processes and is known to be one of the leading groups on Nanofluids in the world. Another area of focus of the group is bio-microfluidics, for medical diagnostics, the platform for drug delivery and understanding pathological states related to cardiovascular diseases and cancer. Prof. Das is a Fellow of the National Academy of Sciences (NASI), the Indian National Academy of Engineering (INAE) as well as of Alexander von Humboldt Foundation. He was a Peabody Visiting Professor at MIT, Cambridge and a visiting Professor - Lund University, Sweden. He is conferred with the prestigious India Citation Awards 2012 by Thomson Reuters. He has published more than 370 research articles and six books. He is the most cited mechanical engineer of the country. Prof. Das is a member of the editorial boards of Heat Transfer Engineering, Taylor & Francis Publishers and the former Editor in Chief of the International Journal of Micro-Nano Scale Transport. He received the Lifetime Achievement Award from IIT Madras.

You Tube Video Recording Link : https://youtu.be/pB6bInBzOpE
People Participated: 45

(iv) The 56th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Prof. Nithin George, Dean of Academic Affairs, IIT Gandhinagar on 10th March, 2025 on "Microphone Array Signal Processing and Beamforming for Hearables*"*.

Key Points: As per estimates of the World Health Organization (WHO), around 63 million people in India suffer from significant hearing disorders. The most widely used rehabilitation measure is an electronic assistive listening device. Improving speech intelligibility, especially in the presence of noise, has been challenging in hearables and other assistive listening devices. One way to improve speech intelligibility is first to estimate the direction of arrival of the sounds of interest, followed by an effective

beamforming algorithm development to enhance the speech quality. This talk dealt with design methods for microphone array systems, including developing algorithms for the direction of arrival estimation and beamforming, with particular attention on hearables.

Biodata: Prof Nithin George received his BTech in Electronics and Communication Engineering from the University of Kerala and MTech in Telematics and Signal Processing from NIT Rourkela. He was awarded a PhD in Electrical Sciences from IIT Bhubaneswar in 2012, and he was the first graduate of the Institute. He joined IIT Gandhinagar as a faculty member in Electrical Engineering in 2012. He is currently a TEOCO Chair Professor in Electrical Engineering at IIT Gandhinagar. His research interests include audio signal processing and array signal processing. He has published over 75 articles in top international journals. He received the Department of Foreign Affairs and International Trade (DFAIT), Government of Canada GSEP Fellowship in 2008, INSPIRE faculty award in 2013, Indo-Australia Early and Mid-Career Researchers Fellowship in 2017, Excellence in Institution Building Award of IIT Gandhinagar in 2018 and Excellence in Research Award of IIT Gandhinagar in 2023. He served as the Associate Dean for Postgraduate Studies at IIT Gandhinagar from 2015 to 2018, and Associate Dean for Faculty Relations from 2018 to 2022. From 2022, he is serving as the Dean of Academic Affairs at IIT Gandhinagar

You Tube Video Recording Link https://youtu.be/y_z-6Io3O5E
People Participated: 43

(v) The 57th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Prof. Lipika Dey, Professor, Computer Science, Ashoka University, on 24th March, 2025 on "Agentic Problem Solving: Intelligent Agents for Adaptive and Autonomous Decision-Making".

Key Points: Agentic AI represents the next frontier in artificial intelligence, where systems are designed to perceive, reason, and act autonomously in dynamic environments. This talk explored the core principles of agentic AI, including intelligent perception, autonomous reasoning, and adaptive execution. Key architectures, problem-solving strategies, and a few real-world applications were discussed.

Speaker Bio: Dr Lipika Dey is a Professor of Computer Science at Ashoka University. Prior to joining Ashoka University, she was a Chief Scientist at Tata Consultancy Services (TCS), Research, where she was heading research in the themes of Economic and Financial Intelligence and Real Time Context Aware Enterprises. She was earlier a member of faculty at the Department of Mathematics, Indian Institute of Technology, Delhi. She was elected to the Fellowship of Indian National Academy of Engineering in 2021. She was also awarded the Distinguished Scientist award by TCS in 2012. She has served as Program Committee member for several conferences like AAAI, KDD etc.

Dr Lipika Dey has a PhD in Computer Science and Engineering from IIT Kharagpur, where she had also done her graduation and post-graduation in Mathematics and Computer Science. She has been an active member of Association for Computing Machinery (ACM) for more than a decade. Beside serving the committee for ACM(W) in India, she also mentors young researchers and faculty in the area of Computer Science, under the aegis of ACM India. She is currently serving as an Eminent Speaker

You Tube Video Recording Link https://youtu.be/HkirMQQXPQ8
People Participated: 34

(vi) The 58th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Dr. Jhillu Singh Yadav, Vice Chancellor, Director and Trustee, Indrashil University, on 18th April, 2025 on "Chemistry for Sustainable Development: Harnessing Practical Solution".

Key Points: Chemistry plays a vital role in addressing global challenges, from climate change to resource depletion. This presentation explored the contributions of chemistry to sustainable development, highlighting innovative solutions in green synthesis, and eco-friendly agriculture. By leveraging chemical principles and technologies, we can create a more sustainable future, reducing environmental impact while promoting economic growth and social well-being

The following two topics were discussed:
A. Pheromone application technology in sustainable agriculture is a fascinating field. Pheromones are chemical signals that insects use to communicate with each other. In agriculture, synthetic pheromones can be used to manipulate insect behaviour, reducing pest populations and promoting sustainable practices.

Application: 1. Mating disruption: Synthetic pheromones can disrupt insect mating, reducing populations and damage. 2. Trapping and monitoring: Pheromone-baited traps can monitor pest populations, enabling targeted control measures. 3. Push-pull strategies Pheromones can repel pests from crops while attracting them to trap crops.

Benefits: 1. Reduced chemical use: Pheromones offer a targeted, environmentally friendly alternative to broad-spectrum pesticides. 2. Increased crop yields: Effective pest management leads to healthier crops and improved yields. 3. Sustainable agriculture: Pheromone technology supports Integrated Pest Management (IPM) practices, promoting ecosystem balance. New pheromone development*: Research focuses on identifying and synthesizing pheromones for various pest species and Integrating pheromone technology with precision agriculture tools for more targeted applications.

B. Enzymatic degumming of rice bran oil. It is a process that uses enzymes to remove impurities, specifically phospholipids, from the oil. This method offers several benefits like Improved oil quality and stability, Reduced processing costs, environmentally friendly alternative to chemical refining and Potential for increased yields Enzymes like phospholipase A1 or A2 are commonly used for degumming.

You Tube Video Recording Link : https://youtu.be/aCYy2dxwHas
People Participated: 48

(vii) The 59th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Prof. Aniruddha B. Pandit, Institute of Chemical Technology, Mumbai on 25th April, 2025 on "Environmental Management: Way to the Era of Sustainability".

Key Points: "Sustainable Development is a dynamic process which enables all people to realise their potential and improve their quality of life in ways which simultaneously protect and enhance the Earth's life support systems". This contributed to understand that sustainable development encompasses a number of areas and highlights sustainability as the idea of environmental, economic and social progress and equity, all within the limits of the world`s natural resources. Environmental management and sustainable development are two intertwined concepts related to methods of meeting human needs without damaging the environment. Environmental management focuses on maintaining natural resources such as biomass, water and open land without diminishing or destroying them. Sustainable development seeks to meet human needs without depleting resources. There is a growing concern about

how to minimize the impact of human activities on the environment. Due to climate changes, and corresponding environmental and social changes, there is a great need for a more sustainable development of mankind. Over the years, research studies that analysed the sustainable development of different communities with a multi-disciplinary approach, stressed the necessity of preserving the environment for next generations. Therefore, responsible and conscientious management of the environment is a pillar of the sustainable development concept. Environmental management is a broad and rapidly evolving discipline

This talk provided overview of the nature, scope and role of environmental management, with a strong focus on sustainable development. It also explores World`s Water, Demand vs Population, Water Footprint, Approaches for Water Management, Recent Development in Wastewater treatment, Biomass: Biorefinery Concept, Solid waste management (MSW and Keratin waste), Agroforestry Model. It will also cover some of the initiatives of Ministry of Environment, Forest and climate change (MoEFCC), Government of India.

Keywords: Environment management, Sustainable Development, Wastewater treatment, Biorefinery, Solid waste management.

You Tube Video Recording Link : https://youtu.be/mY2b4izgoAU
People Participated: 51

(viii) The 60th lecture of the INAE Distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section and delivered by Dr. J. B. Joshi, **Chancellor**, Institute of Chemical Technology**,** Matunga, Mumbai on 5th May, 2025 **on** "Prosperity Through Science and Technology & Climate Change: Clean Energy Transition & Relevance of Nuclear Power".

Key Points: The wellbeing of any society strongly depends upon the Gross Domestic Product (GDP). On this basis, India stands 140th among 152 nations of the World. The wellbeing is crucial even for cultural development and also correlated with per capita availability of energy, water, food, nutrition and healthcare. If we examine the history of developed nations, the prosperity almost entirely hinges on science, technology and innovations. These innovations are motivated by the problems faced by the nation and market opportunities outside the nation. Most of these innovations have happened in academic institutions. India provides enormous number of opportunities. Some of the success stories will be presented. The possibility of having prosperity through science and technology will be elaborated. The importance of "Scientific Temper" and "Social Entrepreneurship" will be explained.

This lecture aimed to inform policymakers, technologists, scientists, and engineers, as well as the general public and students, about the climate, its dramatic changes in recent years and future projections that threaten the survivability of habitats on the planet where we all live. Explanations were provided for the causes of climate change, their implications and hence the changes in energy policy requirements. This lecture also discussed the current energy scenario and greenhouse gas emissions, the energy transition to clean and green sources, international pledges and commitments, the energy transition in different sectors such as domestic, industry, mining, infrastructure, transportation, etc., the future clean energy requirements relative to the energy potential of various sources, and the challenges for clean energy transition. Due importance was given to the need for nuclear energy, including its reserves, potential, and application in meeting the demand for clean energy. Special consideration and discussion were given to the situation in India, a developing country with an ambitious GDP growth rate and an expanding population.

Biodata: Dr. Jyeshtharaj Bhalchandra Joshi, Distinguished Emeritus Professor, Homi Bhabha National Institute.

You Tube Video Recording Link : https://youtu.be/SJy0mvFdGOk

People Participated: 60

National Technology Day Celebrations

To commemorate the National Technology Day Celebrations, the following four distinguished lectures were delivered between 17th May to 23rd May 2025 by eminent speakers from INAE Fellowship These lectures were held in hybrid mode.

1. 17th May 2025 (Saturday) from 1530 hrs. to 1730 hrs. – Lecture by Prof. AK Tyagi, FNAE, Dean and Senior Professor, Homi Bhabha National Institute, Mumbai; Former Director, Chemistry Group & Bio-Science Group, BARC on "Sustainable Development: Role of Nuclear Science and Technology."
   Venue: SOA University, Bhubaneswar.

Prof. Dr. A. K. Tyagi,
Dean and Senior Professor, Homi Bhabha National Institute

Prof. Damodar Acharya
Chairman, INAE Bhubaneswar Chapter

Prof. Dr. A. K. Tyagi

Prof. Damodar Acharya

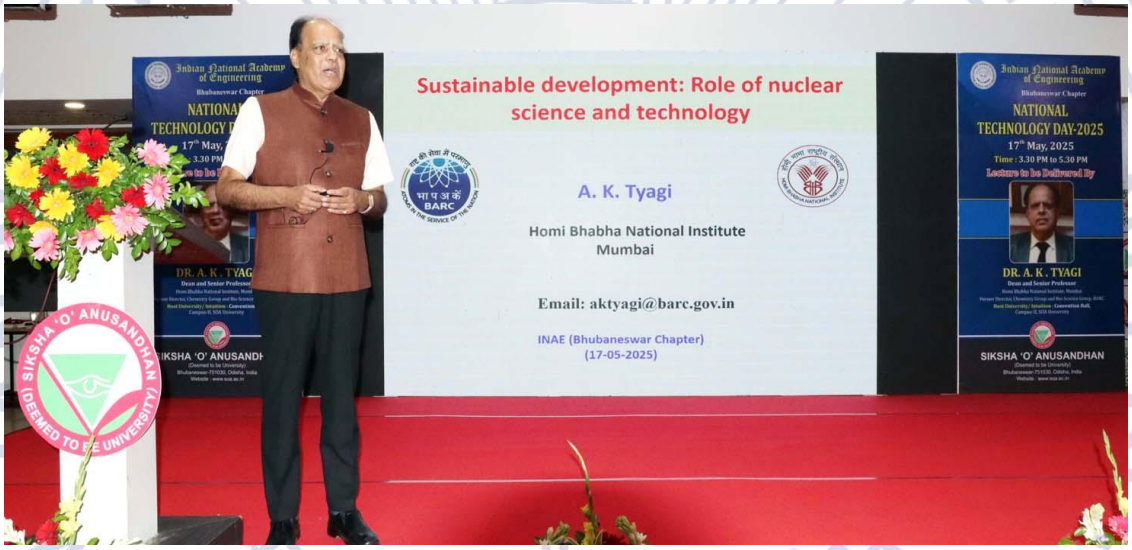
Prof. P.K. Nanda, Vice Chancellor, SOA University

Prof. Subhransu Ranjan Samantaray
IIT Bhubaneswar

Prof. Kulamani Parida
SOA University

Prof. Renu Sharma,
SOA University

National Technology Day-2025, Invited Guests at SOA University, Bhubaneswar



Vote of Thanks by Prof. Renu Sharma, SOA University

2. 19th May 2025 (Monday) from 1530 hrs. to 1730 hrs. – Lecture by Dr. Kota Harinarayana, FNAE, Chairman, BOG, IIT (BHU); Former Vice-Chancellor, University of Hyderabad; Former Project Director and Chief Designer, Light Combat Aircraft on "Application of AI in Aircraft Design".

Venue: IMMT Bhubaneswar

Dr. Kota Harinarayana, Chairman, BOG IIT (BHU)-Lighting the Lamp

Dr Ramanuj Narayan,Director , CSIR-IMMT, Bhubaneswar- Lighting the Lamp

Prof. Damodar Acharya, Chairman, INAE Bhubaneswar Chapter honouring Dr. Kota Harinarayana

National Technology Day-2025, Invited Guests at CSIR-IMMT, Bhubaneswar

3. 21st May 2025 (Wednesday) from 1530 hrs. to 1730 hrs. – Lecture by Dr. V Narayanan, FNAE, Chairman, Space Commission, Secretary, Dept of Space & Chairman, ISRO, Bangalore on "Indian Space Program - Pride of the Nation".

   Venue: NISER, Bhubaneswar

Dr. V. Narayanan, Chairman, Indian Space Research Organisation (ISRO)

Prof. Damodar Acharya. Chairman, INAE Bhubaneswar Chapter

Prof. Hirendra Nath Ghosh, Director, NISER, Bhubaneswar honouring Prof. Damodar Acharya

Prof. Hirendra Nath Ghosh, Director, NISER, Bhubaneswar honouring Prof. Sunil Kumar Sarangi

Prof. Hirendra Nath Ghosh, Director, NISER, Bhubaneswar honouring Prof. Subhransu Ranjan Samantaray

National Technology Day-2025, Invited Guests at NISER, Bhubaneswar

Honouring Dr. V. Narayanan, Chairman, Indian Space Research Organisation (ISRO)

Dr. V. Narayanan
Chairman, Indian Space Research Organisation (ISRO)

Prof. Damodar Acharya
Chairman, INAE Bhubaneswar Chapter

4. 23rd May 2025 (Friday) from 1530 hrs. to 1730 hrs. – Lecture by Dr. Binay Kumar Das, FNAE, Director-General, Electronics & Communication System, DRDO, Ministry of Defence, Govt. of India on Futuristic Defence Technologies: Can India Become World Leader?
Venue: IIT Bhubaneswar

Dr. Binay Kumar Das, Director General Electronics and Communication System DRDO, Ministry of Defence, Govt. of India Lighting the Lamp

Prof. Damodar Acharya
Chairman, INAE Bhubaneswar Chapter
Lighting the Lamp

Invited Guests and Audience at IIT Bhubaneswar

Dr. Binay Kumar Das
Director General Electronics and Communication System DRDO, Ministry of Defence, Govt. of India

Prof. Damodar Acharya
Chairman, INAE Bhubaneswar Chapter

Prof. Shreepad Karmalkar,
Director, IIT Bhubaneswar

Prof. Radhakanta Padhi
Indian Institute of Science, Bangalore

Prof. D. Acharya, Chairman, INAE Bhubaneswar Chapter honouring Dr. Binay Kumar Das Director General Electronics and Communication System DRDO, Ministry of Defence, Govt. of India

National Technology Day-2025 Celebrated at IIT Bhubaneswar, Odisha

INAE Delhi Chapter

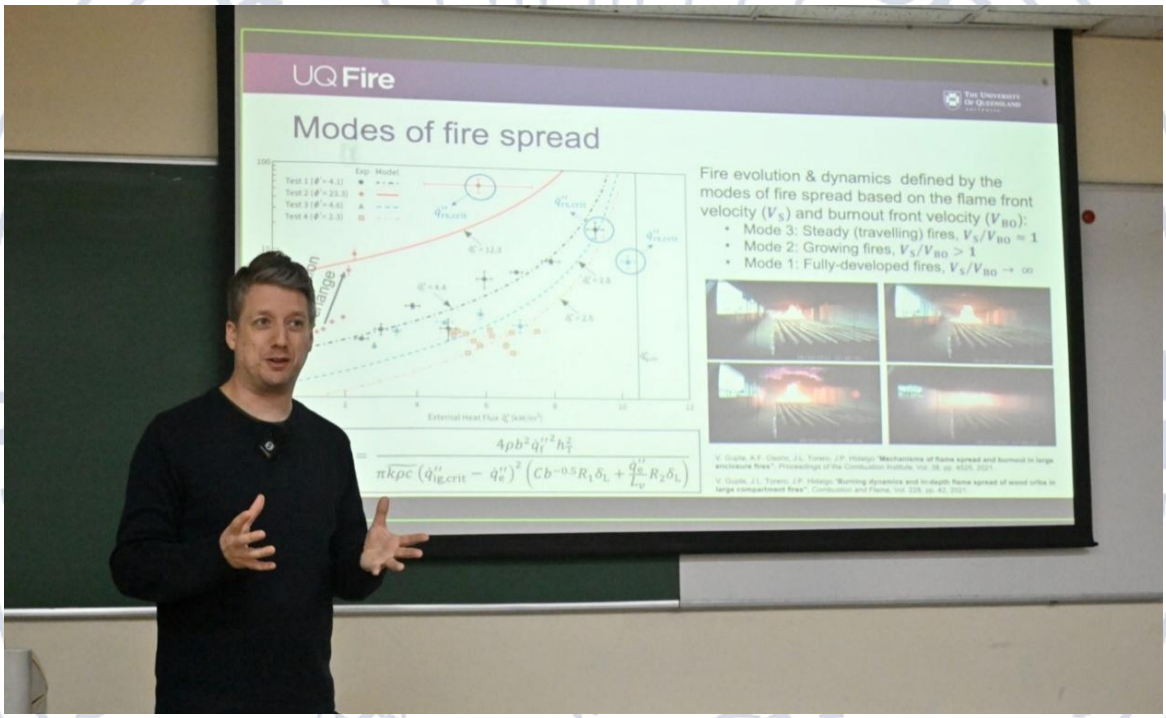
(i) Seminar on "Holistic Fire Safety in Built Infrastructure" by Dr David Lange, Associate Professor in Structural and Fire Safety Engineering at The University of Queensland (UQ) on 14th February 2025

The Department of Civil Engineering, IIT Delhi, in collaboration with the Indian National Academy of Engineering (INAE) and the UQ-IITD Research Academy (UQIDRA), recently hosted a highly insightful seminar on "Holistic Fire Safety in Built Infrastructure". The session was held on 14th February 2025, featuring Dr David Lange, Associate Professor in Structural and Fire Safety Engineering at The University of Queensland (UQ).

