Annual Report
2023-24

Indian National Academy of Engineering

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Contents

Foreword

At the outset, I take this opportunity to convey my greetings and warm wishes to the Former Presidents, Council Members, Fellows, Foreign Fellows, Young Associates, and Officials of INAE for happy, healthy, and prosperous times ahead. As you are all aware, INAE is on the road to financial and administrative autonomy in light of Government directives and the Fellows and Foreign Fellows have played a very supportive role to achieve milestones on this journey in response to letters of appeal from the Academy. As mentioned earlier, funding to INAE in the form of grant-in-aid is likely to stop w.e.f. April 1, 2025 and funding has been reduced over the last two years. In spite of this financial crunch, it is a matter of pride that INAE has remained un-waivered and has conducted all its flagship and major events successfully maintaining highest standards of technical content, outreach and impact across the nation. I am happy to inform that as a new activity, the International Cooperation Division (ICD), Department of Science and Technology (DST) has entrusted INAE to implement India-Taiwan joint program from 2023 onwards and a portion of administrative expenses shall be met with the overheads accrued from the implementation of the project by INAE.

INAE has worked out a strategy to generate a Corpus Fund of Rs 100 crores to ensure its sustainability with financial and functional autonomy seeking contributions from (i) Corporate Donations/Membership; (ii) Institutional Membership (Academic and R&D institutions); (iii) Individual Donations/Membership; (iv) Corporate Social Responsibility (CSR); (v) Government/ Projects; and (vi) Publications. Many of our esteemed Fellows have already contributed to this cause, voluntarily and with alacrity. INAE gratefully acknowledges their contributions to bolster our collective efforts and resolution. We approached several Corporate Houses and Leaders to contribute either through their company or by themselves. Nearly a dozen Engineering Institutions have enrolled themselves as our Institutional Members. Many more have evinced interest in joining INAE soon.

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. I appeal to all Fellows to support these initiatives and help facilitate a greater number of Memberships in all three categories – Institutional, Corporate and Individual Memberships.

At this juncture, let me recapitulate the important events held during the last one year. The 37th Foundation Day Function of Indian National Academy of Engineering (INAE) was held on 20th April 2023 at IIT Delhi in hybrid mode. The Guest of Honour, Prof Rangan Banerjee, FNAE, Director, IIT Delhi gave a thought-provoking talk on “The Challenge of Net Zero and India’s Energy Transition” followed by an enlightening address on “Climate Change and India’s Pathway” by the Chief Guest, Dr VK Saraswat, FNAE, Member, NITI Aayog who spelt out the national priorities in the field of India’s Energy Security and new and green energy technologies for a low carbon economy.

This year, 17th National Frontiers of Engineering (NatFoE), annual flagship event of INAE was organized under SERB-INAE Conclaves on Atmanirbhar Technologies - Engineering Secured Future during June 24-25, 2023 in collaboration with Birla Institute of Technology Mesra. Four themes covered during the event were Mining Technology -Mastering Depth & Exploration; AI, GPT & Robotics - Technology of Future; Smart Water Harvesting & Cleaning - Engineering Water and Embracing Futuristic Technologies to make Engineering Education Alluring. The Innovation in Manufacturing Processes (IMP) – 2023 was dovetailed with event on June 26, 2023 as a national level project competition for engineering students & practitioners so as to engage them to excel in their career paths.

INAE and GITAM University Visakhapatnam successfully organized INAE Youth Conclave 2023 during November 3-4, 2023 under the umbrella of SERB-INAE Innovation Hackathon. The event aimed to provide a platform to the country's youth to express their technological creativity and ingenuity and demonstrate their ability to innovate towards finding solutions under the theme: "Innovation and Technology for Global Challenges". Over 800 students from engineering colleges/institutions from across the country participated in this event which shall inspire them to take up innovative activities.

Similarly, Engineers Conclave 2023 (EC-2023) was organized from October 5-7, 2023 at Raja Ramanna Centre for Advanced Technology (RRCAT) in Indore. The event was overall coordinated by RRCAT and jointly organized by INAE and UGC-DAE- Consortium for Scientific Research (CSR), Indore, with the Devi Ahilya Vishwavidyalaya (DAVV) and IIT Indore as partner institutes. With the two themes focusing on "Laser Technologies for Emerging Engineering Challenges" and "Engineering and Technology for Clean and Green India @2047," the event brought together engineers, scientists, researchers, and industry leaders to explore and discuss cutting-edge technologies and sustainable solutions. The event an astounding success. Actionable recommendations emerged are being followed up with the concerned Government Departments/Agencies for consideration.

INAE Annual Convention 2023 was organized on December 9-11, 2023 at Siksha 'O' Anusandhan University, Bhubaneswar in association with Siksha 'O'Anusandhan University, Bhubaneswar; Indian Institute of Technology (IIT) Bhubaneswar; CSIR- Institute of Minerals and Materials Technology (IMMT), Bhubaneswar and INAE Bhubaneswar Chapter. This was a mega event attended by Fellows, Foreign Fellows, Young Associates and Invitees and there was an overwhelming attendance. Mr. TV Narendran, FNAE, CEO & Managing Director of Tata Steel Limited, the Chief Guest of the Inaugural Function delivered a thought - provoking Inaugural Lecture on the vital role of steel industry in the economic development of the nation. A Book on "Diverse Space Applications" authored by Dr. BN Suresh, FNAE, Former President, INAE & Chancellor, Indian Institute of Space Science & Technology (IIST), Thiruvananthapuram was released during the event. The Annual Convention featured important meetings, Technical Sessions and Presentations and also the Induction Ceremony wherein newly elected Fellows and Young Associates were formally accepted into the rolls of the Academy.

INAE commemorates the National Technology Day, Engineers Day and National Science Day each year in which there is active participation. On National Technology Day on 11th May 2023, Mr. MV Kotwal, FNAE, Ex-Member of the L&T Board & President Heavy Engineering delivered a Talk online on "Technology – A Prime Mover for Growth". As part of Engineers' Day celebrations on 15th September 2023 a Panel Discussion was held on "Cyber Security and Cyber-Physical Systems". Eminent experts participated, and the discussion was focused on issues pertaining to Cyber Security & Cyber-Physical Systems which are important in current scenario. On National Science Day 2024 an online talk was delivered by Prof Uday B Desai, Vice President INAE & Former Director IIT Hyderabad on "Innovations, Entrepreneurship and Creating an Ecosystem" on February 28, 2024.

INAE conducts several unique activities and programs with the objective of fostering the growth of engineering and technology in the country. INAE also undertook several novel initiatives, noteworthy being the erstwhile SERB (now ANRF) -INAE Collaborative Initiative in Engineering. Several events were organized under joint SERB-INAE umbrella viz Conclaves on Atmanirbhar Technologies - Engineer-

ing Secured Future; Woman Engineers Program; Outreach Programs for North East, Jammu & Kashmir and Ladakh and Innovation Hackathon. INAE had received a tremendous response and the tradition was continued with the conduct of meaningful technical event and widespread participation of engineering community.

INAE had taken an initiative to constitute joint consultative committees with eminent organizations so as to align activities of INAE in the areas of national engineering interest. INAE currently has several Consultative Committees with following departments/establishments of Government of India such as Department of Science & Technology (DST), Defence Research & Development Organisation (DRDO), Indian Space Research Organisation (ISRO), Department of Atomic Energy (DAE), Council of Scientific & Industrial Research (CSIR), ANRF (erstwhile) SERB and All India Council for Technical Education (AICTE) which meet periodically to facilitate interaction and identification of topics on thrust areas of engineering for conduct of technical activities and programmes, studies, and events to these agencies for implementation. This year, a meeting of the DST-INAE Consultative Committee was held on January 5, 2024 in the office of the Secretary, DST wherein important issues on the way forward for the Academy were discussed.

I am happy to note that the drive to implement the INAE Digital Platform to facilitate INAE Fellows submitting nominations online for election to Fellowship for improved functioning and coordinating operations of the INAE Office has enhanced its utility and effectiveness. INAE Office functioned normally and all online meetings and selection of Fellows went as per schedule. I am extremely thankful to the Members of all Committees and Forum, especially the ten Sectional Committees who participated and fulfilled their commitment with utmost sincerity and helped the Academy maintain its professional excellence in a timely and efficient manner.

INAE being a Member-Academy of the International Council of Academies of Engineering and Technological Sciences (CAETS) actively participates in its programmes and convocations of global concern at national and international levels. INAE undertakes joint initiatives with several CAETS Member Academies. This year 6th INAE-National Academy of Engineering of Korea (NAEK) Workshop of the series was organized on August 29-30, 2023 in hybrid mode at two cities – New Delhi and Seoul. The theme of the workshop was "Perspective on Space Development". INAE delegation participated in the CAETS 2023 conference on "e2-mobility. Solutions and Opportunities," held in Zagreb in October 9-11, 2023. INAE nominated Experts for various Technical Sessions and several esteemed Fellows are Members of various Working Group/Committees. INAE's contribution in CAETS activities are always appreciated. The Royal Academy of Engineering, UK (RAEnG)- INAE Seminar was held as part of Bilateral Policy Exchange on "Green Hydrogen" from January 31-Feb 2, 2024 at National Chemical Laboratory (NCL), Pune. The objective of this exchange program on Green Hydrogen was to explore opportunities for cross-national learning to aid acceleration towards Green Hydrogen transition in India and UK. The event was an astounding success in terms of knowledge exchange, networking, and collaboration.

The "Transactions of Indian National Academy of Engineering – International Journal of Engineering and Technology" has increased in its outreach and visibility and I earnestly urge all INAE Fellows especially newly elected Fellows and Foreign Fellows to submit at least one manuscript each year.

I am delighted that the Local Chapters this year as well have organized a large number of webinars on topics of current engineering interest. I thank all concerned in the Local Chapter Committees for their active efforts and contributions. A special mention is made to the Brainstorming Session on 'Innovative Pathways for Hydrogen Development' jointly organized by INAE Delhi Chapter, International Solar Alliance (ISA) and INAE Forum on Energy on November 17, 2023 at New Delhi.

The Abdul Kalam Technology Innovation National Fellowship launched by INAE jointly with DST through SERB with the objective of promoting translational research leading to development of innovative technology has progressed well. Ten eminent nominees were conferred the subject Fellowship during this year. A total of fifty-seven awardees have been selected for conferment of this prestigious Fellowship

since its inception and at present forty -three Fellows are on the rolls who have filed patents based on their work and are progressing their translational work further.

Based on the meetings of the INAE Sectional Committees to discuss the way forward to generate quality expert reports on contemporary issues related to Engineering & Technology relevant to the country, that are the outcome of deeply researched studies or surveys on contemporary challenges, it is informed that INAE is in the process of publishing this year's reports in the form of perspective papers in a special issue of Transactions of INAE Journal shortly. This shall indeed make a deep impact on the visibility and outreach of INAE in the policy domain since these reports are unique and impactful.

The Academy is thriving and continuing its activities due to the active and significant contributions of the Fellows, Foreign Fellows and Young Associates. As I mentioned earlier, we at the Academy are looking forward and with the increasing support of the Fellows, Foreign Fellows and Young Associates shall go from strength to strength and shall progress on the road to fiscal and financial autonomy. The contributions of the Fellows and Young Associates are thankfully acknowledged as their response to INAE's call has always been overwhelming. The unparalleled contributions of the Fellows and Young Associates who are ever willing to spare their valuable time in furtherance of the activities and programs of INAE is commended and appreciated.

I express my gratitude to the former Presidents of INAE for their wisdom and guidance in taking the technical activities and programs of the Academy to greater heights of excellence. I look forward to continued and dedicated support of the Fellowship and Young Associates in the future years both in technical activities as well as strengthening of the financial status of the Academy through corpus building activities. I urge all to help in the process of soliciting individual and corporate donations, garnering of Corporate and Institutional Memberships and also Individual Membership. I personally have travelled across the country addressing meetings of Local Chapters and meeting with dignitaries to energize these initiatives and with due support of the Fellows, I am confident the same shall resonate and the Academy shall flourish as before with renewed enthusiasm and vigour. Undoubtedly, the Academy shall be robust not only in technical activities but also sound in resources and attain self-sustenance.

We at the Academy look forward to your active support and shall be delighted to seek your involvement in the new initiatives as well as in furtherance of the technical activities so as to foster the growth of engineering and technology in the country.

Jai Hind!