Dr Lange, a leading expert in fire safety and structural engineering, shared valuable insights on the evolving role of fire safety in modern built environments. Drawing from ongoing research and projects at UQIDRA, he highlighted the importance of adopting a holistic fire safety strategy in today's infrastructure. Topics discussed included advancements in structural fire engineering, timber fire safety, façade fire safety, and the integration of these elements into comprehensive fire safety strategies for buildings.

The seminar provided an in-depth exploration of how fire safety engineering has evolved and the need for more advanced, adaptable approaches given the increasing complexity of buildings. Dr Lange's extensive research contributions have had a significant impact on fire safety standards in Australia, and his expertise offered a fresh perspective on fire safety practices worldwide.

Group Photograph during seminar at IIT Delhi



Dr David Lange delivering talk

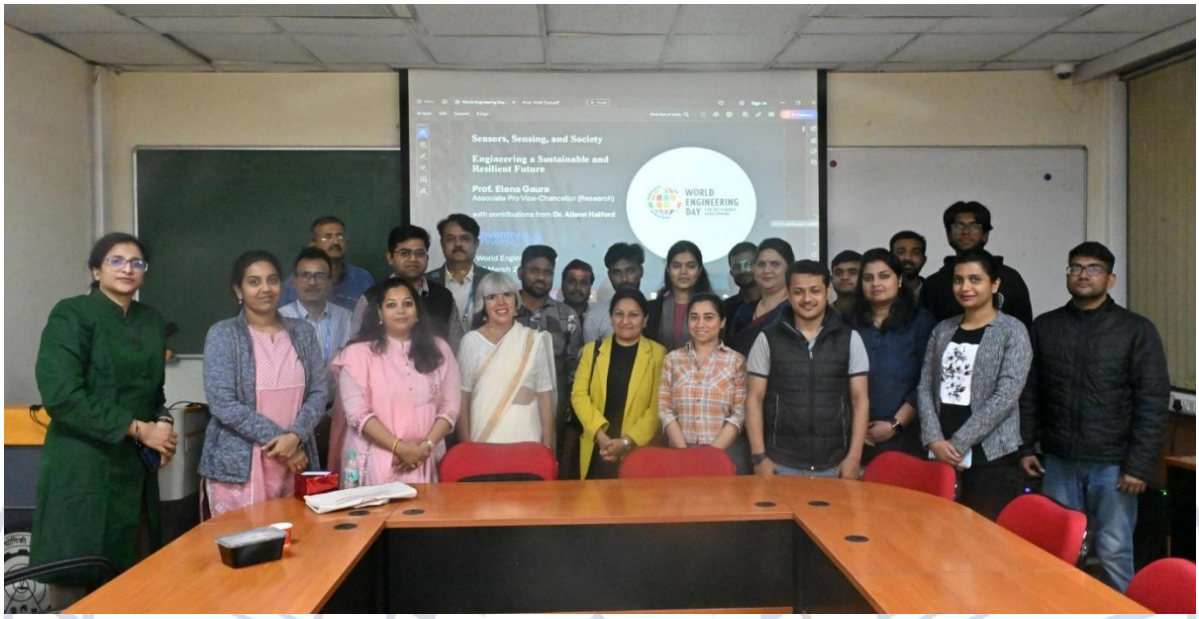
(ii) Talk on "Tomorrow's Engineering Challenges" by Professor Elena Gaura, Professor of Pervasive Computing, FWES, Associate Pro-Vice Chancellor Research from Coventry University, UK, 3rd March 2025

On 3rd March 2025, the Delhi Chapter of the Indian National Academy of Engineering (INAE) and the Department of Civil Engineering at IIT Delhi hosted a thought-provoking hybrid talk by Professor Elena gaura, a leading expert in pervasive computing and Associate Pro-Vice-Chancellor for Research at Coventry University, UK.

The session explored the transformative role of sensors and sensing technologies in driving a sustainable, resilient, and equitable future. Professor Elena delved into critical areas like:

(1) Environmental Sensing & Net Zero Goals
(2) Human-Centric Sensing for Health & Well-being
(3) Sensing for Digital & Physical Infrastructure

Her insights highlighted how these technologies are shaping engineering research, while also raising important discussions about data ethics, accessibility, and security. The talk emphasized the need for a multidisciplinary, collaborative approach that integrates computing, materials science, and social sciences to create responsible and impactful engineering solutions.



Group Photograph of Participants

Prof Elena Gaura addressing the audience

iii. Seminar on "Utilisation of Airborne Sensor Systems for Localisation of Trapped Victims in Disaster Management", wherein lecture delivered by Professor Dr Leonhard Reindl and Professor Dr Juergen Woellenstein from University of Freiburg in Germany on 24th March 2025

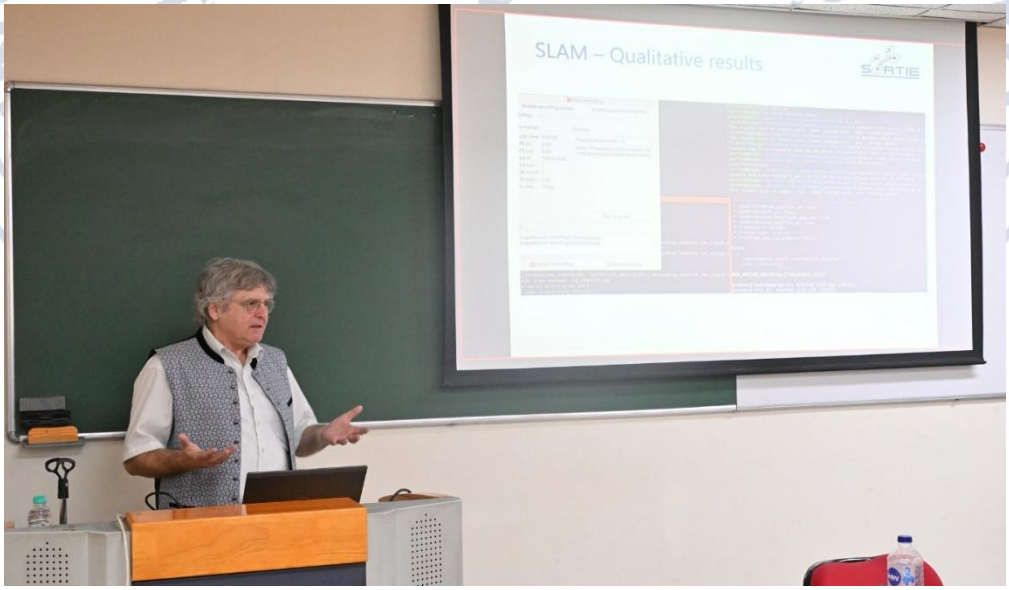
The Delhi Chapter of the Indian National Academy of Engineering (INAE) and the Department of Civil Engineering, IIT Delhi successfully hosted a seminar on "Utilisation of Airborne Sensor Systems for Localisation of Trapped Victims in Disaster Management" on 24th March 2025. Renowned experts Professor Dr Leonhard Reindl and Professor Dr Juergen Woellenstein from the University of Freiburg,

Germany shared their groundbreaking research on technologies designed to enhance rescue operations in disaster-stricken areas. Professor Reindl, Director of the Centre for Renewable Energy, and Professor Woellenstein, Head of the Gas Sensors Department, explored innovative systems such as wireless sensor networks, surface acoustic wave devices, and microwave communication technologies. These advancements are critical in improving the safety and efficiency of rescue teams, particularly in scenarios involving building collapses and infrastructure failures.

The seminar emphasized the importance of these technologies for countries like India, which are highly susceptible to natural disasters, particularly earthquakes. By minimising risks to rescue teams and improving victim localization, these innovations promise significant contributions to disaster management. The event was organized and moderated by Professor Vasant Matsagar, *FNAE*, and was attended both in-person and virtually via online streaming. This seminar provided invaluable insights into the future of disaster response, highlighting the need for global collaboration in advancing life-saving technologies.

Visual Delight of Proceedings of the Seminar

Group Photograph of Participants of the Seminar



(iv) INAE Delhi Chapter and Applied Mechanics Department at Indian Institute of Technology (IIT) Delhi jointly organized a seminar in a hybrid mode on June 20, 2025 by Dr Arun R. Srinivasa, Associate Dean for Student Success at the college of Engineering at Texas A&M University (TAMU), USA on "Breaking up is hard to do: Simulating fracture of quasi-brittle materials, viscoelastic solids and delamination of composites using GraFEA, a novel graph-based nonlocal mechanics approach".

INAE Kolkata Chapter

National Science Day Lecture 2025 organized by INAE Kolkata Chapter

With an overarching aim of promoting scientific awareness, and inspire young minds to pursue careers in science and technology, Indian National Academy of Engineering (INAE) Kolkata Chapter, in association with the Ramakrishna Mission Vivekananda Centenary College (RKMVCC, Autonomous), organized the National Science Day Lecture on March 7, 2025 at Department of Zoology of RKMVCC, Rahara, Kolkata-700118, to commemorate the Raman Effect by Prof. C.V. Raman.

The Science Day lecture was delivered by Prof. Tanya Das, ICMR Emeritus Scientist and former Dean R&D at the Bose Institute Kolkata. Prof. Sankar Kumar Pal (National Science Chair, Govt. of India; President, Indian Statistical Institute, Kolkata; Distinguished Scientist and Former Director, ISI; Founder President, INAE Kolkata Chapter) graced the occasion as the Chief Guest. From the INAE side, Prof. Malay K. Kundu (Indian Statistical Institute & Chairman, INAE Kolkata Chapter), Prof. Debatosh Guha (Institute of Radio Physics and Electronics, University of Calcutta), and Prof. Ranjan Ganguly (Jadavpur University, & Secretary, INAE Kolkata Chapter) were also present.

At the very outset, Swami Kamalasthananda, Principal Ramakrishna Mission Vivekananda Centenary College, welcomed the participants, the invited speaker and the INAE Fellows to the event. He also expressed his earnest gratitude to the distinguished speakers and guests. Prof. S.K. Pal delivered a brief, but inspiring lecture to the students with interesting anecdotes, emphasizing the strong legacy of RKMVCC in imparting quality science education. Prof. M. K. Kundu gave the audience an overview of INAE and the activities of INAE Kolkata Chapter in promoting STEM awareness.

Approximately 150 participants, including faculty, technical staff, and students from RKMVCC attended the celebration that spanned over the entire day. The program was also streamed live through a link provided at the INAE portal. From RKMVCC's side, the whole event was coordinated by Dr. Ajoy Mallik and Dr. Arunava Mukherjee.

The event's hallmark was the Science Day Lecture by Prof. Tanya Das, titled "Cancer Stem Cell: The Pivotal Piece of Cancer Puzzle." Through her talk, which lasted for a little more than an hour, she painted the grim reality of the rapid global upsurge in cancer cases, and the current challenges and shortcomings of the conventional chemotherapy followed by surgery in some special cases.

Her captivating lecture presented a new understanding of breast cancer development and relapse. Through a highly lucid, yet content-rich presentation, Prof. Das explained how her research could efficiently target breast cancer stem cells (*CSCs*), making the drug resistant cells insensitive to chemotherapy. The talk explained how the study by her group not only identified CSCs as the 'pivotal piece' – missing which deciphering the 'cancer puzzle' can never be successful, but also offered a combinatorial treatment strategy with conventional chemotherapeutics for improving recurrence-free survival of breast cancer patients.

In the Q&A session, students and the other participants, including the INAE fellows engaged in a thoughtful discussions and brainstorming. The speaker appreciated the highly intelligent and significant questions posed by the students as she shared her valuable insights on a roadmap for a panacea to this deadly disease.

The program concluded with a Vote of Thanks delivered by Prof. Ranjan Ganguly on behalf of INAE Kolkata Chapter. The speakers and the INAE fellows engaged in informal discussion with the students, faculty and the Principal of RKMVCC after the program while the INAE team was given a tour of the small, yet beautiful campus at the end of the program. Overall, the program was highly appreciated by the students, the INAE Fellows and the speakers.

Glimpses of the National Science Day Lecture held on March 7, 2025 at Ramakrishna Mission Vivekananda Centenary College, Rahara.

Inaugural session -Inaugural speech by Prof SK Pal Address by Prof Malay K. Kundu

Science day lecture by Prof. Tanya Das *Felicitation of the speaker*

Post-lecture interaction at the office of the Principal followed by a campus tour

INAE Mumbai Chapter

Annual General Body Meeting (AGBM) of INAE Mumbai Chapter was held in hybrid mode on 29th March 2025 at Training School Hostel, Anushaktinagar, BARC. The agenda was as follows:

1. A talk on 'Navigating the complexities of the nuclear regime' by Dr. R.B. Grover, Member of the Atomic Energy Commission and Chairman of the Board of Research in Nuclear Sciences
2. Review of activities of the Chapter in last one year (2024-25)
3. Selection of the new Executive Committee of the Chapter for three years (2025-2028)

The following events/workshops/webinars were organized by INAE Mumbai Chapter during the period February 2025 to June 2025 as per details given below:

(i) **Two-day Workshop on "Applications of Advanced Analytical Techniques in Research & Industry" on 18-19 February 2025 organized by Centre for Sophisticated Instruments and Facilities (CSIF) IIT Bombay and INAE Mumbai Chapter**.

The Centre for Sophisticated Instruments and Facilities (CSIF), IIT Bombay, Mumbai, India in collaboration with the Indian National Academy of Engineering (INAE), Mumbai Chapter organized a workshop on "Applications of Advanced Analytical Techniques in Research & Industry" on 18-19 February 2025 under the Institute of Eminence (IOE) outreach program.

The workshop was inaugurated on February 18, 2025, in the P.C. Saxena Auditorium, IIT Bombay, by Prof. Aniruddha Bhalchandra Pandit, Vice-Chancellor, Institute of Chemical Technology, Mumbai. In his inaugural address, Prof. Pandit emphasized the importance of such workshops and recommended incorporating hands-on training to ensure a deeper and meaningful learning experience for participants. During the inaugural function, Prof. S.V. Kulkarni, Co-Chair, INAE (Mumbai Chapter) and Prof. Anindya Datta, Head CSIF-SAIF, also addressed the gathering.

The workshop focused on the applications of sophisticated analytical equipment and aimed to introduce participants to the latest advancements in instrumentation technology and their practical applications in various industries. The event was designed to explore the integration of these technologies into real-world scenarios and enhance participants' understanding of their operational and strategic benefits.

Objectives: The workshop aimed to:

- Provide an in-depth understanding of advanced analytical instruments across various sectors.
- Highlight the practical applications of these technologies in industries such as healthcare, manufacturing, agriculture, pharmaceuticals, and research.
- Foster collaboration and knowledge exchange among professionals, engineers, and industry experts.

Agenda

The workshop was structured as follows:

- **Opening Remarks**: Introduction to the topic and the significance of sophisticated equipment in modern research and industries
- **Session 1**: Overview of Time-resolved Fluorescence Spectroscopy, 2D NMR Spectroscopy.
- **Session 2**: X ray diffraction, Fundamentals & Applications of FTIR & LRIS
- **Afternoon session**: **Poster presentation** by participants from various universities, institutes, and industries showcasing their research activities.
- **Session 3**: Decoding the role of mycobacterial lipid remodelling, Mass spectrometry in Pharmaceuticals, Evolution of pesticide residue analysis methods using GCMS & LCMS.
- **Session 4**: Introduction to SAXS for structural determination, SAXS: An invaluable tool for Nanomaterials and soft matter, Applications & Advancements in analytical methods for trace and isotopic measurement using ICP-MS, Modern Techniques in Structural Biology.
- **Flash presentation:** Selected participants presented their research findings in brief, impactful sessions.
- **Closing Remarks**: Summary of key discussions and insights along with future outlook on analytical techniques

Speakers and Presenters

The workshop featured several distinguished speakers from academia, industry, and equipment manufacturers covering a range of advanced analytical techniques:

- **Dr. Harilal Bhaskar, National Co-Ordinator I-STEM, Bangalore**- Overview of ISTEM (Indian Science, Technology, and Engineering facilities Map)
- **Prof. Sameer Sapra, IIT Delhi-** Experience with SATHI (Sophisticated Analytical & Technical Help Institutes)
- **Dr. Shreeram Oak - Country Head Bruker India Scientific Pvt. Ltd-** Advances in IR Imaging Microscopy.
- **Mr. Anthony Thomas, Spectro Ametek-** Emerging Trends in Multi-Element Analysis
- **Mr. Chandrakant Pawar, Thermo Fisher Scientific India Pvt. Ltd-** Applications of Mass Spectrometry
- **Prof. Sobhan Sen, JNU, New Delhi-** Measuring Molecular Dynamics from Picoseconds to Seconds using Time-Resolved Fluorescence Spectroscopy: An Introduction
- **Prof. Suvarn S Kulkarni, Chemistry, IIT Bombay**- 2D NMR spectroscopy: a valuable tool for characterisation of organic compounds
- **Dr. A. K. Tyagi, BARC, Mumbai-** X-ray diffraction: An indispensable tool in research and industry
- **Prof. Dipanshu Bansal, Mechanical Engg, IIT Bombay-** Fundamental & applications of FTIR and LRIS
- **Prof. Sobhana Kapoor, Chemistry Dept., IIT Bombay-** Decoding the role of mycobacterial lipid remodelling and membrane dynamics in antibiotic tolerance
- **Dr. Sangeeta Mirgal, Sun Pharma Advanced Research Company, Mumbai-** Mass Spectrometry in Pharmaceuticals: Analysing Small Molecules and Nucleic Acid-Based Therapeutics
- **Dr. Kaushik Banerjee, ICAR, Pune-** Evolution of pesticide residue analysis methods in India based on GC-MS & LC-MS
- **Prof. Guruswamy K Chemical Eng. Dept., IIT Bombay-** Introduction to SAXS for structure determination
- **Dr. Sugam Kumar BARC, Mumbai-** Small-Angle Scattering: An Invaluable tool for Nanomaterials and Soft Matter
- **Prof. Sameer Ranjan, Earth Science Dept., IIT Bombay-** Applications and Advancement in analytical methods for trace and isotopic measurement using Q-ICPMS and MC-ICPMS
- **Prof. Ruchi Anand, Chemistry Dept., IIT Bombay-** Modern Techniques in Structural Biology

During the workshop, participants showcased their research through poster presentations, and selected participants were invited for flash presentations. A committee evaluated the presentations and recommended the best poster and flash presentation awards.

Award Winners:

S. No.	Name of the Participant	Affiliation	Position
1	Revati Dharampal Sagare	KLE College of Pharmacy, Hubli	1st
2	Ameya Narendra Parkar	Institute of Chemical Technology (ICT) Mumbai	2nd
3.	Suchita Gulabrao Waghmare	Dept. of Pharmaceutical Sciences, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur	3rd

Participant Interaction

The workshop was highly interactive, with numerous Q&A sessions following each presentation. Participants had the opportunity to engage in direct discussions with the speakers, seek clarifications, and explore specific topics related to their fields of interest. This interactive format enhanced knowledge exchange and encouraged meaningful dialogue between experts and participants.

Workshop Attendance

A total of 255 participants attended the workshop, with representation of 36 participants from both IIT Bombay and 219 from other institutions.

Conclusion: The workshop was a resounding success, providing participants with valuable insights into the importance of sophisticated analytical instruments. It also highlighted the need for continued innovation and investment in technology to stay at the forefront of scientific and industrial advancements. The event also fostered collaboration and knowledge sharing, further strengthening the bridge between academia and industry.

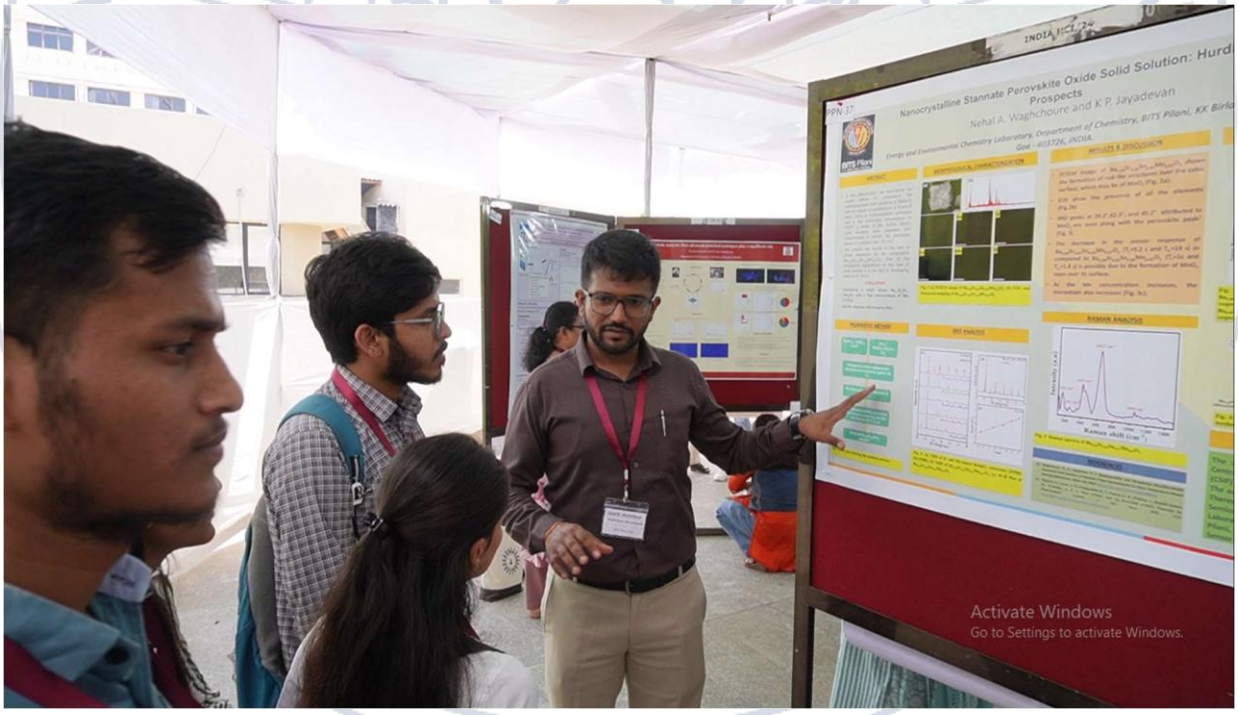
Recommendations:

- **Future Workshops**: It is recommended that future workshops focus on the more specific challenges faced by particular sectors in adopting sophisticated equipment.
- **Training Programs**: Companies should consider offering more detailed training sessions for their workforce to effectively integrate and manage new technologies.
- **Collaboration**: Encourage more collaborations between academia, industry professionals, and technology developers to stay ahead of evolving technological trends.

Photographs of the Workshop

Inaugural address by Prof. A.B. Pandit, Vice-Chancellor, Institute of Chemical Technology, Mumbai

Participants interact with speakers and ask specific questions related to their fields of interest



Poster presentation session

Best poster presentation winners

Group photograph during closing ceremony

(ii) **Webinar by INAE Mumbai Chapter on 29th March 2025 on "Navigating the complexities of the nuclear regime" by Dr. R.B. Grover, a member of the Atomic Energy Commission and Chairman of the Board of Research in Nuclear Sciences.**

Abstract: The global nuclear regime is complex, comprising international treaties, UN resolutions, guidelines of the International Atomic Energy Agency, standards of the International Commission on Radiation Protection, and informal understandings. India is engaged in harnessing nuclear science and technology for the welfare of the nation, and while doing so, has honoured its legal obligations and informal understandings. Also, India has demonstrated a commitment to safety by following a science-based approach to regulation. This must continue when India expands the role of nuclear power. The regime's influence on nuclear power arises because of the intertwining of the nuclear fuel cycle for generating electricity and nuclear weapon technologies. This influences the growth of nuclear power. India has been navigating these complexities considering its geopolitical situation and based on its need to exploit nuclear power for national development following an independent path. India's uranium reserves are very modest. Before 2008, India could not import uranium from the international market. Over the years, India has strengthened its science and technology base. This strength resulted in India taking up the diplomatic initiative that led to the Nuclear Suppliers Group amending its guidelines in 2008 to facilitate international civil nuclear trade with India. This has enabled India to take up an ambitious target to expand nuclear power. The talk will briefly cover the complexities of the nuclear regime and explain the need for large-scale exploitation of nuclear power by India.

Brief biodata of Dr. Grover

Dr Ravi B Grover is a member of the Atomic Energy Commission, Chairman of the Board of Research in Nuclear Sciences, and continues to be associated with Bhabha Atomic Research Centre (BARC) and Homi Bhabha National Institute (HBNI). He graduated from the Delhi College of Engineering (DCE), Delhi University and received a Ph.D. from the Indian Institute of Science (IISc). He worked in BARC, the secretariat of the Department of Atomic Energy (DAE), and HBNI. His past positions include Director of the Knowledge Management Group, BARC; Director of the Strategic Planning Group, DAE; Principal Advisor, DAE; Director/ Vice-Chancellor, HBNI; and DAE Homi Bhabha Chair. Working in BARC, he specialized in nuclear reactor thermal hydraulics, process design, and safety analysis. He worked on the design of the research reactor Dhruva and a compact power reactor. In recent years, he has been working on energy studies with special reference to nuclear energy. He participated in negotiations with other countries and international agencies leading to the resumption of international civil nuclear trade. He was the Sous-Sherpa of the Government of India for the Nuclear Security Summits held in 2010, 2012, 2014, and 2016. He has been representing India as the chair of India's delegation to the ITER Council from its beginning in 2006. He played a very significant role in conceptualizing and establishing HBNI and concurrently with other responsibilities, he was its Founder Director/ Vice-Chancellor from 2005 to 2016. He has received many awards including Lifetime Achievement Award for the year 2011 by DAE. He was conferred with a Padma Shri in 2014. He was President of the Indian Society of Heat and Mass Transfer during 2010-13. He is a Fellow of the Indian National Academy of Engineering, the Maharashtra Academy of Sciences, and the World Academy of Art and Science.

Highlights & Recommendations

To reach the decarbonization goals by 2070, Indian electricity generation from all low-carbon sources (variable renewables and nuclear) must be exploited to their full potential, and this must be done using system-level optimization studies. India has honoured its legal obligations and informal understandings to exploit nuclear energy for the welfare of the nation. It is technologically enabled to increase nuclear energy generation further. India has established a science-based approach to regulation, and this must continue as India increases its nuclear-installed capacity. While the use of fossil fuels may continue, the focus must be to perfect carbon capture on an industrial scale in an economical manner. System engineering-backed studies must be pursued to arrive at the optimum symbiosis between electricity

storage and hydrogen generation as energy carriers. The amendment to the Atomic Energy Act is important to reach our targets of nuclear power generation. The operator of a nuclear power plant must be informed about obligations regarding safety, security, safeguards, design authority, decommissioning, and waste management. This can best be done by explicitly including all these issues in the Atomic Energy Act and the Rules promulgated under it. Therefore, amending the Atomic Energy Act is important. In addition, education must be imparted about the requirements of safety and civil nuclear liability.

INAE Bangalore Chapter

VISHWA 2025

MVJ College of Engineering, Bangalore, collaborated with INAE-BC, organized VISHWA-2025, a one-day workshop on “Innovations for a Climate-Resilient and Sustainable Future on Earth and Beyond” on February 28, 2025 (National Science Day) at MVJ College of Engineering, Bangalore. The workshop was graced by eminent personalities like Dr. V K Aatre, Former Scientific Advisor to Raksha Mantri and Secretary, DRDO; Dr. B N Suresh, Chairman, Board of Governors, MVJCE, Bangalore & Founding Director and Chancellor, IIST, Thiruvananthapuram; Dr. S Gopalakrishnan, Chairman, INAE, Bangalore Chapter & Senior Professor, IISc; Mr M Sankaran, Director, UR Rao Satellite Centre, ISRO, Bangalore; Dr. Bala Govindasamy, Executive Member, Earth Commission, Future Earth, & Professor, Centre for Atmospheric and Oceanic Sciences, IISc.

The Science Day Celebrations began with a warm welcome address by Dr. Ajayan K.R., Principal, who expressed gratitude to the esteemed guests and highlighted the significance of the event. He emphasized India's scientific achievements, particularly in space exploration, and the need to foster innovation among the youth. He also urged attendees to actively participate in discussions on pressing global challenges like climate change and sustainability.

The Opening Address was delivered by Dr. B N Suresh, who emphasized the role of engineering innovations in tackling sustainability challenges. He highlighted the significance of National Science Day, emphasizing its importance in promoting scientific awareness and innovation, inspiring young minds to explore the transformative power of science and technology in addressing global challenges, and providing solutions to societal problems. He encouraged attendees to strive for groundbreaking discoveries that could one day earn global recognition, including a Nobel Prize.

Dr. S Gopalakrishnan, Chairman of INAE, Bangalore Chapter, stressed the need for a transformative approach to the education system, emphasizing that education should focus on nurturing knowledge, critical thinking, and innovation rather than merely assessing students through exams. He underscored the importance of aligning the education system with the Sustainable Development Goals (SDGs) to equip students with the skills and awareness necessary to drive sustainable progress and societal development.

The three distinguished lectures were delivered by esteemed experts who have made significant contributions to the fields of science, engineering, and sustainability:

Dr. V K Aatre, Former Scientific Advisor to Raksha Mantri and Secretary, DRDO delivered distinguished lecture on "Science and Technology - Historical, Philosophical, and Societal Perspectives" provided an insightful exploration of the evolution of science and its profound influence on human civilization. He traced the historical development of scientific thought, illustrating how breakthroughs in fundamental sciences have shaped societies over time. He emphasized the philosophical foundations of scientific progress, stressing the importance of curiosity, scepticism, and ethical responsibility in research. Discussing the societal impact, he highlighted how science has transformed industries, governance, and daily life, particularly in India’s rapid technological growth. He urged young scientists to engage in problem-solving and innovation that address real-world issues, from climate change to

healthcare. Dr. Aatre also discussed the role of interdisciplinary research in fostering groundbreaking discoveries and emphasized that scientific knowledge should be used for the betterment of humanity. His thought-provoking address left the audience with a deeper appreciation of science as a force for progress and a call to use it responsibly.

Dr. Bala Govindasamy, Professor, Centre for Atmospheric and Oceanic Sciences, IISc. delivered a distinguished lecture on "Should We Engineer the Sky to Reverse Climate Change?" He particularly shed light on Solar Radiation Modification (SRM) as a potential strategy to mitigate global warming. He explained the mechanisms of stratospheric aerosol injection and marine cloud brightening, highlighting their potential to cool the planet by reflecting sunlight. However, he also addressed the risks associated with geoengineering, including unintended climate shifts, disruptions in global weather patterns, and ethical dilemmas. He stressed that while SRM could be a short-term measure to curb rising temperatures, it must not replace efforts to reduce greenhouse gas emissions. Citing scientific studies, he underscored the uncertainties in long-term impacts, emphasizing the need for rigorous research before large-scale deployment. He advocated for a balanced approach, integrating emission reduction strategies with carefully monitored climate intervention technologies. His talk sparked discussions on the feasibility, risks, and ethics of manipulating Earth's climate.

In the afternoon, Shri M. Sankaran, Director, UR Rao Satellite Centre, ISRO delivered a distinguished lecture on "Sustained Spirit of Innovation in Space: ISRO – For a Sustainable Future on Earth and Beyond". He provided an overview of India's space missions and their contributions to environmental monitoring, disaster management, and agricultural advancements. He highlighted ISRO's innovations in remote sensing, satellite-based weather forecasting, and geospatial data analysis, which help optimize resource management. He recounted the importance of sustainable space exploration, focusing on reusable launch technologies and low-impact satellite systems. Discussing the future, he outlined ISRO's plans for deep-space exploration, lunar resource utilization, and green propulsion systems. He encouraged students to pursue careers in space research, emphasizing the need for interdisciplinary collaboration in space and sustainability sciences. His session displayed how space technology is not just about exploration but also about solving pressing challenges on Earth.

Students' Oral and Poster Presentations

Student teams both from MVJCE and outside have actively participated in oral and poster presentations, highlighting their research across three broad themes:

1. Climate Tech and Innovation
2. Cyber Systems and Sustainability
3. Clean Energy Systems

The students showcased innovative ideas through oral and poster presentations, addressing sustainability, clean energy, and climate resilience. Projects ranged from AI-driven microgrid optimization, solar-powered environmental monitoring, and sustainable aviation fuel to carbon sequestration and advanced wastewater treatment technologies. These innovative solutions highlight the potential of young engineers in tackling global environmental challenges through technology and innovation. The best presentations were recognized for their technical depth, innovation, and impact. The first-prize winners in both oral and poster presentations were awarded a cash prize of ₹10,000, while the second-prize winners in both oral and poster presentations received a cash prize of ₹5,000. Two second prizes were awarded in both categories. The presentations were judged by INAE fellows and distinguished professors from IISc and MVJCE.

Oral Presentation Winners

First Prize

Title: *Harnessing Graphitic Carbon Nitride Photocatalyst to Treat Textile Industrial Effluent*
Institution: MSRIT, Bangalore
Participants: Raveena SK, Tejaswar Reddy, Shrinivas Magar
Theme: Climate Tech and Innovations

Second Prize

Title: *Eco-Pure: Algae-Based Bio-Membranes for Sustainable Water Filtration*
Institution: Amal Jyothi College of Engineering
Participants: Noufal S, Deon Roji, MuhammedFiam K M S, Fathima Naslim
Theme: Clean Energy System

Second Prize

Title: *Electric Powered Propeller*
Institution: MVJCE, Bangalore
Participants: Bhuvana S, N Manikandan, Rahul Parappa Ganiger, Shreyas B A
Theme: Clean Energy System

Poster Presentation Winners

First Prize

Title: *Designing and Development of a Pressure Transducer-Based Equipment with a Well Cap for Measurement of Heads in Autoflow Wells*
Institution: Kongu Engineering College, Erode, Tamil Nadu
Participants: Siva Surya, Shruthi R, Subhashree S
Theme: Cyber System and Sustainability

Second Prize

Title: *Solar-Powered Atmospheric/Industrial CO_2 to Graphene Converter*
Institution: MVJCE
Participant: Siddaling Nagavimath
Theme: Clean Energy System

Second Prize

Title: *Improvised Sewage Treatment Plant (STP): Harnessing Cyber Systems for Sustainable Water Management*
Institution: MVJCE
Participants: T E Shyam, Aastha Uniyal
Theme: Cyber System and Sustainability

In addition to the student presentations, an expo was organized on the sidelines, providing a platform for students to showcase their working prototypes and innovative models. The exhibition featured cutting-edge projects spanning various areas. The prototypes reflected the scientific rigor, creativity, and problem-solving skills of MVJCE students, demonstrating their ability to apply engineering principles to real-world challenges.

The event concluded with Prof. B N Raghunandan, Dean (Retd.) of IISc and Member of the BoG at MVJCE, summarizing the key takeaway points, followed by the prize and certificate distribution. Dr. M Brindha, Coordinator of VISHWA-2025 and Dean of Affiliation & Accreditation at MVJCE, delivered the vote of thanks, acknowledging the contributions of the INAE- Bangalore chapter, distinguished speakers, guests, participants, and organizers.

VISHWA 2025 successfully fostered intellectual exchange, research collaboration, and innovation-driven discussions on climate resilience, sustainability, and future technologies. The event reaffirmed the critical role of engineers and scientists in shaping a sustainable future for Earth and beyond.

Dr. B N Suresh, Chairman, BOG, MVJCE delivering inaugural address

Dr VK Aatre, Former Scientific Advisor to Raksha Mantri and Secretary, DRDO delivering distinguished lecture on "Science and Technology - Historical, Philosophical, and Societal Perspectives."

Dr. S Gopalakrishnan, Chairman, INAE, Bangalore chapter felicitating Dr VK Aatre, Former Scientific Advisor to Raksha Mantri and Secretary, DRDO

Dr. Bala Govindasamy, Professor, Centre for Atmospheric and Oceanic Sciences, IISc. delivering a distinguished lecture on "Should We Engineer the Sky to Reverse Climate Change?"

Shri M. Sankaran, Director, UR Rao Satellite Centre, ISRO delivering a distinguished lecture on "Sustained Spirit of Innovation in Space: ISRO – For a Sustainable Future on Earth and Beyond."

Shivani Jadhav and team presenting their idea on Mitigating Mobile Tower Radiation: Regulations, Strategies and Environmental Impact

Student Team presenting their idea on 'Sustainable Aviation Fuel (SAF): A Pathway to Cleaner Aviation'

Judges- Eminent Professors from IISc., and MVJCE are interacting with the students during poster presentations

TECHNOTSAV – 2025

One Day Workshop on "AI and Robotics"

Cambridge Institute of Technology, Bengaluru, in collaboration with the Indian National Academy of Engineering (INAE), had planned to host **National Technology Day 2025** as **TECHNOTSAV 2025** through a one-day workshop on "AI and Robotics" on 11th May 2025. The preparation talks began in late March, and regular review meetings were conducted every Friday starting from 4th April 2025. These meetings helped streamline event logistics, speaker arrangements, student participation, and evaluation processes. The organizing committee held regular planning meetings and successfully executed the event on May 11, 2025.

The key objectives of TECHNOTSAV 2025 were to celebrate National Technology Day by promoting awareness and innovation in the domain of AI and Robotics, to provide a competitive platform for engineering students to showcase their research and project ideas, to facilitate technical knowledge-sharing through expert talks by industry and academic leaders, and to encourage interdisciplinary collaboration and technological creativity among students. The event aimed to inspire the next generation of technologists by exposing them to current trends, challenges, and opportunities in emerging technologies.

The event provided a dynamic platform to explore and share the latest developments in AI and Robotics, encouraging innovation, creativity, and collaboration. Students from various engineering colleges across Karnataka actively took part in the event, which aimed to bridge the gap between academic learning and real-world technological applications. In total, 300 students attended the workshop sessions and gained valuable insights into the current trends and practical uses of Artificial Intelligence and Robotics.

The event saw active participation through more than 60 idea submissions from colleges across the state. After a rigorous review process, 10 teams were shortlisted for the Idea Presentation, and 25 teams were selected for the Poster Presentation. These sessions offered participants the opportunity to present their innovations, interact with subject matter experts, and receive constructive feedback. TECHNOTSAV 2025 proved to be a meaningful and enriching experience for all attendees, reinforcing Cambridge Institute of Technology's mission to cultivate innovation-driven learning and excellence in technical education.

Inaugural Session

The event commenced at **9:45 AM** with the formal inauguration.