Indranil Manna
President, INAE

About the Academy

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 and technology and the related sciences for their application to solving problems of national importance. The Academy provides a forum for futuristic planning for country's development requiring engineering and technological inputs and brings together specialists from related fields as may be necessary for providing comprehensive solutions to the needs of the country.

INAE is the only engineering Academy in India. INAE is a Member of the International Council of Academies of Engineering and Technological Sciences (CAETS). The aims and objects of the Academy are given below.

(a) To promote and advance the practice of engineering and technology and the related sciences and disciplines (hereinafter referred to as 'Engineering') in India and their application to problems of national importance.

(b) To disseminate among its members information on all matters pertaining to 'Engineering' and to encourage, assist and extend knowledge and information connected therewith by publishing such proceedings, journals, memoires, and other publications as may be desirable and hold meetings, lectures, seminars, symposia etc.

(c) To interact, after due and detailed consideration, with professional bodies, engineering and scientific academies etc. already established or as may be established in future in India and abroad.

(d) To promote and safeguard academic and professional interest of persons involved in 'Engineering' (hereinafter referred to as 'Engineer' in India by laying down a code of ethics which shall be an obligation to be signed by all Fellows of the Academy on admission thereto).

(e) To provide an association of eminent 'Engineers' and to present at all academic forums research and developmental activities on 'Engineering' on mutually interactive and cooperative basis, both in India and abroad.

(f) To promote the National Policy on Education of the Government of India as announced from time to time, in all matters of technical education where the Academy is concerned.

(g) To assist the Government of India, the Local Governments, All India Council of Technical Education, and others in analysing, forecasting for the purpose of planning and formulating the policies in respect of education in 'Engineering' and ensuring the appropriate standard thereof.

(h) To offer the Government of India, the Local Governments and others, facilities for conferring with and ascertaining the views of 'Engineers' as regards matters directly or indirectly pertaining to 'Engineering' and to confer with the said Governments and others in cooperation with other fraternal professional bodies in regard to all matters pertaining to 'Engineering'.

(i) To encourage inventions, investigations and research and promote their applications for development of both organised and unorganised sectors of the national economy.

(j) To encourage and promote the pursuit of excellence in the field of 'Engineering'.

(k) To institute and establish Professorships, Fellowships, Studentships, Scholarships, Awards and other benefactions and to grant Certificates of Competency and Charter whether under any Act of Government of India or otherwise howsoever.

(l) To do all such other acts and things as are incidental or conducive to the attainment of the above objects or any one of them.

INAE Governing Council for the Year 2024

President : Prof. Indranil Manna, Vice Chancellor, Birla Institute of Technology (BIT), Mesra, Ranchi, Jharkhand [On lien from I.I.T. Kharagpur, W.B.] and Former Director, Indian Institute of Technology Kanpur, U.P.; Former Director, CSIR-Central Glass & Ceramic Research Institute (CGCRI), Kolkata.

Immediate Past President : Dr. Sanak Mishra, Member of the Governing Board of the Steel Research & Technology Mission of India. Formerly Managing Director, Rourkela Steel Plant and Director, Steel Authority of India Ltd. (SAIL); Vice-President, ArcelorMittal and CEO India Projects; Secretary General, Indian Steel Association; President, Indian Institute of Metals.

Vice-President *(Finance & Establishment)* : Prof. UB Desai, Professor Emeritus, IIT Hyderabad, Former Director, Indian Institute of Technology, Hyderabad

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Vice-President *(Fellowship,* Awards & Corporate *Communication)* : Prof. Sivaji Chakravorti, Professor, Electrical Engineering Department, Jadavpur University, Kolkata and former Director, NIT Calicut.

Chief Editor of -Publications : Prof. Amit Agrawal, Professor, Department of Mechanical Engineering, Indian Institute of Technology Bombay, Mumbai.

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Engg Section-III : Prof. Suhas S. Joshi, Director, Indian Institute of Technology Indore.

Engg Section-IV : Prof. GD Yadav, Emeritus Professor of Eminence, ICT and JC Bose National Fellow, 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; Adjunct Professor, University of Saskatchewan, Canada.

Engg Section-V : Dr. Archana Sharma, Outstanding Scientist, Director, Beam Technology Development Group, BARC, Mumbai.

Engg Section-VI : Dr. Aloknath De, Director-CTO Leadership and CTO-XTranssolutions; Former CVP & CTO-Samsung

Engg Section-VII : Dr. Tessy Thomas, Former Distinguished Scientist & Director-General, Aeronautical System, Defence Research and Development Organisation (DRDO), Bangalore.

Engg Section-VIII : Dr. Debashish Bhattacharjee, Vice President Technology and R&D Tata Steel Ltd., Kolkata.

Engg Section-IX : Prof. Rangan Banerjee, Director Indian Institute of Technology Delhi & Formerly, Forbes Marshall Chair Professor, Department of Energy Science and Engineering, Indian Institute of Technology Bombay, Mumbai.

Engg Section-X : Prof. Kripa Shanker, Visiting Professor, Mechanical Engineering Department, Indian Institute of Technology (BHU) Varanasi.

Department of Science & Technology (DST), Ministry of Science & Technology : Prof. Sushmita Mitra, J. C. Bose National Fellow, Professor HAG, Machine Intelligence Unit, Indian Statistical Institute, Kolkata.

Ministry of Education (Erstwhile MHRD) : Prof. Bhaskar Ramamurthi, Former Director, IIT Madras and Professor, Dept of Electrical Engg, IIT Madras

Department of Space (DOS) : Dr. VR Lalithambika, Professor of Practice, Department of Aerospace Engineering, IIT Madras; Former Distinguished Scientist and Director, Directorate of Human Space Programme, ISRO, Bangalore.

	All India Council for Technical Education (AICTE)	:	Prof. (Dr.) TG Sitharam, Chairman, All India Council for Technical Education (AICTE), New Delhi. Former Director, IIT Guwahati.
	Indian National Science Academy (INSA)	:	Prof. V Ramgopal Rao, Vice-Chancellor, Birla Institute of Technology & Science (BITS), (Pilani, Hyderabad, Goa, Dubai & Mumbai), and Former Director, Indian Institute of Technology Delhi, New Delhi.
	Defence Research & Development Organisation (DRDO)	:	Dr. BHVS Narayana Murthy, Distinguished Scientist and Director General Missiles & Strategic Systems, Office of the DGMSS, Hyderabad.
	Department of Atomic Energy (DAE)	:	Mr. RN Jayaraj, Formerly Chairman & Chief Executive, Nuclear Fuel Complex, Department of Atomic Energy, Hyderabad.
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	Federation of Indian Chambers of Commerce & Industry (FICCI)	:	Mr. Shyam Bang, Chairman, FICCI Taskforce on Manufacturing Excellence, FICCI, New Delhi.
	The National Association of Software and Services Companies (NASSCOM)	:	Mr. Siva Prasad Polimetla, Head- ER&D Initiative, NASSCOM, Hyderabad.

INAE Committees

The composition of the ten Sectional Committees is given below.

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Mr. VN Heggade
Dr. S Venkata Mohan
Prof. Souvik Mahapatra

Selection Committee – Young Associates

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Prof. Sivaji Chakravorti

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Dr. Anandavalli Narayanan
Prof. SN Tripathi
Prof. Baidurya Bhattacharya
Dr. Ranjita Bhagwan
Prof. C Bhattacharyya
Prof. Sushmita Sur Kolay

Selection Committee – Young Associates…….Contd..

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Dr. Jayanta Basak
Prof. Ranjan Ganguly
Dr. Dhananjaya Dendukuri
Prof. Bijoy Bhattacharyya
Prof. C. Balaji
Prof. Sunando Dasgupta
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Dr. PR Gogate
Dr (Mrs) Janhavi Raut
Prof Ashok Kumar Pradhan
Prof. Baylon G Fernandes
Prof Mahesh Kumar
Prof. Amitava Chatterjee
Prof. M Balakrishnan
Prof. Subhananda Chakrabarti
Dr. G Venkatesh
Dr Rajeev Shorey
Mr. MV Dhekane
Prof Joseph Mathew
Dr Debasis Chakraborty
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Dr DK Likhi
Dr. GK Dey
Dr. Shashank Chaturvedi
Prof. KS Reddy
Dr. Gopika Vinod
Mr Pradeep Chaturvedi
Dr. V Jayaraman
Prof. Ambarish Ghosh
Dr. Sharmila Mande
Dr. Yashwant Gupta

Youth Committee

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Prof UB Desai

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Dr. Manish Gupta
Prof. Yogesh M Joshi
Prof. Joseph Mathew
Prof D Roy Chowdhury
Prof. Manoj Kumar Tiwari

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Mr. JD Patil

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Dr. CP Ravikumar
Dr. Rajeev Shorey
Mr VN Heggade
Mr Arun Ramchandani
Dr. Aloknath De
Dr Rahul Tongia
Dr. Rajkumar Prasad Singh

Forum on Civil Infrastructure

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Mr. V.N. Heggade
Dr. S.K. Agarwal
Mr. Sanjay Pant
Prof. Manoranjan Parida
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Prof Manoj K Tiwari
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Chairman

Prof. Sivaji Chakravorti

Members

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Prof KK Pant
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Mr. B Prasada Rao
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Dr BC Roy
Prof VC Srivastava
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Prof. Prem Vrat
Mr. AP Mishra

INAE Team

Lt Col Shobhit Rai (Retd)
Deputy Executive Director

Ms. Pratigya Laur
Research Officer

Mr. Virender Kumar
Senior Manager (A&E)

Mr. Bhuwan Adhlakha
Manager (F&A)

Mr. Sheetal Sharma
Assistant Systems Engineer

Mr. Balwant Singh
Assistant Grade-I

Mr. Gourav D Kandalgaonkar
Assistant Grade-II

Mr. Satish Kumar Verma
Multi-Tasking Staff

Project/Contractual Team of INAE

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Dr. Geetanjali Sawhney
Project Coordinator-I

Ms. Mimansa Gulati Babbar
Project Scientist – II

Dr. Chanchal Mony
Principal Project Associate

Dr. Arushi Verma
Senior Project Associate

Mr. Ramachandran EP
Manager (A&E)

Mr. Rakesh Antil
Senior Assistant Grade-I

Mr. Piyush Verma
Project Assistant

New Initiatives during the Year

(a) **New Categories of Memberships Introduced in INAE, viz., Institutional Membership, Corporate Membership and Individual Membership and other initiatives for generation of INAE Corpus Fund**

On 06th May 2022, INAE received a letter from DST regarding Rationalization of Autonomous Bodies – Implementation of recommendations of Department of Expenditure, which meant disengagement of INAE gradually in 3 years and no Government Grant -in -Aid to INAE from 01 April 2025 onwards. The issue was deliberated in various high-level forum with the Government of India and it emerged that the Academy shall endeavour to achieve a path of functional and financial autonomy in order to fulfil its aims and objectives and furtherance of its activities. In addition, INAE being the only Engineering Academy in India, represents India in CAETS, an international body having engineering academies of 33 countries as members. It is imperative that INAE takes appropriate steps and measures to achieve financial and functional autonomy for which a well-defined strategy has been initiated. Accordingly, new initiatives were instituted, with consensus of the INAE Fellowship for raising funds by INAE as well as due approvals of DST for creation of a Corpus Fund account.

As recommended during the Special Governing Council meeting held on 30th November 2023 followed by the 149th Meeting of the Governing Council on December 9, 2023 and subsequently approved and adopted by the House during the Special General Meeting of Fellows held on December 11, 2023 at Siksha O Anusandhan University, Bhubaneswar in hybrid mode the six sources of generation of funds as well as engagement with the engineering environment, viz., (i) Corporate Donations/Membership; (ii) Institutional Membership (Academic and R&D institutions); (iii) Individual Donations/Membership; (iv) Corporate Social Responsibility (CSR); (v) Government/ Projects; and (vi) Publications**.** Larsen & Toubro Ltd. has agreed to be a donor under the Platinum category of INAE, to be released over the next five years in five equal instalments. So far about 10 premier Educational Institutions/Organizations have already become Institutional Member of INAE/accepted in principle for the same and each of them have/would contribute Rs.10 lakhs against Institutional Membership of INAE in near future. An appeal was made to the Corporate Leaders who have been elected as INAE Fellows affiliated to the category 'Industry" may contribute to this noble cause and help INAE in strengthen its current drive for generation of funds to attain financial and functional autonomy. By virtue of implementing proposed schemes for generation of funds with immediate effect, certain relevant Rules & Regulations of INAE as recommended by the Governing Council were amended with immediate effect. The process of inviting nominations from corporates, institutions and individuals under different categories of Membership has commenced and is being progressed vigorously. So far, a number of Institution expressed interest and opted to become INAE Institutional Member. Accordingly, a list of INAE Institutional Members upto 31st March 2024 is as under:

1	Indian Institute of Management (IIM), Mumbai [erstwhile National Institute of Industrial Engineering (NITIE)]
2	SRM University - AP
3	Indian Institute of Technology -Indore
4	Defence Institute of Advanced Technology -Pune
5	Indian Institute of Technology -Bombay
6	Indian Institute of Technology -Jodhpur

7	Indian Institute of Technology -Delhi
8	IIST Trivandrum
9	IIT Gandhinagar
10	NIAMT Ranchi
11	IIT Mandi
12	BIT Mesra
13	IIT Goa

(b) 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.