- **Dr. G. Indumathi**, Principal of Cambridge Institute of Technology, delivered the welcome address.
- **Dr. V. K. Aatre**, Former Head of DRDO and Scientific Advisor to Raksha Mantri, graced the event as the **Chief Guest** and delivered an inspiring keynote speech.
- **Prof. Gopalakrishnan**, Chairman, Executive Council of INAE Bangalore Chapter, and **Prof. K. J. Vinoy**, Secretary of INAE Bangalore Chapter, were present as **Guests of Honour**.
- **Mr. Nitin Mohan**, CEO of Cambridge Institute of Technology, was also present during the morning session and encouraged student innovators.
- **Shri. D. K. Mohan**, Chairman of Cambridge Group of Institutions, attended the **valedictory function** and shared motivational insights.

Expert Talks

Three expert sessions were conducted during the workshop by renowned speakers from academia and industry. These sessions offered participants deep insights into the practical applications and emerging trends in Artificial Intelligence and Robotics. Each speaker brought a unique perspective, enriching the audience with real-world use cases, research advancements, and futuristic visions. The sessions played a vital role in bridging theoretical knowledge with hands-on innovation and industry relevance.

Expert Talk Sessions at TECHNOTSAV 2025

SL.NO	Time	Speaker	Topic
1	10:30 – 11:15 AM	Mr. Mathew Joseph, Director and Head of CIMB bank AI Labs	Reinventing Enterprises with Artificial Intelligence
2	11:30 – 12:30 PM	Prof. Suresh Sundaram, Department of Aerospace Engineering, Artificial Intelligence and Robotics Lab, IISC, Bangalore	Recent Trends in AI-Driven Autonomous Vehicles
3	12:30 – 01:15 PM	Dr. Antony Louis Piriyakumar, Dean (R & D), Cambridge Institute of Technology	Robocup

Student Participation

The event received **60 presentations** from engineering colleges across Karnataka. Based on evaluation, **10 teams** were shortlisted for Idea Presentations and **25 teams** for Poster Presentations.

Idea Presentation Judging Panel

The panel comprised distinguished professors from the Indian Institute of Science (IISc), Bangalore, bringing extensive expertise in engineering and research:

1. **Dr. K. Raghavendra**, IISc Benagaluru
2. **Dr. Gopal Hegde**, IISc Bengaluru
3. **Dr. Ananda Theerthan**, IISc Bengaluru
4. **Dr. Harish Barshilia**, Chief Scientist, NAL

Poster Presentation Judging Panel

Led by Heads of Departments from Cambridge Institute of Technology (CIT), this panel represented diverse engineering disciplines:

1. **Dr. Shreekanth M Prabhu** - Head of Computer Science & Engineering (CSE)
2. **Dr. Shiva Panchakshari T G** - Head of Electronics & Communication Engineering (ECE)
3. **Dr. Suma S P** - Head of Mathematics
4. **Dr. Suneel Kulkarni** - Head of Mechanical Engineering
5. **Dr. Shankar B. S** - Head of Civil Engineering

Awards and Recognitions

1. **Idea Presentation Winners** - Ten teams from different institutions were shortlisted for the Idea Presentation competition. Out of these, four teams gave outstanding presentations and were selected as winners, receiving top prizes and cash awards.

SL. NO	PRIZE	Team ID	Institution	Prize Money
1	1st	TNSV16	Cambridge Institute of Technology – ECE	20,000/-
2	2nd	TNSV39	SJBIT	10,000/-
3	3rd	TNSV06	Cambridge Institute of Technology - AIML	5000/-
4	3rd	TNSV18	New Horizon	5000/-

2. **Best Poster Presentation Winners –** Twenty-five teams from different colleges were shortlisted for the Poster Presentation competition. Out of these, five teams gave excellent presentations and were selected as the best poster presentation winners**,** as listed below.

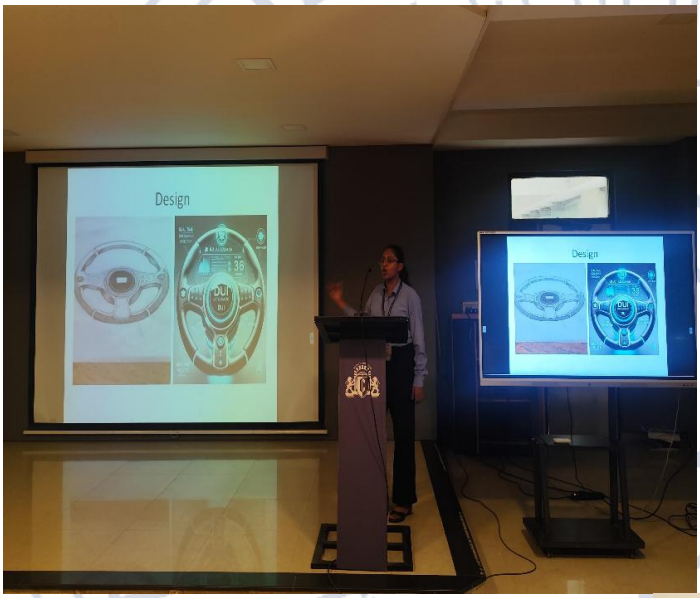
Sl. no	Team ID	Institution	Prize Money
1	TNSV32	MSRIT	2000
2	TNSV41	Cambridge Institute of Technology – ME	2000
3	TNSV29	New Horizon College of Engineering	2000
4	TNSV03	Cambridge Institute of Technology – CSE	2000
5	TNSV08	Cambridge Institute of Technology – CSE/ISE	2000

Valedictory Session

The **valedictory session** began at **4:10 PM**, presided over by Shri. D. K. Mohan, Chairman of Cambridge Group of Institutions. He addressed the gathering and congratulated all the participants and winners. The judges offered insightful feedback and appreciated the creative ideas and technical presentations showcased by the students. The session concluded with a formal **vote of thanks** delivered by the organizing committee.

Photos of the Event:


Evalv.AI
TEAM ID : TNSV16
Evalv.AI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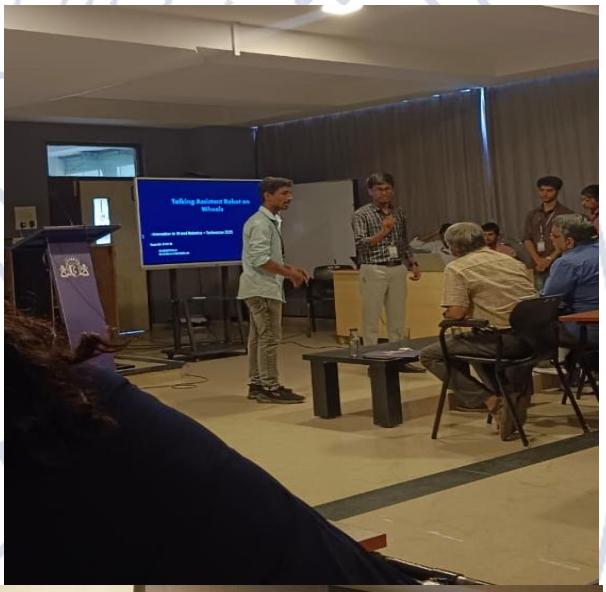
Talking Assistant Robot on Wheels

INAE Kanpur Chapter

(i) **National Conference on Virtual labs (May 02-03, 2025)**

Theme of virtual lab conference is focused on paradigms of complimenting in-class learning with tools available to students to utilize for strengthening their experience as per their available pace of learning, time of learning and place of learning. As limited infrastructure no longer remains a hurdle, and labs available on-the-go, learning can become a choice with complete learning management system available at user's fingertip.

Inauguration Ceremony by Prof. Manindra Agrawal (Director IIT Kanpur) in presence of Prof. Ranjan Bose (Director IIIT Delhi), Prof. Tarun Gupta (Dean R&D IIT Kanpur), Prof. Jayant K. Singh (Vice President INAE Kanpur Chapter), Prof. Kantesh Balani (PI, Virtual Labs) on 2nd May, 2025.

Prof. Kantesh Balani (PI, Virtual labs) Welcoming Dignitaries, Nodal Centre Coordinators, and all participants of the conference on 2nd May, 2025

Prof. Tarun Gupta (Dean R&D, IIT Kanpur) Addressing the participants of the national conference, how virtual labs stand as a powerful 02tool that bridges the gap between theoretical knowledge and practical application on 2nd May, 2025 .

Prof. Ranjan Bose spoke about the transformative impact of Virtual Labs on the Indian education system. He emphasized the importance of providing equitable access to laboratory experiences for students across the country

Keynote Talk by Prof. Shyam Diwakar (Amrita Vishwa Vidyapeetham) on 03 May, 2025.

Keynote Talk by Prof. J. Ramkumar (IIT Kanpur) on 03 May, 2025.

(ii) Materials Camp at IIT Kanpur (May 08-11, 2025)

Material Advantage @ Indian Institute of Technology (IIT) Kanpur, a student technical chapter in the Department of Materials Science and Engineering (MSE), and Advanced Centre for Materials Science (ACMS), kick-started the four-day "Materials Camp 2025" during May 08-11, 2025, in collaboration with Materials Society, Indian Institute of Metals (IIM) Kanpur Chapter, Indian National Academy of Engineering (INAE) Kanpur Chapter, and ASM International India Chapter. "Materials Camp 2025" has attracted participation of 42 students and nine teachers from nine schools of Kanpur, viz. Jai Narayan Vidya Mandir, Jugal Devi Saraswati Vidya Mandir, Air Force School, Dr. Virendra Swaroop Education Centre, Kendriya

Vidyalaya IIT Kanpur, Methodist High School, Allenhouse Public School, Sheiling House school, and DPS Kalyanpur. During the inaugural, Prof. Anish Upadhyaya, Chair IIM Kanpur Chapter, & Head, ACMS, emphasized exploring new application avenues using materials engineering, andProf. Kantesh Balani, Head Materials Science and Engineering & Chair INAE Kanpur Chapter, welcomed the participants and apprised the importance of materials in human civilization. Dr. Navin Manjooran, President, ASM International, and Mr. Lawrence Somrack, Treasurer, ASM International, joined online for inaugurating the event on May 08, 2025, and highlighted ASM International as the biggest materials society in the world and congratulated everyone for their participation in the Materials Camp 2025.






INAE Forums

One of the important objectives of the Academy is to assist the Government from time to time in formulating policies on critical technical issues. For this purpose, five forums were constituted – INAE Forums on Energy; Technology, Foresight and Management; Engineering Interventions for Disaster Mitigation; Indian Landscape of Advanced Structural Materials and Civil Infrastructure. These forums enable giving inputs to policy makers, institutes of higher learning & research, industries, etc. The following are the updates on activities carried out during the year.

Workshop on Report on "Sustainability of Civil Infrastructure" by INAE Forum on Civil Infrastructure held on March 11, 2025 at India International Centre, New Delhi

The Indian National Academy of Engineering (INAE), founded in 1987 comprises India's most distinguished engineers, engineer-scientists and technologists covering the entire spectrum of engineering disciplines. INAE functions as an apex body and promotes the practice of engineering & technology and the related sciences for their application to solving problems of national importance. The Academy also provides a platform to deliberate upon the futuristic planning for country's development requiring engineering and technological inputs and brings together specialists from such fields as may be necessary for comprehensive solutions to the needs of the country.

Workshop in progress

The INAE Forum on Civil Infrastructure, consisting of domain experts was set up in January, 2018, and had earlier undertaken to study the National status of 'Urban Transportation' and 'Housing in India' – the challenges being faced, and, the possible way forward to tackle these. The Forum undertakes comprehensive studies of the problem involving not only the engineering issues, but also other related ones such as, policy interventions needed, societal involvement, and, regulatory mechanisms. Currently the Forum is studying the vitally important subject relating to Sustainability of Civil Infrastructure, a subject of much contemporary concern. The study relates to such aspects as, infrastructure demand, impact of infrastructure on environment, life cycle cost analysis, suitability for use of construction materials and technology. The main objective of the forum is to create "White Papers" from its study to provide a set of needed actions, related to, Policy Initiatives, Engineering Development/Research, Education.

In order to cover comprehensive aspects in the field of "Sustainability of Civil Infrastructure", a brainstorming workshop was conducted by the INAE Forum on Civil Infrastructure on March 11, 2025 at India International Centre, Lodhi Road, New Delhi to review the report in its pre-final stage and solicit views of respective domain experts. This workshop was aimed to bring together domain experts, policymakers, and other stakeholders to discuss and deliberate on the pressing issues related to the sustainability of civil infrastructure. The workshop was attended by various prominent members of the INAE Forum on Civil Infrastructure and invitees working in different arenas of civil infrastructure. These included experts in civil engineering, sustainability, urban development, and policy-making, all contributing their knowledge and insights to the discussion on sustainable infrastructure practices.

L to R: Dr V K Saraswat, FNAE, Member, NITI Aayog, New Delhi, Mr JD Patil, President, INAE with and Prof Prem Krishna, Chairman, INAE Forum on Civil Infrastructure

The workshop focused on the importance and requirement of sustainability in civil infrastructure development, highlighting the use of waste materials and innovative design practices to address environmental and sustainability challenges and to promote economic growth.

Workshop in progress on "Sustainability of Civil Infrastructure" by INAE Forum

Key inputs received from invitees:

Mr J D Patil – Presidential Address

1. Sustainability plays a crucial role in governing large organizations, and our cities are becoming increasingly challenging to live in.
2. A report on sustainability is highly valuable for policymakers and major corporations, as it can help identify sustainable solutions, such as utilizing waste materials in construction instead of depleting natural resources.
3. One critical area requiring attention is the emission levels from the construction industry. The management, reduction, and control of these emissions should be a key focus.
4. Innovative methods and solutions must be developed to promote a sustainable and clean environment.

Dr V K Saraswat – Address by the Chief Guest

1. **Infrastructure Investments:** Ongoing investments in various sectors should be closely monitored, with a particular focus on the energy sector.
2. **Carbon Emissions & Energy Consumption:** High carbon emissions from cement and steel production, along with excessive energy use in buildings, pose significant challenges. The integration of renewable energy, adoption of low-carbon construction methods, and consideration of biodiversity preservation in construction projects are essential.
3. **Funding for R&D:** Exploring funding opportunities with the Railway Ministry for research and development of steel slag-based aggregate.
4. **PV Recycling Plants:** Developing a plan to establish photovoltaic (PV) recycling plants for silicon and silver recovery.
5. **Vertical Axis Wind Turbines:** Investigating the feasibility of implementing vertical axis wind turbines instead of horizontal ones for improved performance.
6. **Fish Conservation in Hydropower:** Researching the implementation of fish ladders and bypass systems in hydropower plants to protect fish populations.
7. **Solar Desalination for Water Grid:** Exploring the potential for creating a water grid using solar desalination technology along India's coastline.
8. **Packaging Standards:** Developing and standardizing packaging guidelines to make them more accessible and easier to follow.
9. **Strategic Planning & Financial Scalability:** Promoting strategic planning, replicability, and financial scalability to drive transformation.
10. **AI & Data Analytics in Decision-Making:** Encouraging data-driven decision-making using artificial intelligence and advanced data analytics.
11. **Carbon Capture & Taxing:** Implementing carbon capture utilization and carbon taxation to mitigate environmental impacts.
12. **Green Building Certification:** Promoting green building standards through:
    (i) Use of low-carbon construction materials (e.g., fly ash, bamboo composites)
    (ii) Energy-efficient designs, passive cooling, solar rooftops, and smart lighting
    (iii) On-site waste recycling for concrete and bricks
13. **Eco-Friendly Materials:** Encouraging the use of innovative, biodegradable, and eco-friendly building materials.
14. **Regulatory Standards:** Establishing clear approval guidelines and BIS standards for building materials to ensure quality and compliance.

Prof SS Chakraborty

1. **Emphasis on Nature-Based Solutions & Green Energy:** Prioritizing sustainable approaches that leverage natural processes and promoting the widespread adoption of green energy solutions.
2. **High Emissions from Steel & Cement:** Steel and cement production contribute nearly 20% of total emissions, yet limited progress has been made in reducing their environmental impact.
3. **Energy-Efficient Building Materials & Construction Practices:**
   (i) Promoting the use of energy-efficient materials in construction.
   (ii) Addressing unsafe construction practices that contribute to disasters, such as landslide-prone structures.
4. **Diversification of Energy Sources:** Considering nuclear energy as a viable option alongside renewable energy sources to ensure a balanced and sustainable energy mix.
5. **Roadmap for Cleaner Steel Production:** Collaborating with INSDAG to implement strategies for cleaner steel production. With over 20 alternative materials available, state-level policies should be developed to facilitate their adoption.
6. **Skill Development & Education:** Strengthening educational programs and skill development initiatives at various levels to equip professionals with knowledge and expertise in sustainable practices.

Prof Monto Mani

1. Microplastics & Infrastructure Emissions:

(i) Microplastics significantly contribute to emissions in the infrastructure sector.
(ii) Conduct research on microplastics originating from roads and EVs, particularly focusing on tire wear as the largest contributor.
(iii) Explore mechanisms to filter and recover microplastic contaminants from tires and footwear to prevent environmental pollution.

2. Materials & Carbon Sequestration:

(i) High Emissions from Steel & Cement: 92% of infrastructure emissions are attributed to steel and cement. Approaches toward negative emissions should be explored, such as using materials that sequester carbon.
(ii) Novel Carbon-Absorbing Materials: Investigate non-cement-based materials that can absorb carbon during the setting process.
(iii) Recycled Plastics in Infrastructure: Caution is needed when using recycled plastics in roads and buildings, as they may leach polymers and heavy metals at elevated temperatures (~60°C), leading to environmental risks.
(iv) Integration of Sustainability in **Chapter Five** of the study report: Incorporating aspects of non-toxicity and carbon sequestration into Chapter Five for a more comprehensive approach.

3. Energy Efficiency & Net Zero Goals:

(i) Strengthen the focus on energy efficiency and achieving net-zero emissions.
(ii) LED Advertising Panels: Address the high energy consumption of dynamic LED panels (~3kW per panel, equivalent to a geyser). Over-reliance on such energy-intensive systems, whether powered by renewables or non-renewables, increases the ecological footprint.
(iii) Illumination & Biodiversity Impact: Examine the impact of excessive artificial lighting on eye safety and nocturnal biodiversity.

4. **Urban Infrastructure & Traffic Decongestion:**
   Without addressing traffic congestion, energy efficiency measures in transportation will have limited impact. Example: In Bangalore, with travel speeds of ~10 km/hr, vehicle emissions remain counterintuitively high, regardless of fuel efficiency.

5. **Social & Environmental Impact Considerations:**
   (i) Skill Development & Employment Generation: Integrate Social Life Cycle Assessment (SLCA) into infrastructure planning to explore geographically distributed employment opportunities, reducing rural-urban migration.
   (ii) Re-examine Civil Engineering Additives: Assess common admixtures and additives in construction for their contribution to microplastics and persistent environmental pollutants (e.g., PFAS, "forever chemicals").
   (iii) Infrastructure for Ecosystem Restoration: Investigate how civil infrastructure projects can contribute to remediating environmental pollutants and restoring local biodiversity and ecosystem services.

6. **Greenhouse Gas (GHG) Mitigation Strategies:**
   (i) Develop holistic approaches to reducing GHG emissions across infrastructure sectors.
   (ii) Encourage research on sustainable construction methods, carbon capture, and waste-to-energy solutions.

Prof Mahesh Chandra Tandon

Establishing an Engineer's Act in the country is crucial to regulate the engineering profession, ensuring that high ethical standards and technical expertise are maintained. This act would help establish clear guidelines for engineers, enforce professional accountability, and promote consistency in practices across the industry, ultimately enhancing the quality and integrity of engineering projects. Plan of action to be decided with regulation for implementation.

Prof Pradeep Kumar Ramancharla

1. **Technology & Sustainability Alignment:** Technologies that are unsuitable for specific geoclimatic conditions or inherently unsustainable should not be promoted. The use of inappropriate technologies and materials leads to long-term unsustainable infrastructure.

2. **Gap Between Ideals & Implementation:** There is a significant disconnect between sustainability discussions and actual practices. Human convenience is often prioritized over environmental coexistence, which is a critical concern.

3. **Addressing Systemic Errors in Infrastructure Development:**
   (i) **Error of Concept:** Can be mitigated through capacity building and education.
   (ii) **Error of Implementation:** Can be controlled through strict quality assurance and control measures.
   (iii) **Error of Intention:** Is the most challenging to address and may require legislative measures, such as a dedicated bill or act, to enforce accountability.

4. **Establishment of a National Sustainability Tribunal:** A regulatory body should be formed to oversee and enforce sustainability practices across sectors. This tribunal could set guidelines, monitor compliance, and take corrective action against violations of sustainable development principles.

Mr Satyajit Mohapatra

1. **High Carbon Emissions from Steel Production:** Steel is an essential material but also one of the largest contributors to carbon dioxide emissions.
2. **Importance of Scrap Recycling:** Recycling scrap steel is crucial in reducing carbon emissions and promoting circular economy practices.
3. **Role of Renewable Energy in Steel Manufacturing:** Integrating renewable energy sources into steel production can enhance power efficiency and reduce environmental impact.
4. **Innovations & Roadmap for Sustainable Steelmaking:**
   (i) **AMN Steel:** Focuses on scrap steel recycling and the integration of renewable energy.
   (ii) **Hydrogen in Blast Furnaces:** A structured roadmap has been developed, outlining progress in hydrogen-based steel production.
5. **Challenges in Material Selection & Implementation:**
   (i) While material selection is widely discussed, existing codes and regulations require updates to align with modern sustainability standards.
   (ii) High-quality steel options are available, but their adoption remains a challenge.
6. **Zinc-Aluminum-Magnesium (ZAM) Steel:** Introduced in the past 15 years, yet implementation is hindered by bottlenecks in steel grade selection and regulatory approval.

Mr Rajit Sengupta

1. **Develop a Sustainability Implementation Database:** Create a structured working module or database to track and support the execution of sustainability solutions at the ground level.
2. **Integrate Economic Considerations in Material Selection:** Sustainability discussions must include economic feasibility to ensure practical adoption of eco-friendly materials.
3. **Incorporate Local Geology & Context in Infrastructure Design:** Infrastructure projects must be tailored to regional geoclimatic conditions to enhance durability and sustainability.
4. **Explore Nature-Based Solutions:** Utilize ecosystem-based approaches for sustainable infrastructure development, reducing reliance on resource-intensive technologies.
5. **Resource Consumption & Technology Adoption:**
   (i) Reduce excessive consumption and avoid an unchecked push for new technologies that may not align with long-term sustainability goals.
   (ii) Ensure technology implementation, which considers local conditions for effective and practical application.
6. **Aligning Sustainability Knowledge with Action for large scale infrastructure projects:** While a wealth of sustainability knowledge exists, there is a critical gap in practice. Clear guidelines and correct direction for implementation are essential. Example: Glass buildings are widely known to be unsustainable, yet they continue to be constructed. Further, another example is the proposed tunnel for mobility in Bangalore—while aiming to improve transport; it may not be a truly sustainable solution and requires deeper evaluation.

Prof Manu Santhanam (online)

1. **Chapter 3: Life Cycle Assessment (LCA)**
   (i) Incorporate illustrations and examples to clarify the application of LCA in the sector.
   (ii) Provide case studies from the group, such as LC3 cement and Recycled Concrete Aggregates (RCA), to demonstrate practical implementation.
2. **Chapter 4: Suitability of Materials**
   (i) The proposed content is extensive; a structured approach is necessary for better presentation.
   (ii) Consider descriptive assessments for key materials while referring to existing literature for broader coverage.
3. **Chapter 7: Vision & Roadmap:** Present the vision from multiple perspectives—government, industry, and academia—to ensure a comprehensive roadmap.

4. **Policy Gaps & Material Suitability**
   (i) The absence of a clear mandate and policy hinders the use of unconventional materials like recycled concrete aggregate.
   (ii) Policies and guidelines should facilitate their adoption.
5. **Advancing Supplementary Material Usage:** Focus on research and development to improve the understanding and application of supplementary materials in construction.
6. **Water Consumption in Construction:** Construction activities consume large volumes of water; treated wastewater should be prioritized for use in these projects.

Mr P K Mishra, INSDAG

1. **Focus on Construction Material Sustainability:** Greater awareness and emphasis are needed on sustainable materials and their long-term impact.

2. **Mandatory Life Cycle Cost (LCC) Analysis:**
   (i) LCC should be a compulsory criterion before selecting construction materials to ensure cost-effectiveness and sustainability. Example, Japan builds tall buildings with steel designed for a 100-year lifespan—India must adopt similar sustainable and durable construction practices.
   (ii) Currently, LCC is included in the General Financial Rules (GFR) for railways, but it is not mandatory—this needs to change for all public infrastructure projects.

3. **LCC in Public Asset Planning:** Any public asset, especially those designed for long-term use (e.g., 200-year lifespan infrastructure), must undergo a mandatory LCC study before finalizing construction methods.

4. **Education & Training on Sustainable Materials**
   (i) Professionals need structured training to design sustainable structures effectively.
   (ii) Educational institutions should integrate material sustainability, LCC methodologies, and structural design into their curricula.

5. **Skill Development in Construction & Fabrication:** There should be focused training programs for construction-related skill development, such as fabricators and material specialists, to enhance workforce expertise.

Discussion: Response by Forum Members
Prof Manoranjan Parida
Integrating Steel Slag Aggregates & Life Cycle Cost Analysis (LCC) in Infrastructure Projects

1. **Utilization of Steel Slag-Based Aggregates:**
   (i) Steel slag aggregates can be effectively used in construction, provided they are incorporated into the BIS codes and supported by policy guidelines.
   (ii) The Ministry of Steel is currently examining guidelines for their implementation, which should be formalized into a national steel policy to ensure widespread adoption.
2. **Mandatory Life Cycle Cost (LCC) Analysis in Infrastructure Projects:**
   (i) LCC should be a standard part of project screening for highway and infrastructure development to assess long-term sustainability.
   (ii) Incorporating LCC in project evaluations will enhance decision-making in material selection and serve as a key component in training programs for engineers and policymakers.
3. **Field Demonstrations & Long-Term Performance Assessment:**
   (i) Beyond laboratory testing, on-field trials are necessary to evaluate the real-world performance and durability of new materials like steel slag aggregates.
   (ii) Implementation strategies must consider long-term performance data to validate material effectiveness before large-scale deployment.

Mr VN Heggade

Strengthening Sustainability in Steel, Cement, and Construction Sectors

1. **Mandatory Renewable Captive Power Plants for Steel & Cement Manufacturing**
   (i) Given that 92% of CO_2 emissions in built infrastructure come from cement and steel (and 80% in the building sector), it is crucial to mandate steel and cement manufacturers to have renewable energy-based captive power plants to reduce their carbon footprint.
   (ii) Electric Arc Furnaces (EAF), which consume significant energy, should also be required to integrate renewable energy sources.
2. **Implementing Sustainable Building Standards Across All Sectors**
   (i) Sustainable building standards should be mandatory across all sectors, including government infrastructure, roads, and dams.
   (ii) Current policy-making standards are not embedded in building codes, which prevents their implementation—this gap needs to be addressed.
3. **Sustainability in Procurement & Contracting**
   (i) The procurement process and contracting currently do not prioritize sustainability.
   (ii) A Quality-Cost-Sustainability System (QCSS) must be included in Detailed Project Reports (DPRs) to ensure sustainability considerations in material selection and construction methods.
   (iii) Contractors must be required to use alternative materials and sustainable practices, rather than prioritizing cost alone.
4. **CBAM & Green Hydrogen for Steel Production**
   (i) Carbon Border Adjustment Mechanism (CBAM) policies, like those in Germany, will impose taxes on non-green steel.
   (ii) To remain competitive in the global market, India must adopt green hydrogen for steel production and develop regional standards for sustainable buildings, roads, and infrastructure.

Mr Alok Bhowmick

Advancing Sustainable Infrastructure Development: Policy & Implementation Strategies

1. **Adopting Model Code for Concrete 2020 for Faster Implementation**
   (i) The Model Code for Concrete 2020 offers a structured approach to integrating sustainability into construction practices.
   (ii) Its adoption can accelerate the implementation of sustainable design and material selection across infrastructure projects.
2. **Rethinking Infrastructure Contracting Beyond EPC**
   (i) The EPC (Engineering, Procurement, and Construction) model does not account for Life Cycle Cost (LCC), making it unsuitable for sustainable infrastructure development.
   (ii) Alternative models should be explored for long-term sustainability and accountability.
3. **Government-Industry Agreements for Sustainability**
1. The government must take the lead in sustainability efforts. Example: Netherlands, where the government has MoUs with industries to drive sustainability, can serve as a model for India.
2. A regional sustainability framework should be developed to ensure locally available materials are prioritized, reducing carbon footprints and promoting economic viability.

Mr Sanjay Pant

Strengthening Sustainable Construction Practices

1. **Structural Safety Through Bamboo Design Code:** Entire bamboo-based buildings can be designed to be structurally safe by adhering to the Bamboo Design Code, making them a viable sustainable alternative.
2. **Utilization of Construction and Demolition (C&D) Waste:** Established BIS standards for construction and demolition waste should be effectively used in infrastructure development.

3. **Leveraging the National Building Code (NBC) for Sustainability:** The National Building Code (NBC) of India includes a dedicated chapter on sustainability at the township level, first introduced in 2005, revised in 2016, and currently under review. These guidelines should be referenced for external development, infrastructure planning, and sustainable urban expansion.
4. **Emphasizing Maintenance and Building Performance Tracking:** Sustainable construction should focus not just on materials and methods but also on long-term maintenance. This includes tracking building performance in terms of water efficiency, energy use, and overall environmental impact.
5. **Recognizing Existing Standards for Alternative Materials:** Various waste and alternative materials (e.g., fly ash, recycled aggregates, bamboo composites) already have BIS codes and design standards in place. Sustainability assessments may explore viable options based on workable options brought out in BIS codes.

Joint Initiatives with DST

I. India-Taiwan Programme of Cooperation in Science & Technology

International Cooperation Division (ICD), DST entrusted INAE to implement India-Taiwan joint program from 2023 onwards which was earlier with Global Innovation & Technology Alliance (GITA). This cooperation is being coordinated by National Science and Technology Council (NSTC) from Taiwan's side. It is a joint program of cooperation between India and Taiwan and a joint call for proposal is launched every year. 11 projects were approved and are ongoing under CFP 2022. For year 2023, the call for proposals were invited in the broad areas of (i) Artificial Intelligence, IoT (Internet of Things), Big Data, Cyber Security, (ii) Green Energy Technology/ Renewable Energy (solar energy and bioenergy)/ Clean Energy, (iii) Micro/Nano-electronics, Embedded Systems & Sensors, (iv) Biotechnology, Healthcare including Functional Genomics, Drug Development and Biomedical Devices, Agriculture and Food Sciences and (v) Aerospace Technology. For evaluation of the proposals received, a Project Evaluation Committee (PEC) was constituted by DST. Based on the scores received from PEC, a total of 15 proposals have been approved and are currently in progress.

Similarly, for year 2024, call for proposals were invited. "Manufacturing processes" were introduced as new domain and Micro/Nano-electronics, Embedded Systems & Sensors was replaced by "Semiconductors and communications." A total of 15 projects were recommended by PEC and approved by DST.

The call for the year 2025 has been launched on June 2, 2025 with the last date of receipts of proposals as July 31, 2025. The proposals shall be invited in the following domains:

- Artificial Intelligence, Cyber Security, Quantum technology
- Biotechnology, Healthcare including Functional Genomics, Drug Development and Biomedical Devices, Agriculture and Food Sciences
- Green Energy Technology/ Renewable Energy (solar energy and bioenergy)/ Clean Energy
- Semiconductor & Communication
- Green Manufacturing Technologies

The proposals received shall be evaluated by a respective Project Evaluation Committee (PEC), constituted by DST and results shall be jointly declared by INAE and National Science and Technology Council (NSTC) during the Joint Committee Meeting (JCM), tentatively planned to be held in November 2025.

II. Vaishvik Bharatiya Vaigyanik (VAIBHAV) Fellowship

The VAIBHAV fellowship is instituted by DST and INAE has been entrusted as an implementing agency, to facilitate collaboration between scientists of the Indian Diaspora with HEIs, Universities, and/ or public-funded Scientific Institutions in India. During the first call launched in 2023, a total of 22 VAIBHAV Fellows and 2 Distinguished VAIBHAV Fellows were selected. The projects have since been sanctioned and funds have been disbursed to eligible fellows. The visits to Indian Host Institutes by VAIBHAV fellows are progressing. The post visit reports from the fellows who have completed their visit to Indian host Institutes are being sought and submitted to DST. During the second call launched during 2024, a total of 17 VAIBHAV fellows have been selected by DST. The first-year funds to the fellows have been disbursed to them.

III.DST-Women International Grant Support (WINGS) program

The WINGS program aims to provide opportunities to Indian Women Scientists, Engineers & Technologists to undertake international-level research experience in advanced research labs of relevant institutions of the world, to enhance their scientific research capacities. The program includes three modules (i) Module I: WINGS Internship (up to 12 months), (ii) Module II: WINGS Fellowship (up to 12 months), and (iii) Module III: Wings Science visit (up to one month). The administrative works of the program are in progress. Additionally, INAE was entrusted to organize a four-day residential workshop on the Women in Space and Allied Sciences Leadership Programme (WiSLP) from January 21−24, 2025 at the Aryabhatta Hall, Department of Science and Technology (DST), New Delhi, India. This program was organised by DST and the UK-India Education and Research Initiative (UKIERI), India, delivered by the British Council, India and the Coventry University, UK. The initiative focused on supporting institutions and women scientists in fostering and strengthening women's leadership.

International Affairs

CAETS Engineering Education Working Group

International Council of Academies of Engineering and Technological Sciences CAETS is an independent non-political, non-governmental, international organization of engineering and technological sciences academies, one-member Academy per country. INAE being the only engineering academy of the country represents India at CAETS. The CAETS EEWG was reconstituted in 2023 to help CAETS in contributing to continuous improvement and modernization of engineering education and practice internationally and promoting ethics in engineering education, research and practice. Prof Indranil Manna, Former President, INAE Chairs the Working Group with academies' representatives from twenty-four countries as the members of this Working group. Prof GK Ananthasuresh, FNAE and Prof Amit Agrawal, FNAE are also members of the EEWG from INAE. The meetings of this working group are held quarterly. The objective of EEWG is to contribute to continuous improvement and modernization of engineering education and practice internationally and bring out a report on the subject. The representatives from the Member Academies of CAETS presented an abstract on each country specific inputs pertaining to specific topic. The information and status of each of the member countries enabled the Members to appreciate the status, lacunae, best practices, and advantages better to be included in the report under preparation by the Working Group. Meetings of EEWG have since been held and during each meeting various topics pertaining to the engineering education are discussed in detail with specific country's perspective. The ninth meeting of CAETS EEWG was held on February 27, 2025 online where 14 Representatives from 10 Member Academies participated and following two topics were discussed– (i) Intellectual Property Rights (IPR), and (ii) Accreditation of engineering degree courses. The 10th meeting of the Engineering Education Working Group (EEWG) of CAETS was held on May 29, 2025. The discussion was based on the themes covered during the previous 9 meeting including post-pandemic education challenges, Gender parity and mobility, Accreditation practices, Intellectual property, AI integration and ethics, Medium of instruction and Problem-solving and creativity. The next meeting is tentatively scheduled for August 15, 2025 with a focus on finalizing the top 10 engineering education themes for presentation at the CAETS Council Meeting in Brisbane to be held in September 2025**.**

Election of Fellows and Foreign Fellows

Nominations for Fellowship and Foreign Fellowship were invited in January 2025 with last date of March 31, 2025 which was extended to April 15, 2025 after due approval. As a part of the on-going initiative of INAE to digitize as much of its operation as possible, from the year 2020 onwards, nominations for election to the Fellowship of INAE were invited to be submitted online through a Digital Platform (using personal log-in credentials of the Fellows registered with INAE). However, as this is the fifth year of transition in exceptional circumstances, nominations were also to be submitted as soft copy forwarded through email, if not feasible for submission through Digital Platform. Details regarding eligibility criteria, nomination process, nomination forms and other important issues were uploaded on INAE website as per practice.

A total of 417 valid nominations for Fellowship (181 New and 236 carried forward from 2023 and 2024) and 27 valid nominations for Foreign Fellowship (16 New and 11 carried forward) were considered by the Sectional Committees during their meetings from May 15, 2025 to May 30, 2025 to shortlist nominees for "Peer Review" and identify suitable domain experts to carry out the review. During the first meetings of the Sectional Committees, 124 nominations were shortlisted for Fellowship 2025 and 15 nominations were shortlisted for Foreign Fellowship in respect of whom, Peer Review were sought accordingly. The second meeting of the Sectional Committees were held from July 21, 2025 to August 5, 2025 to consider the peer review reports in respect of shortlisted nominees and recommend further to the Council in respect of Fellowship and Selection Committee for Foreign Fellows followed by Council during its next meeting on August 22, 2025 in New Delhi in physical mode.

INAE Young Associate 2025

Nominations were invited for INAE Young Associate 2025 with last date of March 31, 2025 which was extended to April 15, 2025 after due approval. The sponsor must be either a Fellow of INAE or Head of the organization/ institution/HoD/Dean where the nominee is working. The recognition of "INAE Young Associate" is being given by INAE as per guidelines, to recognize outstanding achievements/contributions made by Young Engineers with strong potential for future professional growth impact in any branch of engineering. The objective of the recognition is to identify, recognize and encourage young and promising talents in India who have made and are likely to continue to make outstanding contributions impacting engineering research and design, technology development and transfer. The criteria entails evidence of excellence in engineering research, product/process, design, technology development and transfer. Specific contribution submitted for consideration of the recognition which should have been carried out in India. Any citizen of India not older than 35 years holding the first tertiary degree in engineering/technology as on 1st of January each year is eligible for consideration. However, lady nominees are eligible for age relaxation of five years for consideration. Upto 30 INAE Young Associates shall be selected each year. A Certificate as INAE Young Associate shall be given to the selected nominees, however there is no cash prize. All INAE Young Associates on selection and shall continue to be so till attaining 45 years of age. Further details and application proforma can be downloaded from INAE website at the link

https://www.inae.in/young-criteria/

This year, enormous number of nominations, almost double the number received last year, have been received for INAE Young Associate 2025 and accordingly a methodology was adopted for initial screening of the nominations by the Sectional Committees online based on chosen parameters, followed by shortlisting in the second meeting of the Sectional Committees for presentation and final recommendation before a separate Selection Committee during meetings to be held in August 2025.

INAE Publications

Transactions of Indian National Academy of Engineering – An International Journal of Engineering and Technology"

INAE is currently publishing a Journal named "Transactions of Indian National Academy of Engineering – International Journal of Engineering and Technology" published by M/s Springer which was earlier named INAE Letters. **Transactions of INAE - Volume 10, Issue 1, March 2025** and **Volume 10, Issue 2, June 2025** were published through Springer Publishers during the period February 2025 to June 2025.