In this regard, a MoU was signed between INAE and ICD, DST on May 15, 2023 in presence of the Secretary, DST, and the President, INAE wherein it was discussed to launch a call for proposal (CFP) for the projects to be implemented from 2024 onwards and to implement the eleven approved projects for year 2023.

For the CFP 2022, the following 11 projects under the CFP 2022 were assigned to INAE for further implementation and processing:

1 Title: Development and Growth of industry scale DS and CCZ silicon ingots for PV Applications
Indian PI: Dr. Manikkam Srinivasan, Sri Sivasubramaniya Nadar (SSN) College of Engineering, Noida
Taiwanese PI: Prof Chen Jyh-Chen. Department of Mechanical Engineering, National Central University, Taiwan

2 Title: Combined Machine Learning and Molecular Simulation for New Broadly Neutralizing Antibodies against COVID-19 and AIDS
Indian PI: Prof. Prabal K. Maiti, Indian Institute of Science Bangalore
Taiwanese PI: Prof Shiang-Tai Lin, National Taiwan University,
Taipei

3 Title: Nanoconfinement of hydrides in functionalized porous hybrid materials based on silica, MOF, and polymers for tunable hydrogen release
Indian PI: Prof. Leena Nebhani, Indian Institute of Technology Delhi
Taiwanese PI: Prof Cheng-Yu Wang, National Yang Ming Chiao Tung University

4 Title: Renewable energy storage based on reversible PEM Fuel Cell for grid applications
Indian PI: Dr. Satya Sekhar Bhogilla, IIT Jammu
Taiwanese PI: Prof Jenn-Kun Kuo, National Sun Yat-sen University

5 Title: AI/ML-based Reconfigurable Intelligent Surface Assisted IoT Networks
Indian PI: Dr. Sudip Biswas, Indian Institute of Information Technology, Guwahati
Taiwanese PI: Prof Meng-Lin Ku, Department of Communication Engineering, Taiwan

6 Title: A numerical and experimental study of the water-drop-based mobile energy harvesting on different hydrophobic and superhydrophobic substrates
Indian PI: Dr. Bahni Ray, IIT Delhi
Taiwanese PI: Prof An-Bang Wang, Institute of Applied Mechanics, National Taiwan University, Taiwan

7 Title: Vaccine development for Streptococcus agalactiae and Streptococcus Iniae in tilapia and hybrid grouper
Indian PI: Dr. Preetham Elumalai, Cochin University of Science and Technology, Cochin
Taiwanese PI: Prof Shih-Chu Chen, National Pingtung University of Science and Technology, Taiwan

8 Title: Probing Ion Transport and Osmotic Energy Harvesting through Sub-nm Channels in Two-Dimensional Metal-Organic Frameworks
Indian PI: Dr. Gopinadhan Kalon, IIT Gandhinagar
Taiwanese PI: Prof Li-Hsien Yeh, National Taiwan University of Science and Technology

9 Title: AI/ML- based Channel Estimation and Beamforming for mmWave MIMO-OTFS in 6G
Indian PI: Dr. Kuntal Deka, IIT Guwahati
Taiwanese PI: Prof Yuan-Pei Lin
Dept. Electrical Engr. And Institute of Electrical and Control Engineering, National Yang Ming Chiao Tung University Hsinchu, Taiwan

10 Title: Integration of group-III oxide and III-nitride-based wide bandgap semiconductors for next-generation electronics applications
Indian PI: Dr. Ankush Bag, IIT Guwahati
Taiwanese PI: Prof Jen-Inn Chyi, National Central University,
Taiwan

As per practice, for year 2023, call for proposals were invited from June 1- July 31, 2023 in the following broad areas and a total of 132 proposals were received, out of which 123 eligible proposals were considered:

- Artificial Intelligence, IoT (Internet of Things), Big Data, Cyber Security (17 proposals)
- Green Energy Technology/ Renewable Energy (solar energy and bioenergy)/ Clean Energy (46 proposals)
- Micro/Nano-electronics, Embedded Systems & Sensors (20 proposals)
- Biotechnology, Healthcare including Functional Genomics, Drug Development and Biomedical Devices, Agriculture and Food Sciences (36 proposals)
- Aerospace Technology (4 proposals)

For evaluation of the proposals received, a Project Evaluation Committee (PEC) was constituted by DST. The proposals received under respective domain were forwarded for evaluation to the domain experts from the constituted PEC.

In order to finalize the result, a Joint Committee Meeting (JCM) between India and Taiwan was held on December 6, 2023 wherein the areas for the next call for proposal were also discussed. Based on the scores received from domain experts and the recommendation received from the Taiwanese counter-parts, a total of following 15 proposals have been approved during the JCM:

1 Title: Development of portable NMR prototype and its application in medical field using AI/ML
Indian PI: Dr Arup Polley
Associate Professor, Indian Institute of Science, Bangalore
Taiwanese PI: Prof Henry Horng-Shing Lu, Distinguished Professor, National Yang Ming Chiao Tung University

2 Title: CO2 Photoreduction For Producing Value Added Fuels Using Halide Perovskite Heterocatalysts
Indian PI: Prof Soumitra Satapathi, Associate Professor, Department of Physics for sustainable energy, IIT, Roorkee
Taiwanese PI: Prof Di-Yan Wang, Associate Professor, Department of chemistry, Tunghai University

3 Title: Localizing fast radio bursts with BURSTT
Indian PI: Dr Saurabh Singh, Associate Professor I, Astronomy & Astrophysics, Raman Research Institute Raman Research Institute, Astronomy & Astrophysics, C. V. Raman Avenue, Bengaluru, Karnataka
Taiwanese PI: Prof Ue-Li Pen, Distinguished Research Fellow & Director, Institute of Astronomy and Astrophysics, Academia Sinica (ASIAA), 106, Taiwan, Taipei City

4 Title: Sustainable Hydrogen Production, Storage and Utilization using Hybrid Photoelectrocatalysts
Indian PI: Dr Rakesh K Sharma, Professor, Department of Chemistry, Indian Institute of Technology Jodhpur
Taiwanese PI: Prof Jeffrey C. S. Wu Professor, Department of Chemical Engineering, College of Engineering, National Taiwan University (NTU)

5 Title: Design and Technology Co-Optimization of Stacked Nanosheet RF for 6G Applications
Indian PI: Prof Yogesh Singh Chauhan, Professor, Department of Electrical Engineering, Indian Institute of Technology, Kanpur
Taiwanese PI: Prof Chee Wee Liu, Distinguished/Chair Professor, National Taiwan University

6 Title: Self-powered wound dressing for treatment of diabetic foot ulcers
Indian PI: Dr Siddharth Jhunjhunwala, Associate Professor, Indian Institute of Science, Bangalore
Taiwanese PI: Prof Zong-Hong Lin, Professor, National Taiwan University

7 Title: Design and synthesis of dendrimer-based organic photocatalysts for the applications in sustainable clean energy
Indian PI: Dr Rajamalli Pachaiyappan, Assistant Professor, Materials Research Centre, Indian Institute of Science, Bangalore
Taiwanese PI: Prof Ho-Hsiu Chou, Professor, Department of Chemical Engineering, NTHU, Taiwan

8 Title: Room Temperature Ferroelectricity in Two-Dimensional Janus TMDs for Image Processing
Indian PI: Prof Shaibal Mukherjee, Professor, Department of Electrical Engineering, Indian Institute of Technology Indore
Taiwanese PI: Prof Yu-Lun Chueh, Professor, Department of Materials Science and Engineering, National Tsing Hua University

9 Title: Heterogeneously Integrated CMOS-Piezoelectric MEMS Low Phase Noise Oscillator
Indian PI: Dr Gayathri Pillai, Assistant Professor, Indian Institute of Science, Bangalore
Taiwanese PI: Dr Ming-Huang Li, Assistant Professor, National Tsing Hua University

10 Title: Highly Efficient Sperm Sorting Chip and Commercialization
Indian PI: Dr Tuhin Subhra Santra, Associate Professor, Engineering Design, Indian Institute of Technology Madras, India
Taiwanese PI: Prof Fan-Gang Tseng, Distinguished Professor, Engineering System Science, National Tsing Hua University, Taiwan

11 Title: Solar Fuels: Green H2 via Solar Thermochemical Splitting of Water and Conversion of CO_2 to CO over Reducible Oxides
Indian PI: Prof Sounak Roy, Head of the Department, Professor, Department of Chemistry, BITS Pilani Hyderabad Campus
Taiwanese PI: Dr Bor Kae Chang, Associate Professor, Dept. of Chem. & Mat. Engg., National Central University, Taiwan

12 Title: Design and Development of Self energized battery operated FEP based Tribo-electric nanogenerator coupled for machine tool condition monitoring
Indian PI: Prof Anand Palani Iyamperumal Professor, Indian Institute of Technology Indore
Taiwanese PI: Prof Chuan-pu Liu, Professor, National Cheng Kung University, Taiwan

13 Title: Design and Development of Group-III nitride-based LEDs for UV-Blue region for underwater communication Indian PI: Dr Nikhil Deep Gupta, Assistant Professor, Visvesvaraya National Institute of Technology (VNIT), Nagpur
Taiwanese PI: Prof Ray Hua Horng, Professor, National Yang Ming Chiao Tung University/ Hsinchu, Taiwan

14 Title: Feasibility study of emergency cooling in an air-cooled data-centre using PCM (phase change material) thermal module
Indian PI: Prof Atul Bhargav, Professor, Indian Institute of Technology Gandhinagar, Palaj, Gandhinagar
Taiwanese PI: Prof Chi-Chuan Wang, Chair Professor, National Yang Ming Chiao Tung University

15 Title: Experimental and Numerical Study on Combustion Characteristics of the Green Propellants with Nitrous Oxide Fuel Blend
Indian PI: Prof Amit Kumar, Professor, Indian Institute of Technology Madras
Taiwanese PI: Prof Hsin-Yi, Professor, Chang Gung University, Taiwan

During the JCM, the domains for the call for proposals to be launched in June 2024 in the following domains was also decided.

- Artificial Intelligence, IoT (Internet of Things), Big Data, Cyber Security

- Green Energy Technology/ Renewable Energy (solar energy and bioenergy)/ Clean Energy
- Semiconductors and communications
- Biotechnology, Healthcare including Functional Genomics, Drug Development and Biomedical Devices, Agriculture and Food Sciences
- Aerospace Technology
- Manufacturing processes

It was decided to organize four joint workshops on "Biomanufacturing in medicine" during first half of the year in India, "Semiconductor/Communications" during first half of the year in Taiwan, "Cybersecurity/AI" and "Quantum computation/ Communication" during second half of the year 2024. The workshops are planned to be held during the desired timeframe. The call for proposals on the above-mentioned areas will be launched between June 1-July 31, 2024 and the same can be viewed at INAE website www.inae.in

Joint Activities with ANRF (erstwhile SERB)

INAE has partnered with Science and Engineering Research Board (SERB) (now ANRF) in the year 2022. In this regard a Letter of intent was signed by the Secretary, SERB and President, INAE on November 9, 2021. As an outcome, the following four initiatives under the umbrella of 'Collaborative Initiative in Engineering' were planned to be organized during this year.

a. SERB-INAE Conclaves on *Atmanirbhar* Technologies - Engineering Secured Future

b. SERB-INAE Woman Engineers Program

c. SERB-INAE Outreach Programs for North East, Jammu & Kashmir and Ladakh

d. SERB-INAE Innovation Hackathon

The initiative has progressed well, and various events have been organized for the year 2023-24 under all the four initiatives. The events/programs organized under the subject initiative are as mentioned below:

(a) ANRF (erstwhile SERB)-INAE Conclaves on Atmanirbhar Technologies - Engineering Secured Future

This year, 17th National Frontiers of Engineering (NatFOE), annual flagship event of INAE was organized under SERB-INAE Conclaves on *Atmanirbhar* Technologies - Engineering Secured Future during June 24-25, 2023 in collaboration with Birla Institute of Technology Mesra. The main objective of the event was to encourage Young Engineers (ages ~27-45) from industry, universities, and R&D labs to discuss leading-edge research and technical work across a range of engineering fields. This event was attended by young researchers across various academic institutions, R&D laboratories and industries as speakers and participants.

Prof C Jeganathan, Dean RIE, Coordinator, BIT Mesra delivered the Welcome address and explained the objectives of the symposium. The inaugural program was presided over by Prof Indranil Manna, President, INAE where he briefed about the background of the collaboration of Science and Engineering Research Board with INAE through various initiatives. He also emphasized the role of INAE to promote and advance the practice of engineering and technology and to identify and recognize top engineering professionals in the country. Shri Jayant Sinha, Member of Parliament, Lok Sabha graced the occasion as the Chief Guest. He enthused and motivated the august audience of young engineers for achieving great heights in their endeavours. He also delivered a talk on "Getting to the Green Frontier: A Net-Zero Development Model for India" wherein he interacted with the students on the Green Frontier Model and laid down the challenges that might occur in the near future due to climate change. Lt. Col Shobhit Rai (Retd), Deputy Executive Director, INAE expressed his heartful gratitude and regards to all the dignitaries, coordinators of the event and SERB.

There were technical sessions on four thematic areas in the symposium and each session had one plenary talk and three keynote talks by experts from the relevant disciplines. All the technical sessions were conducted by the respective theme conveners. Four themes covered during the event were (i) Mining Technology -Mastering Depth & Exploration (ii) AI, GPT & Robotics - Technology of Future (iii) Smart Water Harvesting & Cleaning - Engineering Water (iv) Embracing Futuristic Technologies to make Engineering Education Alluring. In addition, a special session on *Azadi ka Amrit Mahotsav* was organized to commemorate the seventy-fifth year of Indian independence and the achievements of the country during this period. There was total 20 presentations by domain experts in the thematic areas and Plenary Talks by eminent speakers during the Symposium.

The Plenary talk of the first session on Mining Technology - Mastering Depth & Exploration was given by Prof Arvind Kumar Mishra, Director of CSIR-Central Institute of Mining and Fuel Research, Dhanbad (CIMFR). His talk was on "Emerging Trends of Exploration and Extraction Technologies for Deep-Seated Coal Deposits." He stressed that Mining contributes to 18% of export earning of country. Growth of this sector is expected with Make in India and Made in India. The contribution of mining industry to GDP is 2.5 to 3%. Steel industry, fertilizer, cement industry is dependent on mining. The focus should be on Net zero mining which would otherwise result in consequences (climate change) such as drought, extreme summer, cloud burst, forest fire, etc. The first keynote talk was given by Dr Debasis Bandhopadhyay, CMPDI (HQ), Ranchi. His talk was on "Numerical Groundwater Flow Modelling for Impact assessment due to Coal Mining activity at Jharia Coalfield, Dhanbad, Jharkhand." He laid stress on the importance of hydrogeologist in mining. He explained the role of numerical ground water flow modeling for impact assessment due to coal mining activities. The second keynote speaker was Dr PS Paul, IIT (ISM) and delivered talk on "Assessment of Machine Vibration Impact on the HEMM operators in mechanized Underground Mines Using Machine Learning Techniques." The third keynote talk was delivered by Dr Siddhartha Roy, CMPDIL (HQ), Ranchi. His topic was "Mining Depth and Upgrading of Mine Mechanization." He laid stress on the importance of deep mining and how machinery should be upgraded for the same. The *Azadi* talk was delivered by Prof. Jayanta Bhattacharya, IIT Kharagpur on "How to Prepare for "*Amrit Kaal*" of Indian Mineral Sector: Legal and Structural Reforms Remain."

The second session on AI, GPT & Robotics - Technology of Future was graced by Dr Manish Gupta, Director, Google Research as plenary speaker. The topic of his talk was "What an Amazing Time to be an AI Researcher." He explained AI trends and deep learning and a new paradigm which is the Foundation Model which is pre-trained on large model with self-supervision. The lacuna includes how face can be recognized by deep neural network by image classification and Automatic speech recognition using deep learning and machine translation. He also explained Regenerative model which is a large pretrained model of self-supervision, for example BERT. The first keynote lecture was given by Dr. Swagatam Das, Indian Statistical Institute, Kolkata on the topic "Deep Generative Machine Learning: Foundations and Perspectives." He explained deep generative models such as GAN, VAE, low flow-based model and diffusion model. The challenges include as mentioned were bias, lack of explanability, ethical concern and misinformation. The second keynote lecture was given by Dr Anuj Kumar Sharma, AKTU Lucknow on the topic "Control and Coordination of Multi Robot System." He explained multi-robot systems with centralized, decentralized and hybrid approaches for control and coordination. A computer vision-based control for centralized system and path design using ant colony optimization for decentralized approach was also suggested by him. The third keynote lecture was given by Mr Gopi Krishna Nuti, Autodesk, Bangalore on the topic "AI/ML use cases in construction industry." The *Azadi* talk in this session was delivered by Mr Joy Mustafi, MUST Research, Hyderabad on "Applications of Artificial Intelligence Research."

The plenary talk on Smart Water Harvesting & Cleaning - Engineering Water was delivered by Prof T. Pradeep, IIT Madras as a plenary speaker. The topic of his talk was "Affordable Clean Water Using Advanced Materials**.**" He stressed on the need for providing access to clean water using nano-technology. He also discussed about the importance of materials in water purification. The first keynote lecture was given by Prof VC Srivastava, IIT Roorkee. His topic was "Catalysis and engineering challenges towards carbon-di-oxide conversion to organic carbonate." He stressed on the utilization of carbon dioxide, its control and convert to useful products. He also explained the Methanol economy, its production and utilization for various usage. The second keynote lecture was given by Dr J Rajesh Banu, Central University of Tamil Nadu on topic "Recent advances in the removal of emerging pollutants from water and wastewa-

ter." He discussed about the problems such as removal of nutrients (nitrogen and phosphorus) and excess sludges in wastewater treatment. The third keynote lecture was given by Dr Pradip P Kalbar, IIT Bombay delivered the invited talks in this session. His topic was "Smart and Innovative Technologies for Equitable Water Supply to Every Household." The *Azadi* talk was given by Dr Indira Khurana, Director, Research at the Safai Karmachari Andolan, NGO Tarun Bharat Sangh. Her topic was "Climate Adaptation Through Practical Science and Technology: Experiences of Community Water Conservation." Her talk included details such as countries at flood risk, impact of drought, flood and climate change, etc. Her real-world examples of how droughts affected the lives of people and how places with scanty rainfall can receive plenty of water for their needs. She stressed on the fact that the world is at peril with risk of drought or flood.

The Plenary talk of the session on Embracing Futuristic Technologies to make Engineering Education Alluring was given by Dr Rajeev Shorey, IIT Delhi as a plenary speaker. Dr Shorey spoke about "Recent Investigations in the Intersection of Machine Learning and Edge Computing." Dr. Shorey stated the importance of collaboration and digital transformation in research. The role of AI/ML in Communication network was also highlighted. The first keynote lecture was given by Dr. Tapan K. Gandhi, IIT Delhi on the topic "Advancing Science and Serving Humanity." He discussed a case study on Spinal injury problem and how AI can be positively used for such applications. The second keynote lecture was given by Dr. Kaushal Kumar Bhagat, IIT Kharagpur on the topic "From Theory to Experience: Enhancing Engineering Education with Augmented and Virtual Reality." His lecture was centred around enhancing engineering, education with AR/VR. He started with the employability issue of engineering graduates in India. The third keynote lecture was given by Dr. Manjira Sinha IIT Kharagpur on "Inclusion in Engineering Education: How Technology can Play a Key Role.". The *Azadi* talk was given by Dr. T V Bharat, IIT Guwahati on the topic "Current Scenario of Engineering Education in Technical Institutions and a Way Forward." Prof. T.V. Bharat talked on the topic current scenario of engineering education by highlighting demand of various branches of engineering in educational institution. He displayed the lab equipment's in a civil engineering department of IIT Guwahati.

Dignitaries to include Prof. Indranil Manna, FNAE, President, INAE and Vice-Chancellor, BIT Mesra and Shri Jayant Sinha, Hon'ble Member of Parliament and Chief Guest at the Inaugural Ceremony of NatFoE 2023 held during June 24, 2023 at BIT Mesra

Dr Manish Gupta, FNAE, Director, Google Research delivering his plenary talk

Participants attending the second plenary talk

Prof T. Pradeep, FNAE, IIT Madras Presenting a Memento to a speaker

A large number of Research Scholars and Faculty Members of BIT Mesra also attended the Symposium and helped towards the organization of the symposium. Through this symposium, participants got the opportunity to form connections and opportunity to engage with successful alumni, faculty, and professionals with vast experience and professional standing. The symposium provided participants and students alike access to knowledge and insights that helped them in their professional journeys as engineering professionals and students.

Innovations in Manufacturing Practices (IMP) 2023

Under the umbrella of SERB-INAE Conclaves on *Atmanirbhar* Technologies - Engineering Secured Future, Innovation in Manufacturing Processes (IMP) – 2023 was conducted by INAE at BIT Mesra on June 26, 2023. It is a national level project competition open to all engineering students and practitioners with the endeavour to engage with the engineering youth of the country. The Innovation in Manufacturing Processes (IMP) – 2023 was dovetailed with the 17th National Frontiers of Engineering (NatFoE-23) Symposium.

In addition to undergraduate and postgraduates (Master's students) categories, start-ups were also invited scholars to showcase their project work related to innovations in manufacturing sector. Students participated from various eminent institutions such as NIT Rourkela, NIT Patna, NIT Jamshedpur, IIT (ISM), Dhanbad, IIEST Shibpur, IIT Guwahati, RCC Institute of Technology, Kolkata, Rai University, Sido Kanhu Murmu University, Dumka, BIT Polytechnic and BIT Mesra.

The competition received an overwhelming response with a registration of total 62 teams. Entries were invited in the form of three-minute video (mp4) of the functioning model process, operations and a description of 250 words write-up document. Out of all these entries, 16 entries were shortlisted for the final pitching in front of the Jury members. The Pitching session included many innovative ideas in areas such as Drilling Technology, Sustainable E.V. development, and Sustainable biodegradable paper packaging from waste material. A total of six prizes, three winners and three runner-up prizes of Rs 40,000 and Rs 20,000 respectively in the undergraduate, postgraduate and Start-ups/PhD categories were conferred.

The Chief Guest at the Inaugural ceremony of IMP-2023 was Prof Sivaji Chakravorti, Vice President, INAE, and the Guest of Honour cum Jury members were Dr. Hariharan, Former General Manager, HRD - MTI SAIL Ranchi, Dr. P.K. Chatterjee Former Chief General Manager, MECON Ltd., Ranchi and Mr. M.K. Gupta, Principal, Jharkhand Tool Room, Govt of Jharkhand. The session began with the Welcome Address by Dr. C. Jeganathan, Dean of Research, Innovation and Entrepreneurship, Coordinator of IMP-23 BIT Mesra. He welcomed the dignitaries and briefed about the competition and about the details of various participating institutions. The jury members of IMP-2023 addressed the gatherings and stressed about the need for Innovation in India's Manufacturing Industry. The Chief Guest Prof Sivaji Chakravorti highlighted the importance of IMP as an opportunity for young engineers and entrepreneurs in this national level project competition. Prof Indranil Manna, President, INAE & Vice Chancellor, BIT Mesra also addressed the audience with pertinent information about India's glorious past in the field of manufacturing and emphasized the need for sustaining the GDP through manufacturing industry since it can serve to strengthen national security, provide job opportunities, and stimulate the growth of a sustainable economy. Prof Indranil Manna, Vice Chancellor, BIT Mesra presented Memento as a token of gratitude to Chief Guest and jury members. Dr. Richa Pandey, Assistant Professor, Mechanical Department, BIT Mesra proposed the vote of thanks.