Donations to INAE Corpus Fund

INAE had faced an unexpected development because of the decision of the Government conveyed through the Department of Science and Technology that the funding of INAE would cease from April 1, 2025 onwards. Therefore, a lot of measures had to be taken to counter the situation and the Governing Council took the decision that INAE should raise its own corpus so as to become not only functionally but financially autonomous. A target to achieve about Rs 100 Crores was set so that the annual interest of Rs 5-6 Crores could meet the operational cost of the Academy. Since then, good progress has been made and substantial commitment and contributions have been received, which shall ensure the continuance of the Academy and that INAE would not only survive but thrive.

INAE's Progress on Donations & Membership Schemes

In accordance with the directive from the Department of Science and Technology (DST) dated 6th May 2022, the Indian National Academy of Engineering (INAE) has moved towards full financial and functional autonomy, with government Grant-in-Aid concluding on 1st April 2025. To ensure long-term sustainability, INAE has implemented a strategic plan—endorsed by its Fellowship and approved by DST—centered around the creation of a dedicated Corpus Fund, supported by six key revenue streams: corporate and institutional memberships, individual donations/membership, CSR contributions, government/project support, and publication revenue.

INAE gratefully acknowledges generous contributions and commitments from leading corporates and institutions, including L&T, Tata Sons, Google, Infosys Foundation, Microsoft, and others, as well as memberships from premier academic and research organizations. These contributions affirm strong confidence in INAE's mission and significantly support its journey toward financial self-reliance.

INAE has 29 Institutional Members (23 Diamond, 1 Sapphire, 1 Ruby, 4 Coral), and 158 Individual Members (115 Senior and 43 Associate). Tata Steel, Tata Motors, and Kent RO have taken our annual Corporate Membership while HAL has become Patron Corporate Member.

Support for INAE Corpus Fund: A Call for Collective Commitment

INAE leadership had appealed to the Fellowship for contributions to the INAE Corpus Fund, emphasizing the importance of collective support during this critical transition to financial autonomy. They highlighted that the current challenge also presents an opportunity for INAE to strengthen its role in advancing engineering and serving the nation. Contributions are seen as a shared responsibility of the entire Fellowship.

In recognition of donors, INAE has a **Wall of Donors** on its website at the link https://www.inae.in/wall-of-donors/

Account Details and QR code:
Account Name: INAE Corpus Fund
Account No.: 41790835603
Bank: SBI, JNU Branch, New Delhi
IFSC: SBIN0001624
Account Type: Savings

Tax Benefits:
Donations qualify for 50% tax deduction under Section 80G (for those under the old tax regime), with receipts and certificates issued within a quarter.

INAE expresses deep gratitude to all supporters and continues to welcome contributions from Fellows, Young Associates, Awardees, and Corporate partners, which are essential to ensuring INAE's long-term self-reliance and mission continuity.

Categories of Memberships Introduced in INAE

INAE Membership was introduced to embrace a wider reach and participation of engineering community, which shall be accorded to working professionals in engineering in the industry, R&D or academic institutions, engineering services, entrepreneurship firms, and government/private agencies. After a duly approved process, Individual Membership will be awarded to aspiring mid-career to senior engineering professionals, to give them a fillip for their future professional journeys who still have milestones to achieve in their career path, before they attain the gold standards to be elected as Fellows of INAE. Individual Membership entails a yearly fee and is as per timelines. The Fellowship retains the premier Gold Standard and the Membership category is independent and by no means affects the prestige of the Fellowship category. An appeal has been made to all Fellows to support these initiatives and help facilitate a greater number of Memberships in all three categories – Institutional, Corporate and Individual Memberships. INAE Fellows have been requested to help facilitate forwarding of nominations for Memberships in all three categories – Institutional, Corporate and Individual Memberships.

Important Meetings held during February 2025 to June 2025

February 2025

i. Fifth meeting on the proposed INAE-Infosys Centre for Engineering Education (IICEE) held on February 9, 2025 over WebEx.
ii. Combined Initial Briefing Meeting of both the INAE Search Committees for Gender Parity in INAE held on February 10, 2025 over WebEx.
iii. Video Conference on INAE-Infosys Foundation Centre for Engineering Education and Excellence (CEEE) Program held on February 19, 2025 over WebEx.
iv. 43rd Finance Committee Meeting of INAE held on February 20, 2025 held in hybrid mode at New Delhi.
v. Meeting with the Centre Coordinators and Domain Coordinators of CEEE program held on February 25, 2025 over WebEx.
Vi. 9th Meeting of CAETS-Engineering Education Working Group (EEWG) held on February 27, 2025 over WebEx.

March 2025

i. Meeting to discuss and finalize the program for the Workshop on "Sustainability of Civil Infrastructure" held on March 4, 2025 over WebEx.
ii. Workshop to discuss the INAE Study on "Sustainability of Civil Infrastructure" held on March 11, 2025 in hybrid mode at New Delhi.
iii. 154th Governing Council Meeting of INAE held on March 21, 2025 over WebEx.

April 2025

i. Online meeting on CEEE Program with Centre Coordinators held on April 5, 2025 over WebEx.
ii. Meeting with Centre and Domain Coordinators to work out the CEEE Program implementation plan held on April 8, 2025 over WebEx.
iii. Meeting of INAE Forum on Civil Infrastructure held on April 14, 2025 over WebEx.
iv. Meeting for INAE-INFOSYS Foundation Centre of Engineering Education Excellence (CEEE) Program held on April 17, 2025 over WebEx.
v. 53rd Apex Committee Meeting of INAE held on April 20, 2025 in hybrid mode at New Delhi.
vi. Meeting in respect to INAE Chair Professorship, INAE Distinguished Professorship/Technologists, and NatFoE Symposium & IMP 2025 held on April 24, 2025 over WebEx.
vii. MOU signing ceremony AICTE and INAE held on April 28, 2025 in hybrid mode at New Delhi.
viii. Review meeting of Online and Digital Gaming Research Initiative held on April 29, 2025 over WebEx.

May 2025

i. Meeting of INAE Forum on Civil Infrastructure held on held on May 3, 2025 over WebEx.
ii. Discussion on INAE Membership held on held on May 8, 2025 over WebEx.
iii. Meeting with Conveners of all Sectional Committees held on May 9, 2025 over WebEx.
iv. Meeting of Centre Coordinator of the CEEE Program held on May 13, 2025 over WebEx.
v. First Meetings of 10 Sectional Committees (SC I to SC X) for shortlisting of nominations for peer review for election to INAE Fellowship 2025 held from May 15 to June 3, 2025 over WebEx.
vi. Meeting of the Sub-Committee to review INAE Awards for reinstatement in 2025 held on May 26, 2025 over WebEx.
vii. 10th Meeting of CAETS- Engineering Education Working Group (EEWG) held on May 29, 2025 over WebEx.
viii. Meeting with 4 Domain Coordinators of CEEE Program held on May 31, 2025 over WebEx.

June 2025

i. Meeting of INAE Forum on Civil Infrastructure held on June12, 2025 over WebEx.
ii. Meeting with Centre Coordinators and 5 Domain Coordinators of CEEE Program held on June17, 2025 over WebEx.
iii. Meeting to Discuss Symposium on National Frontiers of Engineering (NaTFoE) and Innovation in Manufacturing Processes 2025, Flagship events of Indian National Academy of Engineering (INAE) held on June18, 2025 over WebEx.
iv. 44th Finance Committee Meeting of INAE held on June 19, 2025 in hybrid mode at New Delhi.
v. 155th Governing Council Meeting of INAE held on June 27, 2025 in hybrid mode at New Delhi.
vi. 37th Annual General Meeting (AGM) of Fellows (Part-A) held on June 27, 2025 in hybrid mode at New Delhi.

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INTERNATIONAL/NATIONAL CONFERENCES/SEMINARS BEING ORGANIZED BY IITS/OTHER INSTITUTIONS

2nd edition of "India Gas-Tech Conference" in-person on 20th to 21st August 2025 at New Delhi, Delhi.
Website: https://www.indiagastech.com/

International Conference on Sustainability Innovation and Technology (ICSIT 2025) online and in-person on 22nd to 23rd August 2025 at Nagpur, Maharashtra.
Website: https://www.icsitnagpur.in/

3rd International Conference on Data Analytics and Insights (ICDAI-2025) online and in-person on 28th to 30th August 2025 at Kolkata, West Bengal
Website: https://tint.edu.in/icdai/2025/

6th Congress on Intelligent System (CIS 2025) online and in-person on 6th to 7th September 2025 at Delhi.
Website: https://scrs.in/conference/cis2025

4th International Conference on Advancements in Smart Computing and Information Security online and in-person on 11th to 13th September 2025 at Rajkot, Gujarat.
Website: https://ascisconf.org/

3rd International Conference on Energy Resources and Technologies for Sustainable Development (ICERTSD 2025) in-person on 11th to 12th September 2025 at Howrah West Bengal
Website: https://www.icertsd.org/

Second International Conference on Security, Surveillance and Artificial Intelligence ICSSAI-2025 online and in-person on 12th to 13th September 2025 at Kolkata, West Bengal.
Website: https://www.technoindiaeducation.com/icssai2025/index.php

IEEE International Conference on Next-Gen Technologies of Artificial Intelligence and Geoscience Remote Sensing online and in-person on 17th to 18th September 2025 at Hyderabad, Telangana.
Website: https://attend.ieee.org/earthsense-2025/

7th International Conference on Communication and Intelligent system (ICCIS 2025) online and in-person on 26th to 27th September 2025 at Goa
Website: https://scrs.in/conference/iccis2025

IEEE International Conference on Advances in Computing Research on Science Engineering and Technology (ACROSET 2025) online and in-person on 27th to 28th September 2025 at Indore, MP.
Website: http://acroset.in

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Honours and Awards

(covering the period February 2025 to June 2025)

1	Prof. M.R. Madhav, *FNAE,* Professor Emeritus, JNT University; Visiting Professor, IIT, Hyderabad was selected as a recipient of the first ISSMGE Asian Lifetime Service Awards which is a testament to his remarkable contributions and achievements in the field. The award will be given during the 1st Geotech Asia 2025 to be held in Goa.
2	Mr VN Heggade, *FNAE* Founder & CEO of DECon Complete Solutions received the "First S D Limaye award for excellence in structural engineering" by Indian Concrete Institute (Pune Centre) at NICMAR University Pune on March 21, 2025.
3	Professor Cato Thomas Laurencin, *FNAE*, a Foreign Fellow of INAE, CEO, The Cato T. Laurencin Institute for Regenerative Engineering; Professor of Chemical & Biomolecular Engineering; Material Science & Engineering; Professor of Biomedical at University of Connecticut and Professor of Orthopaedic Surgery at University of Connecticut School of Medicine; USA is now Professor Sir Cato Thomas Laurencin. He was appointed Knight Commander of the Order of Saint Lucia, an Order Established by Queen Elizabeth II in March 2025. Prof Laurencin is internationally recognized for his groundbreaking contributions to the field of regenerative engineering that he founded, along with groundbreaking work in orthopaedic surgery, polymer science chemistry and engineering, and musculoskeletal repair and regeneration. Further details are available at the link given below. https://today.uconn.edu/2025/03/dr-cato-t-laurencin-appointed-knight-commander-of-the-order-of-st-lucia/
4	Prof Suman Chakraborty, FNAE, Director and Professor of Mechanical Engineering, Indian Institute of Technology Kharagpur was recognized with the 2026 TWAS Award in Engineering and Computer Sciences by UNESCO on March 7, 2025 for developing low-cost medical diagnostic solutions. Further details are at the link. https://www.thehindu.com/news/national/west-bengal/iit-kharagpur-professor-wins-unesco-award-for-developing-low-cost-medical-diagnostic-solutions/article69305842.ece
5	Dr Ulrich L. Rohde, *FNAE*, Partner of Rohde & Schwarz, Munich Germany; Chairman of Synergy Microwave Corp., Paterson, New Jersey has been awarded the "Bavarian Order of Merit" by Bavaria, Germany. Earlier he was appointed a Visiting Scientist at MIT's Research Laboratory of Electronics.
6	Prof GD Yadav, *FNAE*, National Science Chair, Govt. of India and Emeritus Professor of Eminence, ICT and JC Bose National Fellow, Institute of Chemical Technology, Mumbai, Former Vice Chancellor & R.T. Mody Distinguished Professor, Institute of Chemical Technology; Former Tata

	Chemicals Darbari Seth Distinguished Professor of Leadership and Innovation; Conjoint Professor, University of New Castle, Australia; Adjunct Professor, RMIT University, Australia and Adjunct Professor, University of Saskatchewan, Canada has been approved for the conferment of the award of CSIR Bhatnagar Fellowship for the year 2024 by the Council of Scientific and Industrial Research (CSIR) in recognition of his outstanding work in science and technology. Prof GD Yadav was also conferred the Prestigious Eminent Engineer award by the Engineering Council of India (ECI). He was also selected for 'Paryavaran Bhushan' Award as per details at the link: https://timesofindia.indiatimes.com/city/nagpur/litu-chairman-ganpati-yadav-to-get-paryavaran-bhushan-award/articleshow/122010232.cms
7	Dr Vallam Sundar, *FNAE*, Advisory Consultant and formerly Professor Emeritus, Department of Ocean Engineering, Indian Institute of Technology Madras, Chennai was conferred Honorary Membership Award of The International Association for Hydro-Environment Engineering and Research in June 2025 in recognition of his lifelong contributions to coastal, port, and harbour engineering, his leadership in advancing hydro-environment research and education, and his outstanding service to IAHR.
8	Prof Kehar Singh, *FNAE*, Honorary Professor in the Optics and Photonics Center, Indian Institute of Technology Delhi has been selected as the 2025 recipient of the Emmet N. Leith Medal. Prof Singh is honored for extensive contributions to diverse aspects of optical encoding for security and cryptography, digital holography, correlators and optical storage systems.

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NEWS OF FELLOWS

(covering the period February 2025 to June 2025)

1.	Prof Manoj Kumar Tiwari, *FNAE* was reappointed as IIM Mumbai Director in March 2025.
2.	Prof Suman Chakraborty, *FNAE*, Professor of Mechanical Engineering, Indian Institute of Technology Kharagpur has been appointed as the new Director of IIT Kharagpur. He officially took charge on Monday, June 23, 2025.
3.	Prof. Dr. S.N.Mukhopadhyay, *FNAE*, Former Professor, DBEB, IIT Delhi; Former Professor & Head, BERC, IIT Delhi jointy with wife Mrs Sakuntala has contributed in handwritten Bangla medium an article, Hindu mahimai o Christian gorimai gourobojjal Goa's Sanskriti in the Avidha 2025 Magazine of BUS,I.I.T.Delhi, Barsobaran Issue of 2025 p23-36.
4.	Prof. Raghavan Gopalan, *FNAE*, Technology Advisor and INAE Chair Professor; Former Regional Director, ARCI, Chennai was invited to chair a session on Raw Materials and Recycling and also present a paper during the 28th International Workshop on Rare Earth and Future Permanent Magnets and their Applications (REPM2025), held in Tsukuba, Japan, from July 27 to July 31, 2025.

Technical Inputs from INAE Fellows

Book Review by Professor Ganapati D. Yadav, *FNAE*

Title (English): *Divine Scientist*
Title (Marathi): *Gurunam Guruh*
Author: Aneeta Patil
Publisher: Sundaram Digital Publication House, Mumbai
Price: ₹995 per copy (available at www.sundarampublication.com)

Reviewer: Professor Ganapati D. Yadav, Bhatnagar Fellow & National Science Chair, Emeritus Professor of Eminence and Former Vice Chancellor, Institute of Chemical Technology, Mumbai

I had the privilege of reading this compelling biography of Padma Vibhushan Professor Man Mohan Sharma, FRS, first in its original draft in Marathi version and then in its English translation. Aneeta Patil requested me to go through it and provide missing links or corrections if any. As someone who has had the good fortune of knowing Prof. Sharma for over five decades, initially as his student, later as a colleague at UDCT (now ICT Mumbai), and as a close family friend, I found this work to be profoundly moving and inspiring. He has been my mentor, the Maha Guru and philosopher who has influenced my life. I was also fortunate to get to know many of his family members during my Ph.D. days. Every word written in the book raises the curiosity to know more and more about this saintly persona.

The biography is thoughtfully structured into 29 chapters, yet rather than summarizing each, I prefer to highlight its most striking elements. Once you begin reading, it becomes impossible to put down. Whether you are a student, colleague, admirer, or someone unfamiliar with Prof. Sharma, you will inevitably find yourself wishing you had met him, or had the honour of being his student or acquaintance. His presence has always been mesmerizing.

The book teaches profound lessons in humility, curiosity, integrity, and quiet confidence. It celebrates a life dedicated wholly to science, education, industry, government policy and national service, free from the lure of power, position, or privilege. He wanted his students to surpass his achievements and never took anybody else's credit although he may be the generator of the idea. What scientists call now as a 'nano' was studied by him in 1969 in his theoretical work with P.A. Ramachandran and was mentioned by the great Chemical Engineering Professor T.K. Sherwood of MIT in 1975! Ramachandran's entire thesis was theoretical.

Author Aneeta Patil deserves great credit for capturing the essence of this extraordinary yet deeply humble man in such lucid prose. Over a year of research, she interviewed numerous individuals including his famous students whose lives were touched by Prof. Sharma, friends, classmates, students, colleagues, and industrialists alike. Three of his most renowned and accomplished students, namely, Dr. R.A. Mashelkar, Prof. J.B. Joshi, and Prof. G.D. Yadav (the author of this review), all elected Fellows of the Indian National Science Academy (INSA), International Members of the US National Academy of Engineering, Fellows of The World Academy of Sciences (TWAS), and recipients of Padma awards, shared personal and insightful stories about their beloved Guru. Aneeta's work unveils the inner world of a man revered across academia, whose influence continues to span generations.

I was honoured to speak at the book's release on June 6, 2025, before a large and enthusiastic audience. On that occasion, I remarked that Prof. Sharma is like a Jain Muni, detached from worldly ambition, glitter and materialist pleasure. He turned down top positions including Secretary, DST; Chairman, UGC; DG, CSIR; and Director, IIT Kanpur. Instead, he chose to remain a professor at his alma mater, the UDCT, becoming the youngest professor in the University of Mumbai's history and later its longest-serving one. I was deeply moved when he specifically acknowledged me in his speech, praising my invaluable efforts to remove the shanties along the footpaths surrounding the ICT campus, even at the great risk of my own life and that of my family. Such is his magnanimity.

You will always wonder, is such a person amongst us as a beacon of knowledge and humility?
His list of accolades is staggering. But what truly defines him is his generosity of spirit. He is a mentor of mentors, a sculptor of minds, a sage counsellor to many in different walks of life and the nation at large. These facets are beautifully brought out in the book.

The foreword, written by Bharat Ratna Prof. C. N. R. Rao, FRS, is a heartfelt tribute to Prof. Sharma's intellect, integrity, and enduring friendship. Despite not always being fully recognized by his own university, where even his election to the Royal Society in London was met with cold indifference, Prof. Sharma never uttered a word of protest. He accepted such moments with equanimity and grace. He was once denied the prestigious Bhatnagar Fellowship by the university, yet he bore it with humility rather than resentment.

His academic lineage, over 1500 Ph.D. scholars, directly and through his students, has created a towering banyan tree of knowledge and innovation. Long before "translational research" became a buzzword, he practised it. His Ph.D. research led to a patent sold to Shell for £1,000 in 1963, a princely sum then. Among those inspired and mentored by him is industrialist Mukesh Ambani, who, at the book release function, announced a historic donation of ₹151 crore with no conditions attached. It was an unparalleled moment in the annals of Guru-Shishya (teacher-student) tradition and made headlines the following day. What a legacy he has created!