Shri N. C. Agrawal, CEO of Meditron, Ranchi, was the Chief guest of this valedictory function. Shri N.C Agarwal addressed the gathering with his experience in the entrepreneurial journey, and motivated

and congratulated all the participants. In the Undergraduate category, first prize was awarded to Ankit Niraj Pandey and Team from Parul University, Gujarat for their Project on "Drilling Technology", and the second prize was awarded to Bogi Manish Kumar and Team from IIT(ISM) Dhanbad for their project on "AI Chat/GPT and Robotics". In the Post-Graduate Category, the first prize was awarded to Pranjal Pandey and Team from BIT Mesra for his project on 'AI, Chat/GPT and Robotics', and the second prize was awarded to Ms. Nistha Mukhopadhyay and Team from BIT Mesra for their project on "Biodegradable Packaging Paper from Waste Material." In the final category comprising of Start-ups/PhD the first prize was awarded to Piyali Mukherjee and Team from IIEST Shibpur, Kolkata for their project on "Healthcare Diagnostics", and the joint-second prize was shared between Akanksha Kumari and Team, BIT Mesra and Sweta Satpathy and Team BIT Mesra for their projects on "Key Intervention to Solve Micronutrient Deficiencies" and "High-Speed Non-Invasive, Biomechanical Profiling for Medical Purposes" respectively. The total number of participants of Innovation in Manufacturing Processes (IMP) – 2023 were thirty-six.

Prof Sivaji, Chakravorti, FNAE and Vice-President, INAE,
Chief Guest of Inaugural Session of Innovations in Manufacturing Practices (IMP) 2023

Participants/Winners with Jury members of IMP 2023

Pitching session Undergraduate Category

Certificate Distribution ceremony during IMP2023

Certificate Distribution ceremony during IMP 2023

(b) SERB-INAE Woman Engineers Program

i) Symposium for Young Women Engineers on 'Technologies forsustainable developments in North-Eastern Region' at Tezpur University, Assam

The 2-days symposium for Young Women Engineers (<45 years of age) on "Technologies for sustainable developments in North-Eastern Region" was successfully organized at Tezpur University with collaboration with Indian National Academy of Engineering (INAE) and Science and Engineering Research Board (SERB) during Nov 20-21, 2023. The subject event was organized under the aegis of SERB-INAE Woman Engineers Program. The symposium emphasized on the role of engineering in developing tech-

nologies for sustainable future for that region. Amongst the invited resource personals, diversity aspect was ensured not only in terms of gender (Female: 4; Male:4), but also region-wise (4 from the North-East region and the remaining 4 from rest of India). Resource persons and participants from each of the North-eastern states are listed below:

Resource persons: (Ladies: 4, Gentleman: 4)	**Participants: 32**
1. Dr. Rekha Singhal, Institute of Chemical Technology (ICT), Mumbai 2. Prof. Charulata Mahanta, Tezpur University, Tezpur 3. Dr. Ng. Iboyaima Singh, College of Food Technology, Lamphelpat, Manipur 4. Prof. Saroj Barik, North-Eastern Hill University (NEHU), Shillong, Meghalaya 5. Dr. Shashi Bhushan, Institute of Himalayan Bioresource Technology (IHBT),Palampur 6. Dr. Virendra Tiwari, National Geophysical Research Institute (NGRI),Hyderabad 7. Dr. Atya Kapley, National Environmental Engineering Research Institute(NEERI), Nagpur 8. Dr. Swapnali Hazarika, North East institute of Science & Technology (NEIST), Jorhat	Arunachal Pradesh: 4 Assam: 4 Manipur: 4 Meghalaya: 3 Mizoram: 0 Nagaland: 3 Sikkim: 1 Tripura: 4 Host-institute in-houseparticipants: 09

The inaugural function was graced by Prof Shambhu Nath Singh, Vice-Chancellor, Tezpur University, who emphasized the role of women in science and technology for the growth of the nation. Dr Sharmila Mande, FNAE addressed the participants and briefed on the theme of the symposium. She also highlighted that the symposium is a means to provide a platform for young women engineers to explore innovative solutions for sustainable development in the North-Eastern region.

During Day 1, the inaugural session was followed by technical sessions on 'High-value Agri-based products' by the resource personals.

1. Dr Rekha Singhal, Institute of Chemical Technology (ICT), Mumbai on Science, Technology and Engineering interventions for valorization of food products
2. Prof. Charulata Mahanta, Tezpur University, Tezpur on Novel technologies for processing and preservation of fruits cultivated in North -East India
3. Dr Ng. Iboyaima Singh, College of Food Technology, Lamphelpat, Manipur on Engineering challenges in sustainable food processing
4. Prof Saroj Barik, North-Eastern Hill University (NEHU), Meghalaya on Meeting technology challenges for value addition of agricultural products
5. Dr Shashi Bhushan, Institute of Himalayan Bioresource Technology (IHBT), Palampur on Technological interventions for value-added crops to boost farm income in North-East region

Each of the eminent speakers highlighted their research work which are relevant for that region. Post the first day's session, the participants were divided in four groups, each group consisting of one participant from each state. The participants deliberated for close to two hours on the day's theme on 'High-value Agri-based products. All the resource persons also mentored the participants during their discussion

sessions. Each group then presented their overall research plan to solve a particular problem which is relevant to their states. At the end of Day 1, four prospective projects were proposed by the participants.

The resource persons for the second day technical sessions on 'Rejuvenation of natural resources' were:

1. Dr Virendra Tiwari, National Geophysical Research Institute (NGRI), Hyderabad on Sustainable Groundwater availability
2. Dr Atya Kapley, National Environmental Engineering Research Institute (NEERI), Nagpur on Harnessing microbial community intelligence and engineering them to preserve surface waters
3. Dr Swapnali Hazarika, North East institute of Science & Technology (NEIST), Jorhat on Engineering intervention of waste management of oil and petroleum industry

Post the second technical session on Day-2, the same group of participants deliberated on the day's theme on 'Rejuvenation of natural resources' and presented their overall research plan to solve certain problem relevant to their states. At the end Day-2, four prospective projects were proposed by the participants. The two days symposium enabled the participants in gaining knowledge on advanced technologies for solving problems in their own states. The group-activities during the break-out sessions also helped them in coming up with research proposals which may lead to sustainable solutions, implementation of which can help the North-eastern states of India. The participants were requested to submit brief concept notes with flowchart of work components on all the eight proposed project plans which emerged as a result of the break-out sessions on Day 1 and 2.

During the concluding session, the participants expressed their views on the 2-days symposium. They were happy with the presentations by the speakers who had deliberated in the area of food and water related problems of northeast India. They also found the interactive break-out session to be very interesting and productive. Overall, they felt that the program was well organized, and expressed that more such training be organized in other north-eastern states covering diverse areas of research.

Inauguration ceremony of Symposium for Young Women Engineers on 20th Nov 2023 (Day 1) wherein Prof Shambhu Nath Singh, Vice-Chancellor, Tezpur University graced the occasion in presence of Dr Sharmila Mande, FNAE

Participants attending the Inaugural session

Breakout sessions

Group photograph of young women researchers during Symposium for Young Women Engineers on 21st November 2023 at Tezpur University

(ii) Workshop for Women Engineers on "Sustainability Environment and Water" at IIT (BHU) Varanasi

A workshop for Women Engineers of North India was organized at IIT (BHU) Varanasi by Indian National Academy of Engineering (INAE) and Science and Engineering Research Board (SERB) DST, under the aegis of "SERB-INAE Woman Engineers Program" during February 26-27, 2004.

The workshop on Sustainability in Water and Environment was planned for young women engineers (<45 years) from engineering and technological institutions/universities from eight states (Uttar Pradesh, Bihar, Uttarakhand, Himachal Pradesh, Jammu & Kashmir, Ladakh, Punjab, Haryana). 30 participants from Uttar Pradesh, Bihar, Jharkhand, Uttarakhand. New Delhi-NCR, Himachal Pradesh, Haryana and Punjab participated in to this prestigious workshop.

The workshop's theme was chosen considering the need for developing engineering-based technologies for sustainable future in this region. Keeping in mind the environmental pollution problem due to large footfall of pilgrimages and tourists, sessions on the theme 'Water and Environment' were planned. These sessions addressed engineering-based technological solutions to mitigate the problem of pollution (including in the river Ganges) due to various wastes, emission from vehicles, etc.

Eminent speakers were invited to deliver lectures highlighting their research work which address the above-mentioned challenges. The participants not only gained knowledge on such advanced technologies, but also were able to carry out similar research in their own institutes. At the end of each session, the participants were divided into smaller group to encourage them discuss the problems and challenges, pertaining to the topic of each session. They made brief presentations on the same at the end of the session, based on which detailed deliberations were carried so as to come up with research ideas with the goal of better/improved sustainability solutions for this region.

	Resource persons	Participants: 30
1.	Prof. Ligy Philip, IIT-Madras	Uttar Pradesh
2.	Prof. Makarand Ghangrekar, IIT-Kgp	Bihar
3.	Dr. Swadha Anand, TCS Research, Pune	Uttarakhand
4.	Prof. Sachchida Nand Tripathi, IIT-Kanpur	Himachal Pradesh
5.	Prof. P K Mishra, IIT-BHU	Jammu & Kashmir
6.	Dr. Virendra Tiwari, CSIR-NGRI, Hyderabad	Ladakh
7.	Prof. Suparna Mukherji, IIT-Bombay	Punjab
8.	Prof. Prasenjit Mondal, IIT-Roorkee	Haryana

The workshop was coordinated by Dr. Sharmila Mande, FNAE and Prof Pradeep Kumar Mishra was Coordinator on behalf of the host Institute (IIT BHU, Varanasi). The workshop was inaugurated by Lt Col Shobhit Rai (Retd), Deputy Executive Director, INAE. He highlighted the contribution of INAE, various programs, especially for women engineers. Prof Sharmila Mande presented the theme of the workshop and discussed the importance of Sustainability of Environment and Water, especially in reference of Varanasi, being one of the most important pilgrimage centres of the country, where more than lakhs of people are visiting the city from every nook and corner of the country and also from other countries including Buddhist circuit and European Countries. Prof Pradeep Kumar Mishra welcomed the delegates and resource persons to the Institute and Varanasi. Floral tributes were paid to Bharat Ratna Pandit Madan Mohan Malviya, the founder of the Banaras Hindu University. Dr Bhawana Verma, the co-coordinator presented the formal vote of thanks.

The workshop was divided into various technical sessions, covering the following topics:

Day 1

- Sustainable waste management adopting circular economy principles - Prof Ligy Philip, IIT-Madras
- Biological and bio-electrochemical wastewater treatment technologies and their efficacy for imparting sustainability to wastewater treatment - Prof Makarand Ghangrekar, Indian Institute of Technology, Kharagpur
- Sustainable Bioremediation: Designing potential microbial consortia for waste management - Dr Swadha Anand from TCS Research, Pune
- Importance of clean air for sustainable cities – Prof. Sachchida Nand Tripathi of Indian Institute of Technology Kanpur

Day 2

- Water Budgeting of Ganga Basin, Consequences of water depletion and Aquifer mapping and management of groundwater - Dr Viren M Tiwari, Director, CSIR-NGRI
- To develop a treatment system for the removal of Arsenic and Fluoride - Prof Prasenjit Mondal, IIT Roorkee
- The need of advanced treatment prior to disposal or reuse as number of contaminants such as nitrogen and phosphorus and other micro pollutants - Prof Suparna Mukherji, IIT Bombay
- The sustainability of water treatment and role of membrane technologies - Prof. Pradeep Kumar Mishra, IIT BHU (Varanasi)

All the participants were given opportunity to give their feedback on the content, quality and organization of the workshop. Everyone was unanimous in declaring the event a grand success. One noteworthy suggestion for the improvement in the current format was to make it a three-day event to give more time to break out sessions and one to one interaction to make the event more meaningful and have positive impact on the research domain of the delegates. Certificate distribution was done to the participants and contribution of organising team was appreciated in the valedictory sessions.

Technical session on Sustainable waste management adopting circular economy principles by Prof Ligy Philip, FNAE, IIT-Madras

Felicitation of the Prof. Sachchida Nand Tripathi, FNAE by Prof PK Mishra

Participants interacting with Prof. Tripathi

Group Photograph of Participants with Dignitaries, to include Dr. Sharmila Mande, FNAE, Prof. Sachchida Nand Tripathi, FNAE, Prof. Ligy Philip, FNAE, Prof. Suparna Mukherji, FNAE, Prof. MM Ghangrekar, FNAE, Prof PK Mishra, Lt Col Shobhit Rai (Retd) and others

(c) SERB-INAE Outreach Programs for North-East, Jammu & Kashmir and Ladakh

i) Workshop on "Entrepreneurship and Skill Development with Special Reference to Startups" at University of Leh, Ladakh

With the aim to inculcate an entrepreneurial spirit among the participants and motivate them to become successful entrepreneurs, the Univer sity of Ladakh with the support of the Indian National Academy of Engineering (INAE) and Science and Engineering Research board (SERB) organized a two-day workshop on "Entrepreneurship and Skill Development with Special Reference to Start-ups" under the aegis of SERB-INAE Outreach Programs for NE, J&K and Ladakh in the Leh campus of the University of Ladakh during July 17-18, 2023.