Prof. Sharma has forged lifelong friendships across age groups and professions, academicians, scientists, bureaucrats, and industrialists, driven by a shared commitment to national development. The book recounts several such episodes that reveal his vast influence. He has a phenomenal memory and recollects many forgotten instances when he meets old timers.

A devout and disciplined individual, he observes a fast every Tuesday in honour of Lord Ram and visits a Hanuman temple every Saturday as far as possible, no matter where he is. His spiritual discipline is matched by his intellectual brilliance. He is an avid reader of Ram Charit Manas. Often called a

“walking-talking encyclopaedia,” his memory and command over data, policy, history, and even old Hindi film songs are legendary. A true Brahmarshi of the modern era.

He has served on elite panels selecting IIT directors, secretaries to the government, CSIR lab directors, Director Generals, and more. The list is long. His mastery of English, although having been educated in Hindi, deep grasp of global chemical markets, and precise articulation have shaped policy at the highest levels. As a member of the Scientific Advisory Committee to the Prime Minister, along with some of the most revered scientists, his ideas helped shape institutions like IITs, IISERs, and AcSIR.

His rapport with the former and the late Prime Minister Dr. Manmohan Singh (when he was the Chairman UGC), his longstanding chairmanship of the Petroleum Ministry’s scientific committee, and his role in the Empowered Committee of the MHRD are part of institutional memory. That committee, after a decade of selfless service, voluntarily disbanded, an act of rare ethical leadership. Some of the most visionary decisions for university and college research raised the level of research in India.

As Chairman of the IIT Council, he championed doctoral research and institutional excellence. The number of PG and Ph.D. students in major IITs swelled to more than 50%. He was the Chairman of the BOG of IIT Madras, where his visionary ideas helped them to propel in leaps and bounds. His vision for institutional autonomy, especially for his *karmabhoomi* UDCT, and other universities, left a lasting mark on technical education in India. His influence spans CSIR’s industrial linkages, chemical and pharma sectors, and even the functioning of the Ministry of Chemicals and Fertilizers.

At every step, his late wife Sudha remained his quiet strength. Her affectionate nickname for him, *Gyaan Pipaasu*, a thirster of knowledge, perfectly captured his insatiable intellectual curiosity. Their children and grandchildren spoke movingly at the book release, underlining how deeply family and values are embedded in his life.

The book is rich with anecdotes and reflections that underscore his generosity, brilliance, and humility. He fondly recalls his mentors, Dr. G. P. Kane, Prof. P. V. Danckwerts of Cambridge, and Prof. G. M. Nabar, acknowledging their lasting impact on his life.

The biography quickly became a bestseller. On his 88th birthday (June 4), followed by the felicitation in Mumbai on June 6, countless admirers attended in person or online. His autograph on the sold copies was a hallmark, and those who met him and received his blessing were the happiest. His relatives, too, were moved to rediscover their connection to such a towering figure, at once a *Dnyan Yogi* and *Karma Yogi*.

This book is a collector’s item and deserves a place in every personal and institutional library. Sundaram Digital Publication House has done an outstanding job, with plans to release Hindi and Gujarati translations soon. Given Prof. Sharma’s multilingual abilities and close ties with families from Maharashtra and Gujarat, these editions are sure to resonate deeply.

Let me conclude with a prayer from the *Atharva Veda*:

"जीवेम शरदः शतम्"

May he live to see a hundred autumns.

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INAE ON SOCIAL MEDIA

INAE has a LinkedIn Account to post the news of recent INAE activities in the social media. The same can be viewed at the link below.

(a) LinkedIn https://in.linkedin.com/company/indian-national-academy-of-engineering-inae-

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Obituaries

Mr. Kuljit Singh Popli

(June 16, 1960 - April 18, 2025)

Mr Kuljit Singh Popli, FNAE born on June 16, 1960 passed away on April 18, 2025. He was elected to INAE Fellowship in the year 2017 and affiliated to Engineering Section IX (Energy Engineering).

Mr Kuljit Singh Popli, Director, Clime Finance Pvt Ltd, New Delhi and former Chairman & Managing Director, Indian Renewable Energy Development Agency (IREDA) Ltd., New Delhi had made significant contributions in the renewable energy sector. Between 2014 and 2019, he served as Chairman & Managing Director of IREDA, a pioneering developmental financial institution dedicated to the financing of renewable energy and energy efficiency projects in India. Subsequently, he served as Advisor to the International Solar Alliance (ISA) till November 2021. He also had held the position of Chairman Renewables, India Energy Forum and Chairman of the Steering Committee of the World Renewable Energy Technology Congress. At IREDA, he played an important role in project financing for conventional and renewable energy technology and is credited with formulating innovative financial instruments for the sector. As Advisor, International Solar Alliance he contributed towards promoting the use of solar energy in the Agriculture, Health, Transport and Power Generation sectors. He had received several prestigious awards and recognition for his contribution in his individual capacity and as head of IREDA.

May God bless her soul to Rest in Peace

Dr K Kasturirangan

(October 24, 1940 - April 25, 2025)

Dr K Kasturirangan, FNAE born on October 24, 1940 passed away on April 25, 2025. He was elected to INAE Fellowship in the year 1989 and affiliated to Engineering Section VII (Aerospace Engineering).

Dr K Kasturirangan, FNAE, was President, INAE during the years 2005-2006 and was a distinguished globally recognized engineering luminary who had held the prestigious appointments of Chairman, Space Commission and Secretary, Department of Space, Bangalore; Director, National Institute of Advanced Studies, Bangalore; Member (Science), Planning Commission, New Delhi; Chancellor, JNU and Chairman, Karnataka Knowledge Commission and the Chairman of New Education Policy Committee of GoI. He was well known for his contributions to the Indian space program, serving as the Chairman of ISRO (Indian Space Research Organisation) for over nine years. Over his career he oversaw the successful development and operationalization of India's key launch vehicles, the Polar Satellite Launch Vehicle (PSLV) and the Geosynchronous Satellite Launch Vehicle (GSLV). He led the design, development, and launch of advanced civilian satellites such as IRS-1C and IRS-1D, second and third generation INSAT communication satellites, and ocean observation satellites IRS-P3 and IRS-P4. He was Project Director for India's first two experimental earth observation satellites, Bhaskara-I and II, and directed the Indian Remote Sensing Satellite IRS-1A. A trained astrophysicist, Dr Kasturirangan's research focused on high-energy X-ray and gamma ray astronomy.

Dr Kasturirangan was known across India and the globe for his stellar contributions not only to the Indian Space Program but to the growth of engineering and technology and promotion of education in particular engineering education in the country. As Chairperson of Drafting Committee on New National Education Policy (NEP), he played an important role in shaping India's transformative education policy bringing in key and far-reaching reforms in India's education system. In recognition of his outstanding contributions to Satellite technology development and to the advancement of Engineering and Technology, INAE conferred the Life Time Contribution Award in Engineering for the year 2004 on Dr K Kasturirangan. He was a recipient of the three major civilian awards conferred by the President of India viz Padma Shri, the Padma Bhushan and the Padma Vibhushan.

May God bless his soul to Rest in Peace

Prof Nagesh R Iyer

(November 06, 1953 - May 10, 2025)

Prof Nagesh R Iyer, FNAE born on November 6, 1953 passed away on May 10, 2025. He was elected to INAE Fellowship in the year 2008 and affiliated to Engineering Section I (Civil Engineering).

Prof Nagesh R Iyer, Former Director, CSIR-Structural Engineering Research Centre; Dean (IPS) & Visiting Professor, IIT Dharwad; Coordinating Director, CSIR Madras Complex; Acting Director & Distinguished Emeritus Professor, AcSIR & Director, Engineering Coordination, CSIR, New Delhi had made significant research contributions in the field of Structural Engineering. His contributions in computer-aided analysis and design of complex and large structures which include infrastructural facilities such as power plant structures, flyovers, bridges, natural draught RCC hyperboloid cooling towers, offshore & ship structures and critical components of Aerospace Structures are well recognized. Prof. Iyer was member of the team that received the CSIR Technology Prize for Engineering Technology for pioneering contributions and leadership in the development of advanced computational methodologies, modelling techniques and software for analysis and design of complex structures, that are nationally and internationally recognized. He held different portfolios/positions in several prestigious bodies/organizations, such as member, Academic Council and Board of Studies (Civil Engineering) of SASTRA, Member, Governing Council, NIWE (National Institute of Wind Energy), MNRE, etc.

May God bless his soul to Rest in Peace

Dr MR Srinivasan

(January 5, 1930 - May 20, 2025)

Dr MR Srinivasan, FNAE born on January 5, 1930 passed away on May 20, 2025. He was elected to INAE Fellowship in the year 1987 and affiliated to Engineering Section IX (Energy Engineering).

Dr MR Srinivasan, FNAE Formerly Member, Planning Commission; former Chairman, AEC and Secretary, Department of Atomic Energy; Formerly Adviser, International Atomic Energy Agency; Former Chairman, NPCIL, Mumbai had made outstanding contributions in the field of Nuclear Power and Energy Technologies and was recognized as a key architect of India's nuclear programme. His contribution in the refinement and adaptation of Pressurised Heavy Water Reactors, went on to become the backbone of nuclear power in India. Dr Srinivasan played an instrumental role in developing critical nuclear infrastructure towards the country's self-reliance in the energy sector. He was instrumental in the development of several nuclear power plants in India and played a key role in the construction of India's first nuclear power station at Tarapur. He also oversaw the establishment of the Madras Atomic Power Station and many other nuclear power units across India, including Kalpakkam, Rawatbhata, Kaiga, Kakrapar, and Narora. In recognition of his distinguished contributions to India's nuclear energy program, Dr Srinivasan was awarded the Padma Shri in 1984, Padma Bhushan in 1990 and Padma Vibhushan in 2015 by President of India.

May God bless his soul to Rest in Peace

Prof. Ranjit K. Ray

(July 10, 1942 – June 24, 2025)

Prof. Ranjit K. Ray, FNAE born on July 10, 1942 passed away on June 24, 2025. He was elected to INAE Fellowship in the year 1999 and affiliated to Engineering Section VIII (Mining, Metallurgical & Materials Engineering).

Prof. Ranjit Kumar Ray, formerly, Head of Advanced Centre for Material Sciences & Professor, Dept. of Materials & Metallurgical Engineering, IIT Kanpur; Formerly, Visiting Scientist, R&D Division, Tata Steel, Jamshedpur and Formerly, Visiting Professor, IIEST Shibpur had made significant research contributions in the areas of Physical Metallurgy and Crystallographic Texture. He was also AICTE-INAE Distinguished Visiting Professor. Prof Ray was awarded several prestigious awards and honours including INAE Outstanding Teachers Award in 2020 for his outstanding contributions in the area of texture and its application in design and development of metallic alloys including steel. He pioneered texture analysis, initially through conventional pole figure method and subsequently using 3-dimensional orientation distribution function (ODF) analysis. He was also a recipient of the Alexander von Humboldt Fellowship, Distinguished Alumnus Award, B.E. College; Best Metallurgists' Award, Govt. of India and was Fellow of the Indian Institute of Metals. He was a prolific writer and written books such as ‘Textures in Materials Research’ and ‘Materials for the Third Millenium’ published by Oxford/IBH Publishing Co. Pvt. Ltd. (New Delhi) & Science Publishers Inc. (USA).

May God bless his soul to rest in peace

Prof. AB Bhattacharyya

(December 19, 1937- 27th June 2025)

Prof. AB Bhattacharyya, FNAE born on December 19, 1937 passed away on June 27, 2025. He was elected to INAE Fellowship in the year 1987 and affiliated to Engineering Section VI (Electronics and Communication Engineering).

Prof AB Bhattacharyya, formerly Professor, Centre for Applied Research in Electronics (CARE), Indian Institute of Technology Delhi; formerly Programme Director, VLSI Design, Department of Physics, Goa University; formerly Emeritus Professor, Jaypee Institute of Information Technology, Noida and formerly Chairman, Board of Governors, NIT Durgapur had made outstanding research contributions in the area of Microelectronics ,VLSI Design: Micropower Analog CMOS, MEMS & Sensors and MOSFET Compact Model. Prof Bhattacharyya was a Founder Fellow of INAE and Member of the first INAE Governing Council. Some of his seminal research in the field of electronics include programmes on Sixteen bit Submicron Gap Charge Coupled Devices based on extensive Si-SiO_2 technology research; Area Variable MOS Capacitors for voltage programmable CCD analog signal processing; Partially Illuminated Surface Acoustic Wave Devices for band pass filtering; CMOS micro power Inside – the - Ear Hearing Aids and Micro-scale Non-destructive characterization of silicon microstructures and properties with Mirage and optical probes. He was a recipient of several prestigious awards and honours including Hari Om Vikram Sarabhai Award (1980); Bhasin Award (1984); Khosla National Award (1986); Prof S.N. Mitra Memorial Award (2005) by INAE and Indian Semiconductor Association (ISA) Techno Visionary Award (2009)

May God bless his soul to rest in peace

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ENGINEERING AND TECHNOLOGY UPDATES

Civil Engineering

1. First Section Of Bullet Train's Undersea Tunnel Opens In Maharashtra

In a major boost to India's first high-speed rail project, the construction of the first section of the 21 km undersea tunnel between Bandra-Kurla Complex (BKC) and Thane has been successfully completed in July 2025. This undersea tunnel is part of the Mumbai–Ahmedabad Bullet Train project, which is being built in collaboration with Japan using advanced Shinkansen technology. Civil construction across the 508 km corridor is progressing rapidly. So far, 310 km of viaducts have been constructed, alongside the completion of 15 major river bridges, while work on four more bridges is at an advanced stage. Of the planned 12 stations along the route, five have already been completed and three more are nearing completion. One of the engineering highlights of the project is the Mumbai terminus at Bandra Kurla Complex (BKC). This station will be located 32.5 metres below ground level and has been designed with a robust foundation capable of supporting a 95-metre high building above ground, showcasing cutting-edge construction capabilities. The next-generation E10 Shinkansen trains will be deployed on the Mumbai–Ahmedabad corridor. The entire bullet train corridor is being built using state-of-the-art Shinkansen technology, which is globally recognised for its exceptional speed, safety and reliability standards. This project aims to redefine India's passenger rail experience and set new benchmarks for infrastructure development in the country.

Source https://ddnews.gov.in/en/first-section-of-bullet-trains-undersea-tunnel-opens-in-maharashtra/

2. Scientists just simulated the “impossible” — fault-tolerant quantum code cracked at last

A multinational team has cracked a long-standing barrier to reliable quantum computing by inventing an algorithm that lets ordinary computers faithfully mimic a fault-tolerant quantum circuit built on the notoriously tricky GKP bosonic code, promising a crucial test-bed for future quantum hardware. Quantum computers can perform complex computations thanks to their ability to represent an enormous number of different states at the same time in a so-called quantum superposition. Representing these superpositions of states is incredibly difficult to describe. Now, a research team has found a relatively simple method to simulate some relevant quantum superpositions of states. The illustration shows one of these superpositions, which can be created inside what’s known as a continuous-variable quantum computer. The team was able to observe how these states change when they interact with each other, and they were also able to simulate those changes using wave-like patterns. Quantum computers still face a major hurdle on their pathway to practical use cases: their limited ability to correct the arising computational errors. To develop truly reliable quantum computers, researchers must be able to simulate quantum computations using conventional computers to verify their correctness - a vital yet extraordinarily difficult task. Now, in a world-first, researchers from Chalmers University of Technology in Sweden, the University of Milan, the University of Granada, and the University of Tokyo have unveiled a method for simulating specific types of error-corrected quantum computations - a significant leap forward in the quest for robust quantum technologies. Quantum computers have the potential to solve complex problems that no supercomputer today can handle. In the foreseeable future, quantum technology's computing power is expected to revolutionise fundamental ways of solving problems in medicine, energy, encryption, AI, and logistics. Despite these promises, the technology faces a major challenge: the need for correcting the errors arising in a quantum computation. While conventional computers also experience errors, these can be quickly and reliably corrected using well-established techniques before they can cause problems. In contrast, quantum computers are subject to far more errors, which are additionally harder to detect and correct. Quantum systems are still not fault-tolerant and therefore not yet fully reliable. To verify the accuracy of a quantum computation, researchers simulate - or mimic - the calculations using conventional computers. One particularly important type of quantum computation that researchers are therefore interested in simulating is one that can withstand disturbances and effectively correct errors. However, the immense complexity of quantum computations makes such simulations extremely demanding - so much so that, in some cases, even the world's best conventional supercomputer would take the age of the universe to reproduce the result. The limited ability of quantum computers to correct errors stems from their fundamental building blocks - qubits - which have the potential for immense computational power but are also highly sensitive. The computational power of quantum computers relies on the quantum mechanical phenomenon of superposition, meaning qubits can simultaneously hold the values 1 and 0, as well as all intermediate states, in any combination. The computational capacity increases exponentially with each additional qubit, but the trade-off is their extreme susceptibility to disturbances. To address this issue, error correction codes are used to distribute information across multiple subsystems, allowing errors to be detected and corrected without destroying the quantum information. One way is to encode the quantum information of a qubit into the multiple - possibly infinite - energy levels of a vibrating quantum mechanical system. This is called a bosonic code. However, simulating quantum computations with bosonic codes is particularly challenging because of the multiple energy levels, and researchers have been unable to reliably simulate them using conventional computers - until now. The method developed by the researchers consists of an algorithm capable of simulating quantum computations that use a type of bosonic code known as the Gottesman-Kitaev-Preskill (GKP) code. This code is commonly used in leading implementations of quantum computers.

Source https://www.sciencedaily.com/releases/2025/07/250702214157.htm

Mechanical Engineering

3. Cryogenic Hydrogen Storage and Delivery System for Next-Generation Aircraft

Researchers at the FAMU-FSU College of Engineering, USA have designed a liquid hydrogen storage and delivery system that could help make zero-emission aviation a reality. Their work outlines a scalable, integrated system that addresses several engineering challenges at once by enabling hydrogen to be used as a clean fuel and also as a built-in cooling medium for critical power systems aboard electric-powered aircraft. The study introduces a design tailored for a 100-passenger hybrid-electric aircraft that draws power from both hydrogen fuel cells and hydrogen turbine-driven superconducting generators. It shows how liquid hydrogen can be efficiently stored, safely transferred and used to cool critical on-board systems -- all while supporting power demands during various flight phases like take-off, cruising, and landing. Hydrogen is seen as a promising clean fuel for aviation because it packs more energy per kilogram than jet fuel and emits no carbon dioxide. But it's also much less dense, meaning it takes up more space unless stored as a super-cold liquid at -253°C. To address this challenge, the team conducted a comprehensive system-level optimization to design cryogenic tanks and their associated subsystems. Instead of focusing solely on the tank, they defined a new gravimetric index, which is the ratio of the fuel mass to the full fuel system. Their index includes the mass of the hydrogen fuel, tank structure, insulation, heat exchangers, circulatory devices and working fluids. By repeatedly adjusting key design parameters, such as vent pressure and heat exchanger dimensions, they identified the configuration that yields the maximum fuel mass relative to total system mass. The resulting optimal configuration achieves a gravimetric index of 0.62, meaning 62% of the system's total weight is usable hydrogen fuel, a significant improvement compared to conventional designs. The system's other key function is thermal management. Rather than installing a separate cooling system, the design routes the ultra-cold hydrogen through a series of heat exchangers that remove waste heat from on-board components like superconducting generators, motors, cables and power electronics. As hydrogen absorbs this heat, its temperature gradually rises, a necessary process since hydrogen must be preheated before entering the fuel cells and turbines. Delivering liquid hydrogen throughout the aircraft presents its own challenges. Mechanical pumps add weight and complexity and can introduce unwanted heat or risk failure under cryogenic conditions. To avoid these issues, the team developed a pump-free system that uses tank pressure to control the flow of hydrogen fuel. The pressure is regulated using two methods: injecting hydrogen gas from a standard high-pressure cylinder to increase pressure and venting hydrogen vapour to decrease it. A feedback loop links pressure sensors to the aircraft's power demand profile, enabling real-time adjustment of tank pressure to ensure the correct hydrogen flow rate across all flight phases. Simulations show it can deliver hydrogen at rates up to 0.25 kilograms per second, sufficient to meet the 16.2-megawatt electrical demand during take-off or an emergency go-around. The heat exchangers are arranged in a staged sequence. As the hydrogen flows through the system, it first cools high-efficiency components operating at cryogenic temperatures, such as high-temperature superconducting generators and cables. It then absorbs heat from higher-temperature components, including electric motors, motor drives and power electronics. Finally, before reaching the fuel cells, the hydrogen is preheated to match the optimal fuel cell inlet conditions. This staged thermal integration allows liquid hydrogen to serve as both a coolant and a fuel, maximizing system efficiency while minimizing hardware complexity.