The main objectives of the subject workshop were to inculcate the entrepreneurial skills of youth in this region by offering a conducive ecosystem for exploiting their potential, to inculcate entrepreneurial spirit among participants and motivate them to initiate their own start-ups and become successful entrepreneurs, to develop a congenial environment for the promotion of local indigenous technical know-how and motivating aspiring entrepreneurs by sharing the success stories of successful local start-ups and entrepreneurs, to familiarize the participants with the latest developments in the innovation and entrepreneurship areas.

Prof. SK Mehta, Vice-Chancellor University of Ladakh and Prof. Indranil Manna, President INAE were the chief guest during inaugural day of the event. Prof. Sivaji Chakravorti, Vice-President, INAE and Lt. Col. Shobhit Rai (Retd.), officiating Executive Director also graced the occasion. Around 70 students from Elizer Joldan Memorial College, Leh Industrial Training Institute Leh, and the University of Ladakh participated in the workshop. During the inaugural session the coordinator of the event, Dr. Jigmet Stobdan welcomed the dignitaries and the participants and threw light on the objectives and rationale for organizing the workshop and urged the students to make optimum utilization of the workshop. Prof. Indranil Manna in his inaugural address highlighted the need of organizing this workshop and motivated the young participants to come up with new innovative ideas to solve certain gaps prevailing in the market in the subject field. Prof. SK Mehta also advised students to develop entrepreneurial traits to become successful entrepreneurs in the near future.

The first day included talks on following topics:

Talk 1: Role of Science Technology and Innovation Hub, Ladakh in inculcating innovation mindsets among aspiring innovators in Ladakh

Talk 2: Entrepreneurship and Innovation in Ladakh

Talk 3: Importance of Skilling Local Youth with Locally Relevant Skills

Talk 4: Social Entrepreneurship in Today's Era

Talk 5: Women Entrepreneurship in Ladakh

The above talks acquainted the students with various government incentives and schemes for entrepreneurship development in Ladakh. The host institute invited two talks on Design thinking for Innovation and Community-Based Entrepreneurship and Start-ups by Dr. Debasis Chatterji, Founder Confiscore.com in Ladakh during the day 2 of the event. During the Valedictory Session, Prof Sivaji Chakravorti, Vice President, INAE and Prof AK Sharma, Registrar University of Ladakh were invited as chief guests of the session. While addressing the gathering, Prof. Sivaji Chakravorti shared some anecdotes of successful innovators and advised students to become innovators and broaden their horizons and engage in entrepreneurship at early stages of life even during their studies to make themselves self-dependent.

Participants attending the Workshop on
"Entrepreneurship and Skill Development with Special Reference to Startups"
at University of Leh, Ladakh on 18th July 2023

Felicitation of Prof Sivaji Chakravorti, FNAE and Vice-President, INAE by Prof. SK Mehta,
Vice-Chancellor, University of Ladakh in presence of Prof. Indranil Manna, President, INAE and Chief Guest of the event

Participants during the Day 1 of the Workshop at Leh

ii) **Workshop on "Self-Employment through Entrepreneurship – The Path for Self-Reliant India" at NIT Silchar**

Under the umbrella of SERB-INAE Outreach Programs for NE, J&K and Ladakh, Indian National Academy of Engineering (INAE) in association with National Institute of Technology Silchar successfully organized a three-day national workshop on "Self-employment through Entrepreneurship – The Path for Self-Reliant India" from July 26-July 28, 2023 at NIT Silchar. The primary objectives of the workshop were to make the participants aware of recent trends and future aspects of being an entrepreneur. To identify the possible sectors for becoming an entrepreneur and to motivate young people (Men and Women) representing different sections of society, including SC, ST, EWS, women, the differently abled, and Ex-servicemen to consider entrepreneurship or self-employment as one of their career options in the light of NEP 2020 to making India self-reliant – *Atmanirbhar Bharat*.

Additionally, to enable the target group to think and act in an entrepreneurial way by imparting technical and business skills at an early stage in their career, so that it not only encourages them to consider entrepreneurship as a career opportunity but also helps them become successful in any profession. The program got wide circulation, and a total of 89 participants registered and 52 attended the program from different institutes like Polytechnique College, Government Engineering College, Private College from West Bengal, NERIST, NIT Silchar and also from Assam Pollution Control Board. Out of 52 participants in which 8 were girl students, 19 were OBC students, and 2 were ST students. The event included eight lecture sessions and four hands-on training sessions. Resource Persons for the program were from NIT Silchar, other institutes, industrialists, and entrepreneurs. The lecture sessions were related to recent trends in entrepreneurship and product development, the future of entrepreneurship, and funding schemes provided by the government and other funding agencies.

The lectures were on the following topics:

- Entrepreneurship and NEP 2020 by Prof. Rajat Gupta, Professor, NIT Silchar
- Soft skill development for Engineering Profession by Prof Sivaji Chakravorti, Vice President, INAE, Professor, Jadavpur University
- Design and Innovation: One Step toward Entrepreneurship by Prof Raja P Pappu, GITAM University
- Building a Market fit product in the field water purification by Mr Harjeet Nath, Assistant Professor, Tripura University
- Innovation and Start-up by Dr. Wasim Arif, Associate Professor, NIT Silchar
- Government Scheme and Product development by Dr Sumit Bhowmik, Associate Professor, NIT Silchar

In addition to these, expert talks and lectures were conducted on sustainable product development and innovation possibilities for setting up start- ups, the utilization of natural resources for the development of sustainable products, funding opportunities for entrepreneurs, and the patenting of products. The hands-on training sessions were conducted to familiarize participants with the utilization of the different types of equipment and develop sustainable products for the local region and entrepreneurship. The participants conducted experiments on the wind turbine, 3-D printing, product development using natural resource-based composite materials, and solar photovoltaics.

Inaugural function of the Workshop on "Self-Employment through Entrepreneurship – The Path for Self-Reliant India" at NIT Silchar

The coordinator of the event was Prof. Rajat Gupta, Professor, Department of Mechanical Engineering, National Institute of Technology Silchar and Dr. Sumit Bhowmik, Associate Professor, Department of Mechanical Engineering, National Institute of Technology Silchar.


Hands-on training in different laboratories

Group Photograph of Participants with Dignitaries to include Prof. Sivaji Chakravorti, FNAE, Vice-President, INAE

iii) **Workshop on "Skilling, Reskilling and Upskilling - Need of The Hour for Self-Reliant India" at NIT Srinagar**

A two days' workshop on "Skilling, Reskilling and Upskilling - Need of The Hour for Self-Reliant India" was jointly organized by the Indian National Academy of Engineering (INAE) and Science and Engineering Research Board (SERB), DST at NIT Srinagar during March 4-5, 2024. The workshop was organized under the umbrella of SERB-INAE Outreach Program for NE, J&K and Ladakh. The objective of this two-day skill development workshop was to create an eco-system and importance of skilling and upskilling, to give basic information of skill development initiatives in these areas which include inculcating competencies such as positive attitude, innovative and entrepreneurial mind set, knowledge enhancement, networking, collaborations etc. and to understand the advancements in industrial technology with focus of industry 4.0and 5.0. The aim was to create ecosystem of employability initiatives of youths with special target towards youths and of J&K. The workshop addressed these issues and impart knowledge and skill in CNC Milling, CNC Turning, Welding operations (Developing AR-VR-XR based welding training program), 3D printing, EDM (Electric Discharge Machining).

In the inaugural session, dignitaries from various sectors converged to underscore the significance of skill development landscape in Jammu and Kashmir. Government officials, Educational Leaders, and Industry experts shared their insights and perspectives on the importance of enhancing employability through specialized initiatives. The session commenced with welcoming remarks, highlighting the collaborative efforts to impart essential skills to the youth and professionals of the region. Keynote speakers emphasized the need for skill-based training in CNC technologies, welding, and allied fields to meet the evolving demands of the job market.

The inaugural session set the tone for the training program, inspiring a sense of purpose and determination among attendees to acquire new skills and pursue job opportunities in emerging industries. Eminent speakers attended the inaugural session Prof. Sivaji Chakravorti, Vice President, INAE, Prof. A. Ravinder Nath, Director, NIT Srinagar, Mr Saurabh Bhagat, Commissioner/Secretary to Govt., Science & Technology Department, Prof. Atikur Rehman, Registrar, NIT Srinagar, Prof. Adnan Qayoom, Head of Department of Mechanical Engineering, NIT Srinagar, Dr. Saad Parvez, Head, IIED Centre, NIT Srinagar. These dignitaries provided valuable insights and expertise, contributing to the comprehensive discussions and sessions held throughout the workshop.

On the culminating day of the workshop, participants and organizers gathered for the valedictory session, marking the conclusion of two days filled with insightful discussions and hands-on learning experiences. The session commenced with words of gratitude and appreciation extended to all stakeholders, including participants, organizers, resource persons, and experts, for their invaluable contributions towards making the workshop a resounding success. As a symbol of recognition and appreciation, tokens of appreciation and certificates were distributed to acknowledge the dedication and effort invested by each individual in enriching the workshop with their insights, expertise, and active participation.

Participants attending the detailed lecture during the workshop on "Skilling, Reskilling and Upskilling - Need of The Hour for Self-Reliant India" at NIT Srinagar on March 4-5, 2024

Amidst an atmosphere of camaraderie and accomplishment, recipients received their certificates and tokens of appreciation, signifying not only their individual achievements but also their collective commitment to advancing skill development and fostering innovation. The distribution of certificates served as a poignant reminder of the knowledge gained, skills honed, and connections forged throughout the workshop, empowering participants to embark on their professional journeys with renewed confidence and enthusiasm. Additionally, the ceremony provided an opportunity for reflection on the collective achievements and the enduring impact of collaborative efforts in nurturing talent, driving progress, and shaping a brighter future for the nation.

Certificate distribution during Valedictory Session of the Workshop on 5th March 2024

(iii) Workshop on "Pedagogy Training for Teaching and Research Excellence" held at IIT Guwahati

Indian National Academy of Engineering (INAE) in association Science and Engineering Research Board organized a two days' workshop on "Pedagogy Training for Teaching and Research Excellence" held at Indian Institute of Technology Guwahati during March 15-16, 2024. The workshop was organized under the umbrella of SERB-INAE Outreach Program for NE, J&K and Ladakh.

It was a focused workshop for faculties of different institutes to equip them with pedagogy and teaching paradigms for better teaching and communication. Conventional forms of teaching and assessment techniques are not sufficient to cope up with ever changing modern education. Faculty needs to be equipped with new challenges associated with modern teaching and learning. Faculty training and pedagogy sessions provides a platform for improving teaching learning outcomes. Technology-based teaching and discussion forums are essential tools that can improve student-to-teacher interaction. This workshop

aimed to bring faculty teaching in various technical institutes in North East India under one umbrella and share the best practices in teaching and learning.

The following topics were covered during the subject workshop were:

- Effective classroom management techniques and innovative assessment techniques.
- Need for coexistence of teaching as well as research for achieving academic excellence.
- Social skills necessary for collaboration, professional growth, personnel management.
- Tips for research paper writing, paper reviewing, project proposal writing.
- Use of ICT systems and technologies for effective teaching.
- Tips for introducing Problem Based Learning and Outcome Based Learning.
- Psychological aspects of teaching.

The resource persons of the workshop were Prof. Sivaji Chakravorti, Vice-President, INAE, Prof. Sukumar Nandi, IIT Guwahati, Prof. T. Venkatesh, IIT Guwahati, Dr Antony Franklin, IIT Hyderabad, Dr Samit Bhattacharya, IIT Guwahati, Dr John Jose, IIT Guwahati, Dr Moumita Patra, IIT Guwahati, Dr Abraham Cyril Issac, IIT Guwahati, Dr B. Spoorthi, NIT Warangal, Dr Ruchika Gupta, Chandigarh University.

During the inaugural session, the coordinator of the event Dr John Jose welcomed the dignitaries and the participants and threw light on the objectives and rationale for organizing the workshop and urged the participants to make optimum utilization of the workshop. The Chief Guest of the Inaugural session was Prof. Sivaji Chakravorti, Vice-President, INAE. Prof. Chakravorti gave valuable insights on Useful Pointers and Ethics in Writing a Good Technical Paper. The following talks were held during the workshop:

Day 1

(a) Pedagogy in Flux: Navigating Change by Dr B. Spoorthi, NIT Warangal.

(b) Crafting Effective Connection with Students by Right Communication by Prof. Ruchika Gupta Chandigarh University.

(c) Problem based Learning: Ideas for a Self-reflective and Planned Teacher by Dr Moumita Patra, IIT Guwahati.

(d) How to Write Good Project Proposals for Research Funding by Prof. Antony Franklin, IIT Hyderabad.

Day 2

(a) Authenticity at Work: the precursor to Human Potential Realization by Dr. Abraham Cyril Issac, IIT Guwahati.

(b) Channelizing Curiosity to Novelty – Learning to do Empirical Research by Dr Samit Bhattacharya, IIT Guwahati.

(c) Teaching as a Profession - Challenges and Opportunities and How Can You Become and Infectiously Inspiring Teacher by Dr John Jose, IIT Guwahati.

(d) Good Teaching Practices to Prepare Students for Higher Education Entrance Exams by Prof T. Venkatesh, IIT Guwahati.

Group Photograph of all the Resource Persons, Participants and the organizers of the *Workshop on "Pedagogy Training for Teaching and Research Excellence" held on March 15-16, 2024 at IIT Guwahati*

Dignitaries during the Inaugural session of the Workshop held on March 15, 2024

The workshop was concluded with the valedictory session wherein the participation certificates were distributed, and feedback was collected from the participants. The feedback from all the participants were highly positive and all the sessions and hospitality were highly appreciated. Most participants demonstrated enthusiasm to attend such workshops for the future and looked forward towards them.

Participants attending the detailed lecture on March 16, 2024

(d) SERB-INAE Innovation Hackathon

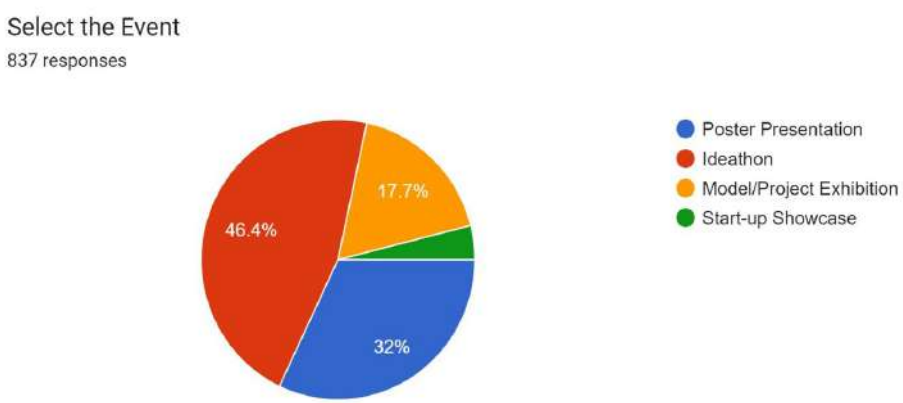
INAE Youth Conclave 2023 organized under the aegis of SERB-INAE Innovation Hackathon at GITAM University, Visakhapatnam during November 3-4, 2023

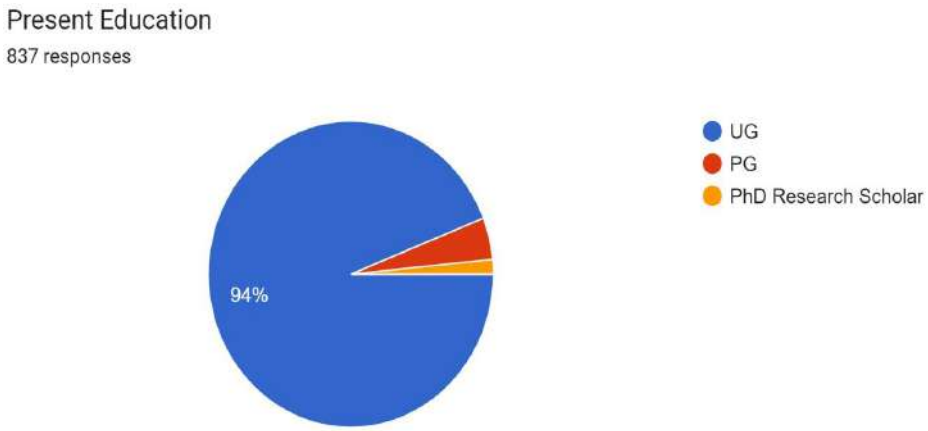
In collaboration with Science and Engineering Research Board (SERB) and Indian National Academy of Engineering (INAE), GITAM University Visakhapatnam successfully organized INAE Youth Conclave 2023 during November 3-4, 2023. INAE Youth Conclave 2023 was organized under the umbrella of SERB-INAE Innovation Hackathon. Youth conclave is an annual event promoted by INAE. The purpose of the event is to provide a platform to the country's youth to express their technological creativity and ingenuity and demonstrate their ability to innovate towards finding solutions that impact our collective future. The goal of Youth Conclave was to give young people a voice and showcase their creative problem-solving skills in an effort to improve our future as a whole. INAE also extends student membership to bright and young budding engineers, thereby endorsing their talent and advocating their ability to contribute meaningfully to the development of the country. The theme of this sixth edition of Youth Conclave-2023 was: "Innovation and Technology for Global Challenges".

The specific focus areas of the Conclave were as follows:

- AI in Healthcare
- Space & Robotics
- Green Energy and Storage
- Circular manufacturing
- Biomedical Engineering and Devices
- Smart City & Urban Planning

Apart from the Technical Sessions which involved Invited talks and Paper / Poster presentations in the above identified focus areas, several other events like Ideathon, Start-up Show Case, Poster Presentation and Model/Project Exhibition were conceptualized, planned and implemented. To encourage participants, cash prizes were given to all the best performers in the above competitions as Rs 25,000 (1st Prize), Rs 15,000 (2nd Prize), and Rs 10,000 (3rd Prize). In addition to these prizes, an all-women team from each of the above events were awarded a cash prize of Rs 10,000. The Industry and R&D Exhibition was conducted to serve as a forum for diverse participants to exhibit, investigate, and advocate for technological and industrial advancements.





A large number of students Nationwide (a total of 837 participants registered) contributed to the success of this event, making it a resounding triumph. The inaugural session commenced on November 3, 2023 with the ceremonial lamp lighting ceremony by the Chief guest and other dignitaries. The gathering was addressed by the Chief Guest of the Inaugural day Shri Atul Bhatt, Chairman & Managing Director of Vizag Steel Plant where he shared the challenges, he faced along with valuable insights gained throughout his journey, addressing the audience with his learned perspectives. Prof Indranil Manna, Distinguished Guest, President INAE also graced the occasion virtually. He provided a detailed overview of the events organized under INAE. Dr KN Satyanarayana, Director IIT Tirupati presented a Keynote Speech. He delved into a comparative analysis of global markets, highlighting ways in which diverse processes could be transformed into sustainable practices. Prof BS Murty, Director IIT Hyderabad delivered a Keynote Speech during the event in virtual mode.

Lamp lightning ceremony by esteemed guests during Inauguration of INAE Youth Conclave 2023 on November 3, 2023

Prof. Indranil Manna, President INAE, Distinguished guest addressing the gathering virtually during the Inaugural Session of the event

Following the inaugural session and keynote speeches, students were gathered in four distinct masterclasses by external guests and INAE Fellows, in the focus areas as per the theme tailored to their individual interests. These masterclasses encompassed diverse topics or fields, allowing attendees to delve deeper into specific areas of their choice. The variety of masterclasses aimed to cater to the diverse interests and preferences of the students, offering them a more focused and enriching learning experience. The eminent speakers for various masterclasses during Day 1 organized were as follows:

(a) Prof Sadhan Kumar Ghosh, Jadavpur University on Circular Manufacturing wherein he discussed the methods and strategies to minimize waste, extend product life, and promote the recycling and reuse of materials.

(b) Mr Venkata Sai Kiran C, Director, Skyroot Technologies Ltd on Space and Robotics. He provided participants with insights into the intersection of space exploration and robotics technology covering the topics such as the role of robotics in space missions, the development of robotic systems for extraterrestrial exploration, and the challenges and advancements in space robotics technology.

(c) Captain Sudheer Gattu, Business Head, Fluentgrid Limited on Smart City and Urban Planning wherein participants received insights into the concepts and strategies associated with building and developing smart cities.

(d) Mr SKV Satish, CEO, Innovation Center for Drone Technologies on Drone Technology provided participants with an overview of the principles, applications, and advancements in the field of unmanned aerial vehicles, commonly known as drones.

The technical sessions were followed by the paper/poster presentation, Model Presentation, Ideation and Start-up showcase by participating students. The second day of the conclave started with Keynote address delivered by Prof M Chandrasekhar, Director, IIM Visakhapatnam. During keynote speech, Pro-

fessor Chandrasekhar touched upon a myriad of subjects, providing inspiration and guidance to the eager minds in attendance. His words resonated across various aspects, encompassing not only academic pursuits but also delving into the realms of personal and professional development. Following the impactful keynote speech, the day unfolded with an exciting array of opportunities as four distinct masterclasses ran concurrently. The eminent speakers for various masterclasses during Day 2 organized were as follows:

(a) Mr Barki Dharmappa, Chairman, Noble Energy Solar Technologies limited on Green Energy and Storage. In this session, participants had the opportunity to delve into the critical and evolving landscape of sustainable energy sources and the storage technologies that support their integration into the power grid.

(b) Mr Barki Dharmappa, Chairman, Noble Energy Solar Technologies limited on Biomedical Engineering and Devices. In this session, participants had the opportunity to explore the intersection of engineering principles and medical applications, focusing on the development and utilization of cutting-edge devices in the healthcare industry.

(c) Dr Abraham Varughese, Director, NSTL, Visakhapatnam on Space and Robotics. He covered fundamental concepts related to space exploration, discussing the challenges and opportunities inherent in exploring the vast unknown. The Master Class probably highlighted the critical role of robotics in space missions, including applications in planetary exploration, satellite deployment, and the maintenance of space infrastructure.

(d) Mr. Suryaprakash Gajjala, CEO, Archimedes Green Energy(P) Ltd., Hyderabad on Green Energy and Storage. The masterclass served as an informative platform for participants to deepen their understanding of green energy and storage, offering a practical perspective on the advancements and innovations in the field. Participants gained valuable insights into the role they can play in contributing to a more sustainable and ecofriendly energy landscape.

(e) Prof Sivaji Chakravorti, Vice-President INAE on Experimentation – How to Do It. During this session, participant received guidance on the principles and methodologies involved in conducting effective experiments across various disciplines. The session catered to participants from diverse academic and professional backgrounds, offering a universal understanding of the scientific method and experimental procedures.

This dynamic setup allowed students to tailor their learning experience based on their individual interests and aspirations followed by the Industrial Exhibition which served as a platform for various companies to showcase their work and engage with students. The exhibition featured stalls from different fields, providing a diverse range of opportunities for students to explore. The conclave concluded with valedictory session where Prof Sivaji Chakravorti, Vice- President INAE provided a formal and reflective conclusion to the event, offering closing remarks that summarized the key takeaways and expressed gratitude to participants, organizers, and contributors. The event's conclusion was marked by prize distribution ceremony recognizing and rewarding students for their notable contributions, achievements, or excellence during the event. The students got a unique opportunity to network with INAE fellows and other professionals who have made significant contributions to engineering research and development, industry, and education. The awardees of INAE Youth Conclave are inducted as INAE Student Members for a period of 5 years and encouraged their involvement in INAE activities.