Source https://www.sciencedaily.com/releases/2025/05/250527180926.htm

Chemical Engineering

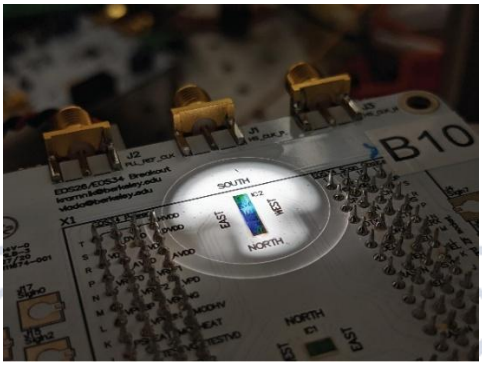
4. Indian Scientists Develop Pocket-Sized Sensor to Detect Toxic Sulfur Dioxide at Trace Levels

In a breakthrough that could significantly improve air quality monitoring, scientists at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru, have developed a portable, low-cost sensor capable of detecting toxic sulfur dioxide (SO_2) gas at extremely low concentrations. The innovation promises safer environments in both industrial and urban settings where exposure to harmful gases is a growing concern. Sulfur dioxide, a pollutant commonly emitted from vehicle exhausts and industrial processes, poses serious health risks even in minute quantities. Known to trigger respiratory irritation, asthma attacks, and long-term lung damage, SO_2 is difficult to detect before it begins to impact health. Current monitoring systems are often costly, bulky, or lack the sensitivity required to identify the gas at trace levels. To address these challenges, researchers at CeNS — an autonomous institute under the Department of Science and Technology (DST) — have designed a compact sensor by combining two metal oxides: nickel oxide (NiO) and neodymium nickelate ($NdNiO_3$). In this setup, NiO functions as the receptor that detects the gas, while $NdNiO_3$ acts as the transducer, amplifying the signal. This synergy enables the sensor to detect SO_2 concentrations as low as 320 parts per billion (ppb), far exceeding the sensitivity of many commercially available sensors. The research team has also developed a portable prototype device that incorporates the sensor and offers real-time air quality feedback. The device includes a color-coded alert system to indicate exposure levels: green for safe, yellow for warning, and red for danger. Its intuitive design makes it user-friendly, even for individuals without technical training. Designed to be compact and lightweight, the sensor system is ideal for deployment in industrial zones, densely populated urban areas, and enclosed spaces where continuous air quality monitoring is essential. The technology offers a practical and accessible solution for early detection and response to SO_2 pollution, ultimately supporting public health and environmental protection efforts.

Source https://ddnews.gov.in/en/indian-scientists-develop-pocket-sized-sensor-to-detect-toxic-sulfur-dioxide-at-trace-levels/

Electrical Engineering

5. World's First Hybrid Chip Combines Electronics, Photonics, and Quantum Power



An interdisciplinary academic team has successfully integrated quantum light sources and control electronics onto a single silicon chip**.** In a significant advancement for quantum technology, researchers from Boston University, UC Berkeley, and Northwestern University have developed the first chip that integrates electronic, photonic, and quantum components. Their findings describe a system that merges quantum light sources with stabilizing electronics, all fabricated using a standard 45-nanometer semiconductor process. This integration allows the chip to generate consistent streams of correlated photon pairs (particles of light), which are essential building blocks for many quantum applications. The breakthrough marks a major step toward the large-scale production of "quantum light factory" chips and the development of more complex quantum systems composed of multiple interconnected chips. Just as electronic chips are powered by electric currents, and optical communication links by laser light, future quantum technologies will require a steady stream of quantum light resource units to perform their functions. To provide this, the researchers' work created an array of "quantum light factories" on a silicon chip, each less than a millimeter by a millimeter in dimension. Generating quantum states of light on chip requires precisely engineered photonic devices—specifically, microring resonators. To generate streams of quantum light, in the form of correlated pairs of photons, the resonators must be tuned in sync with incoming laser light that powers each quantum light factory on the chip (and is used as fuel for the generation process). But those devices are extremely sensitive to temperature and fabrication variations, which can push them out of sync and disrupt the steady generation of quantum light. To address this challenge, the team built an integrated system that actively stabilizes quantum light sources on chip—specifically, the silicon microring resonators that generate the streams of correlated photons. Each chip contains twelve such sources operable in parallel, and each resonator must stay in sync with its incoming laser light even in the presence of temperature drift and interference from nearby devices, including the other eleven photon-pair sources on the chip. The extreme sensitivity of the microring resonators, the building blocks for the quantum light sources, is well known and is both a blessing and a curse. It is the reason why they can generate quantum light streams efficiently and in a minimal chip area. However, small shifts in temperature can derail the photon-pair generation process. The BU-led team solved this by integrating photodiodes inside the resonators in a way that monitors alignment with the incoming laser while preserving the quantum light generation. On-chip heaters and control logic continually adjust the resonance in response to drift. Because the chip uses built-in feedback to stabilize each source, it behaves predictably despite temperature changes and fabrication variations—an essential requirement for scaling up quantum systems. As quantum photonic systems progress in scale and complexity, chips like this could become building blocks for technologies ranging from secure communication networks to advanced sensing and, eventually, quantum computing infrastructure.

Source https://scitechdaily.com/worlds-first-hybrid-chip-combines-electronics-photonics-and-quantum-power/

Electronics and Communication Engineering

6. First-of-its-Kind Crystal Laser Could Power Safer Sensors and Smarter Tech

In a first for the field, researchers from The Grainger College of Engineering at the University of Illinois Urbana-Champaign have reported a photo-pumped lasing from a buried dielectric photonic-crystal surface-emitting laser emitting at room temperature and an eye-safe wavelength. Their findings improve upon current laser design and open new avenues for defense applications. Photonic-crystal surface-emitting lasers (PCSELs) are a newer field of semiconductor lasers that use a photonic crystal layer to produce a laser beam with highly desirable characteristics such as high brightness and narrow, round spot sizes. This type of laser is useful for defense applications such as LiDAR, a remote sensing technology used in battlefield mapping, navigation, and target tracking. PCSELs are typically fabricated using air holes, which become embedded inside the device after semiconductor material regrows around the perimeter. However, atoms of the semiconductor tend to rearrange themselves and fill in these holes, compromising the integrity and uniformity of the photonic crystal structure. To combat this problem, the Illinois Grainger engineers swapped the air holes for a solid dielectric material to prevent the photonic crystal from deforming during regrowth. By embedding silicon dioxide inside the semiconductor regrowth as part of the photonic crystal layer, researchers were able to show the first proof of concept design of a PCSEL with buried dielectric features. Members of the field anticipate that in the next 20 years, these new and improved lasers will be used in autonomous vehicles, laser cutting, welding, and free space communication.

Source https://www.sciencedaily.com/releases/2025/07/250711224310.htm

Aerospace Engineering

7. India Achieves Successful Trial of Akash Prime at High-Altitude

India achieved a major milestone recently by successfully intercepting and destroying two high-speed aerial unmanned targets using the Akash Prime air defence system in the high-altitude region of Ladakh, the Ministry of Defence said in an official statement. The upgraded variant of the Akash Weapon System has been specifically customised to operate at altitudes above 4,500 metres. It includes several enhancements, most notably an indigenously developed Radio Frequency (RF) seeker for improved target acquisition and engagement. The Akash Prime system has been developed through collaboration between the Indian Army's Air Defence units, the Defence Research and Development Organisation (DRDO), defence public sector undertakings like Bharat Dynamics Limited (BDL) and Bharat Electronics Limited (BEL), along with other industry partners. The successful trial was conducted as part of the "First of Production Model" firing tests, intended to validate the system's performance before its induction into service. The Ministry said the trial would pave the way for timely deployment and bolster India's air defence capabilities in challenging high-altitude frontiers. The test follows the strong operational performance of India's air defence systems during Operation Sindoor, where Akash systems effectively neutralised aerial threats involving hostile drones and fighter aircraft.

Source https://ddnews.gov.in/en/india-achieves-successful-trial-of-akash-prime-at-high-altitude/

Mining, Metallurgical and Materials Engineering

8. How Tiny Plastic Beads are helping Scientists Create Colour-Shifting Materials

A team of researchers in Bengaluru has discovered a way to create tunable colour-shifting surfaces inspired by nature's vibrant displays—like the feathers of a peacock or the wings of a butterfly. At the core of this breakthrough is a phenomenon known as structural coloration, where colours are produced not by pigments but by the physical structure of a surface that interacts with light. The study, carried out at the Centre for Nano and Soft Matter Sciences (CeNS), an autonomous institute under the Department of Science and Technology (DST), demonstrates how light can be manipulated at the nanoscale to produce colours that do not fade over time. Unlike dyes or paints, structural colours arise when light waves are reflected, refracted or scattered by microscopic patterns. This is what gives the peacock its iridescent blues and greens that change with the angle of light. The scientists at CeNS have used polystyrene nanospheres, each about 400 nanometres wide, to replicate this effect. These tiny beads, far smaller than a grain of sand, naturally arrange themselves into a hexagonal pattern when placed on water, forming what is called a close-packed monolayer. Once this layer is formed, the team uses a technique called reactive ion etching—similar to a nano-scale sandblasting process—to slightly reduce the size of the spheres while maintaining their orderly arrangement. This changes how light interacts with the surface. As light strikes this nanostructured layer, certain wavelengths are enhanced or suppressed. This means the reflected colour can be adjusted—simply by tilting the surface or changing the viewing angle, shifting it towards shades like blue. The result is a vibrant, durable colour that does not fade under sunlight or over time, unlike traditional chemical dyes. What makes this research notable is its practicality. The technique relies on self-assembly, a low-cost process where the particles naturally arrange themselves—making it scalable for large-area production without complex machinery. According to the researchers, this approach could find applications in wearable sensors, anti-counterfeit labels, flexible displays, and even eco-friendly paints that do not release harmful chemicals into the environment. The findings highlight how understanding light's interaction with matter at the nanoscale could lead to new materials with customisable optical properties. By showing how tiny changes in the geometry of these nanospheres influence how light is reflected, the CeNS team has opened new possibilities for advanced optical materials. Such materials could eventually replace conventional pigments in various industries, helping reduce environmental impact while providing vibrant, long-lasting colours.

Source https://ddnews.gov.in/en/how-tiny-plastic-beads-are-helping-scientists-create-colour-shifting-materials/

Energy Engineering

9. Indian Scientists Develop Next-Gen Green Energy Material for Supercapacitors

In a major scientific breakthrough, Indian researchers have developed a new green energy material that could revolutionize energy storage technology. Scientists from the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru, in collaboration with Aligarh Muslim University (AMU), have engineered a lanthanum-doped silver niobate ($AgNbO_3$) compound that significantly enhances supercapacitor performance. Supercapacitors, known for their rapid charging and discharging abilities, often fall short in energy storage capacity. The new material overcomes this limitation by increasing energy density without sacrificing speed or stability. The team introduced lanthanum—a rare-earth element—into silver niobate nanoparticles, improving their electrical conductivity and shrinking particle size to increase surface area. This led to a remarkable 118% energy retention after repeated use and an unprecedented 100% coulombic efficiency, meaning no energy was lost during charging cycles. A prototype asymmetric supercapacitor using the new material successfully powered an LCD display, pointing to potential real-world applications in everything from portable electronics to renewable energy systems. The study positions lanthanum-doped $AgNbO_3$ as a leading candidate for high-performance, eco-friendly energy storage. Researchers now aim to explore similar doping strategies in other materials and scale up production to enable commercial use. This innovation marks a significant step in India's contribution to sustainable energy solutions amid the global push for cleaner and more efficient technologies.

Source https://ddnews.gov.in/en/indian-scientists-develop-next-gen-green-energy-material-for-supercapacitors/

Interdisciplinary and Special Engineering Fields and Leadership in Academia, R&D and Industry

10. MIT's Tiny New Device Could Save Diabetics from Deadly Blood Sugar Crashes

A new implantable device carries a reservoir of glucagon that can be stored under the skin and could save diabetes patients from dangerously low blood sugar. For individuals with Type 1 diabetes, the risk of hypoglycemia, dangerously low blood sugar, is a constant concern. When glucose levels drop too far, the condition becomes life-threatening and typically requires an injection of the hormone glucagon as the standard treatment.

To address situations where patients may be unaware that their blood sugar is falling to critical levels, MIT engineers have developed an implantable device that holds a supply of glucagon beneath the skin. This device can be activated to release the hormone automatically when glucose drops too low. The system could be especially useful during nighttime hypoglycemia or for young children with diabetes who may not be able to self-administer an injection. The researchers also demonstrated that the same technology could be adapted to deliver emergency doses of epinephrine, a medication used to treat heart attacks and prevent severe allergic reactions such as anaphylaxis. Many people with type 1 diabetes rely on daily insulin injections to help regulate their blood sugar and prevent it from rising too high. However, when blood sugar drops too low, it can lead to hypoglycemia—a condition that may cause disorientation, seizures, and in severe cases, death if not promptly treated. To address this, some individuals carry prefilled syringes of glucagon, a hormone that signals the liver to release stored glucose into the bloodstream. Still, recognizing the early signs of hypoglycemia can be challenging, particularly for children. To provide a more reliable solution, the MIT team developed a compact emergency device that can be activated manually or automatically in response to low blood sugar, based on sensor input. Roughly the size of a quarter, the device houses a small drug reservoir fabricated using 3D-printed polymer. This reservoir is sealed with a material called a shape-memory alloy, engineered to change form when exposed to heat. The team used a nickel-titanium alloy that transitions from a flat slab to a U shape when heated to 40 degrees Celsius. Since glucagon, like many peptide-based drugs, degrades quickly in liquid form, the researchers opted for a powdered formulation that remains stable over extended periods and stays inside the device until needed. The researchers showed that this device could also be used to deliver emergency doses of epinephrine, a drug that is used to treat heart attacks and can also prevent severe allergic reactions, including anaphylactic shock. Each unit can store one or four doses of glucagon and contains an antenna that responds to a specific radiofrequency signal. When triggered, the antenna activates a small electrical current that heats the shape-memory alloy. Once the material reaches the activation temperature, it bends into a U shape and releases the powdered drug from the reservoir. Because the device can receive wireless signals, it could also be designed so that drug release is triggered by a glucose monitor when the wearer's blood sugar drops below a certain level. The researchers also tested the device with a powdered version of epinephrine. They found that within 10 minutes of drug release, epinephrine levels in the bloodstream became elevated and heart rate increased. In this study, the researchers kept the devices implanted for up to four weeks, but they now plan to see if they can extend that time up to at least a year. Typically, when a medical device is implanted in the body, scar tissue develops around the device, which can interfere with its function. However, in this study, the researchers showed that even after fibrotic tissue formed around the implant, they were able to successfully trigger the drug release.

Source https://scitechdaily.com/mits-tiny-new-device-could-save-diabetics-from-deadly-blood-sugar-crashes/

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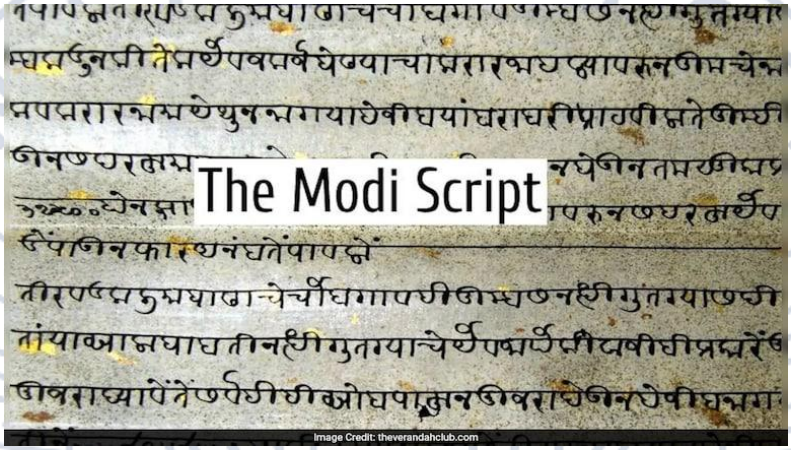
ENGINEERING INNOVATION IN INDIA

IIT Roorkee Develops World's First AI Model to Read and Convert Ancient Modi Script

The Indian Institute of Technology (IIT) Roorkee has recently developed the world's first Artificial Intelligence (AI) model capable of transliterating -the process of converting text from one writing system (alphabet) to another and prioritising representing the sounds of the original language -the historic Modi script into the Devanagari script. This AI model can convert previously unseen Marathi (in Modi script) text into Devanagari, promoting digitisation, transcription, and academic research. The Devanagari script is widely used for languages such as Hindi, Sanskrit, Marathi and Nepali. According to IIT Roorkee's research paper on the breakthrough, researchers used a dataset comprising over 2,000 images of Modi script paired with corresponding Devanagari text to train the AI model. These examples help the model learn patterns necessary for accurate transliteration.



The Modi script was used to write the Marathi language during the medieval period. It was commonly applied in domains such as land records, property documentation, yoga, and medieval science. According to IIT Roorkee's research paper, 40 million documents written using the Modi script have not been yet transliterated and only a few experts in this domain can transliterate this into English or Devanagari. Transliterating these documents could provide valuable insights into India's rich medieval history and scientific heritage. The research team at the IIT Roorkee faced several challenges while developing the AI model, including: The first challenge was the script's cursive nature- first, a horizontal line is drawn and a letter is drawn in such a way that it starts and ends at the line. The script's diverse writing styles, and issues like angular strokes, broken lines, and blurring make accurate recognition difficult. A key challenge was not having a larger dataset to support the better performance of the model. The current dataset used in the AI model includes documents from three medieval periods: Shivkali, Peshwekali, and Anglakali. Incorporating documents from other historical eras, such as the Adyakalin and Yadavkalin periods, could enhance the model further. These additions would help the AI learn more complex and robust patterns, minimising overfitting-where the model performs well on training data but poorly on new unseen data.

Source: https://www.ndtv.com/education/iit-roorkee-develops-worlds-first-ai-model-to-transliterate-the-modi-script-8903705

Note: *Fellows are requested to forward their achievements/achievements of their organziation to be featured under the heading "Engineering Innovation in India".*

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