Shri Atul Bhatt, Chairman & Managing Director of Vizag Steel Plant, Chief Guest delivering the welcome address during the Inaugural Session of the event

Group photograph of Winning team, Dynamic Duo Group, GM Institute of Technology

Team Accumitt, VIT Bhopal University receiving Certificate

Joint INAE-ANRF (erstwhile SERB) Scheme to Promote Translational Research in Engineering: Abdul Kalam Technology Innovation National Fellowship

Indian National Academy of Engineering (INAE) and Science and Engineering Research Board (SERB), Department of Science and Technology (DST) had launched the INAE-SERB, DST Abdul Kalam Technology Innovation National Fellowship in the year 2017 to recognize, encourage and support translational research by Individuals working in various capacities of engineering profession, in public funded institutions in the country. As per the guidelines of the fellowship, the duration of the Fellowship will be initially for three years, extendable by up to two more years depending on the performance. The fellowship can be held for a maximum of 5 years. All fellowships are reviewed on completion of three years, and if the progress is found to be in line with the proposal, an extension of additional two years is granted to the fellow.

The call for nominations were invited with the last date for the receipt of nominations was July 16, 2023. The call for nominations was posted on INAE Website and Advertisements inviting nominations for the subject fellowship were also placed nationwide in newspaper such as Hindustan Times, The Times of India, Assam Tribune, The Tribune, Nav Bharat Times etc., in various editions. The performance of six fellowships completing their tenure of three years on September 30, 2023 was reviewed by the Search Cum Selection Expert Committee (SSEC) during its meeting held on August 1, 2023 in hybrid mode. After detailed deliberations, based on the degree of translational research leading to deployable technology as indicated in the proposals received; the Committee shortlisted 25 nominees who made a presentation of their proposal before the Search cum Selection Expert Committee on August 29, 2023. Based on the presentations, the Committee selected ten nominees to be conferred as Abdul Kalam fellows for Financial Year 2023-24.

Altogether, 57 professionals have been conferred this fellowship so far. At present, 43 fellows are actively on the roll. Translational research has been undertaken by the fellows conferred with INAE- SERB Abdul Kalam Technology Innovation National Fellowships. Several of the translational research projects pursued by these Kalam Fellows have reached the stage of technology transfer and creation of start-ups including filing up of over 91 patents and 347 publications have been done so far setting up of a few technology ventures.

To name a few, the patents pertain to the following areas:

- A system and method for performing video-based surveillance, Patent No: 388052
- Pictorial Representation of Chemiresistive Sensing
- A Low-Cost Bioimpedance Measurement Device and System For Cervical Cancer Screening
- UAct Patent (IITB Ref. No. PAT/BS/20002873-4/22-23) “Design and Development Of Uterine Activity Assessment Device (U-ACT)
- U.S. Pat. No. 6,402,515 B1 discusses a dental implant with variable width and helical thread profile that extends along the coronal and apical region of the implant.
- Another patent, U.S. Pat. No. 2011/0039233 A1 elaborates the dental implant head with frustoconical shaped screw-like shape with series of self-tapping threads that can be used in the upper jawbone or the mandible bone

Significant Achievements/Technology Transfers

- A prototype for the Water-Electro-Lithography (W-ELG) has been designed and fabricated and process for technology transfer has been initiated.
- An intelligent five-fingered hand exoskeleton is being developed. The design of the BRAIL hand exoskeleton involved the use of an underactuated, linkage-based mechanism. Work is in progress for EEG-EMG Adaptive Control of the above hand exoskeleton for providing assistance-as-needed.
- The prototype design for the novel force sensitive joystick is in development. Patients feedback for the same are being sort with the help of neurologist and physiotherapist at Department of Neurology, AIIMS New Delhi.
- Design of SHAKTI based secure Microprocessor projectect has developed an open source indigenous compute ecosystem that could be customized for both civil and strategic needs of our country. This ecosystem available at https://shakti.org.in/ is currently used by startups to build domain and industry vertical specific architectures. The government of India through the Ministry of Electronics and Information Technology has launched the Digital India RISC V program (DIR-V).
- Design and development of Uterine Contraction Assessment and Cervical Screening devices through platform technologies is confirmed by Doto Health a startup in women's health space for UAct and UCan clinical validation finalized with Sion Hospital
- Design and development of Uterine Contraction Assessment and Cervical Screening devices through platform technologies confirmed by Doto Health a startup in women's health space for UAct and UCan clinical validation finalized with Sion Hospital. Technology documents, list of components, MFD files are ready and first 5 prototypes manufactured.
- Design, manufacturing, pre-clinical/clinical validation of novel metallic/ ceramic dental implants, Under the framework of signed NDA and MoU with ARKA Medical devices Pvt. Ltd., Hyderabad.

During the first meeting of SSEC on August 1, 2023 the Committee shortlisted twenty-five nominees, after detailed deliberations, based on the degree of translational research leading to deployable technology as indicated in the proposals received. The twenty-five nominees were segregated in two parallel Groups – Group A and Group B based on the area of Engineering Section/specialization. Group A comprising of thirteen nominations of Engineering Section II (Computer Engg and IT), V (Electrical Engg), VI (Electronics & Communication Engg), X (Interdisciplinary Engg) enclosed at Appendix-A and Group B comprising of twelve nominations of Engineering Section I (Civil Engg), III (Mechanical Engg), IV (Chemical Engg), X (Interdisciplinary Engg) enclosed at Appendix-B. Based on detailed presentation delivered by the nominees, followed by Q & A on August 29, 2023 the Committee selected ten nominees to be conferred as Abdul Kalam fellows for Financial Year 2023-24.

1. Dr Chetan Singh Thakur, Associate Professor, Indian Institute of Science Bangalore, shortlisted for his proposal on "Minimally Invasive Real-Time BCI System for Motor Neurorehabilitation Using Machine Learning Co-Processor Chip".
2. Dr Hardik J. Pandya, Associate Professor, Department of Electronic Systems Engineering, Indian Institute of Science, Bangalore shortlisted for his proposal on "Neonatal Hearing Screening System Development and Validation".
3. Mr Sarath S Nair, Engineer F, Biomedical Technology Wing, Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram, Kerala, shortlisted for his proposal on "Transcutaneous Energy Transfer System for Implantable Medical Devices".

4. Dr. Tapan Kumar Gandhi, Associate Professor, Dept. of Electrical Engineering, IIT Delhi, shortlisted for his proposal on "AI powered Virtual Reality device for fast and accurate diagnosis of visual field defects and impairment in 3D Motion perception".
5. Prof Sukumar Mishra, Professor (HAG), Department of Electrical Engineering, Indian Institute of Technology Delhi shortlisted for his proposal on "Electric Vehicle (EV) agnostic, solar photovoltaic (PV) supportive, cyber secured, bidirectional, single gun charger".
6. Prof Swati Neogi, Professor, Department of Chemical Engineering, IIT Kharagpur shortlisted for her proposal on "Development of composite structures for the application in hydrogen storage and distribution integrated with sensor".
7. Prof Jayant Kumar Singh, Poonam and Prabhu Goel Chair Professor (HAG), Department of Chemical Engineering, IIT Kanpur shortlisted for his proposal on "To develop a high-throughput platform for accelerating the discovery for materials".
8. Prof Sandeep Verma, Professor In-Charge, Gangwal School of Medical Sciences and Technology, IIT Kanpur shortlisted for his proposal on "Chemically Engineered Thermostable Human Insulin for Diabetic Patients".
9. Prof Mahesh S Tirumkudulu, Professor, Department of Chemical Engineering, IIT Bombay shortlisted for his proposal on "Point-of-Care Blood Cell Counter".
10. Prof Santosh Ansumali, Professor, Engineering Mechanics unit, JNCASR, Bangalore shortlisted for his proposal on "In silico tools for modelling hemodynamics constituents and the responses of vascular walls".

ANRF (erstwhile SERB)-INAE Digital Gaming Research Initiative

The SERB-INAE Online and Digital Gaming Research Initiative, was received by INAE through Anusandhan National Research Foundation (ANRF erstwhile SERB) to leverage Digital Gaming Research and Industry in India and to achieve self-reliance in advanced Augmented Reality (AR)/ Virtual Reality (VR) technologies to create indigenous gaming platforms for a number of applications ranging from education to leisure with the backdrop of Indian Ethos, for desktop and hand-held devices. The gaming project, has been one of the major agenda items assigned to DST which has been received by INAE through ANRF. Being a new area of research and development for the country, a pre-conclave meeting followed by conclave was held to identify areas for call for proposal and discuss subsequent implementation methodology. Accordingly, the call for proposals was invited under the following three categories in 2022:

- 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

Forty-three proposals were received during the call and the Program Management and Advisory Committee (PMAC) was been constituted in March 2023 to evaluate, select, and review proposals received in response of the call for proposals. The evaluation was conducted in two stages wherein 23 out of 43 proposals were shortlisted during the first stage followed by the presentation of shortlisted proposals during the second stage. Consequent to the presentations made by the Principal Investigators (PIs), PMAC recommended a total of thirteen proposals to ANRF in three categories – 6 in category I, 6 in category II and a single merged proposal in category III comprising of three different proposals - for final approval by Empowered Committee. The meeting of Empowered Committee was held on 4th August 2023 and a confirmation of approval for the following 12 proposals, 6 each in category I and II was received from ANRF.

Category-I: R&D in Learning, Educational, and Leisure Online Gaming Platforms

1. Project Title: 'splas-H-oli': Rock Art of India
   PI: Dr Neerja Babbar, Amity University, Mohali
2. Project Title: Ed-Immerse: Integration of Immersive technology in STEM Education
   PI: Dr Deepti Prit Kaur, Chitkara University, Punjab
3. Project Title: Multiplayer game lab on the cloud to increase Awareness on pressing health problems like Antimicrobial Resistance
   PI: Dr Anshu Bhardwaj, CSIR-Institute of Microbial Technology, Chandigarh
4. Project Title: Game lab for Responsible Change (GLRC)
   PI: Dr. Koumudi Patil, IIT Kanpur
5. Project Title: Design and Development of Virtual Reality Application for Traffic Safety Education in Indian School Going Children
   PI: Dr Yogeshwar V Navandar, NIT Calicut
6. Project Title: Game based Deep Ocean Knowledge Enrichment through Virtual Reality Simulations and Mission Dives in Indian Sub-Continent Context
   PI: Dr Tusar Kanti Mishra, Manipal Institute of Technology, Bengaluru

Category-II: Immersive Game Prototypes, with a focus on Indian Culture & Values

1. Project Title: Highlighting Indian Heritage through video games
   PI: Dr Souvik Mukherjee, Centre for Studies in Social Sciences, Calcutta
2. Project Title: HampiRun: A Metaverse Based Immersive 3D Game
   PI: Dr Manish Narwaria, Indian Institute of Technology Jodhpur
3. Project Title: Developing automated solutions of motion transfer & digital assets generation for Indic Games
   PI: Dr Avinash Sharma, Indian Institute of Technology Jodhpur
4. Project Title: Game-Based Learning of Indian Tradition and Temple Architecture Through Modern Technology
   PI: Dr Alan S, Karpagam Academy of Higher Education, Coimbatore
5. Project Title: Immersive Game Prototype – Conquest of Chola Dynasty
   PI: Dr Santhosh, Karpagam Academy of Higher Education, Coimbatore
6. Project Title: KALPIT: Digital Creation to Enable Gamification Based on Indian Ethos
   PI: Prof Uma Mudenagudi, KLE Technological University, Hubballi

Approval letters to the 12 PIs was sent and the quotations for equipment, salary structure for the manpower to be hired for the project and a copy of the bond to be signed by the private institutions were sought. Based on the documentations received from the PIs, funds were disbursed to 12 projects under category I and II.

For proposals under category III: Collaborative Technical Design Process - Creation of SERB Game Labs, plan regarding the phase – wise execution of the project was received from ANRF for a total budget of Rs 3.54 Cr for a period of three years. The project is to be carried out in following three phases for efficient coordination and effective implementation:

- Phase I: Before the Initiation of the Project
- Phase II: During the Implementation of the Project
- Phase III: After the Completion of the Project

One of the important requirements of Phase I was to appoint a National Coordinator for the G-Hub proposal who would play a pivotal role in overseeing and harmonizing activities across participating institutions. In context of above, Prof G Nagarjuna, IISER Pune, was recommended to be the National Coordinator after detailed deliberations between INAE, ANRF and the Chairman, PMAC. The first meeting of three PIs of G-Hub proposal chaired by the National coordinator was held wherein it was decided to prepare a draft MoU between the participating institutions outlining the details of each team's objectives, competencies, timelines, expectations, protocols and financial considerations.

A workshop to review the progress of proposals approved and to discuss other pending action points under the scheme was held on March 12th, 2024 wherein the respective PIs were invited to present their work progress before the PMAC. The deliberations from the PMAC from the meeting pertaining to progress of respective projects were communicated to the PIs for effective implementation of their project.

Seminars/Workshops/Conferences –National

The Academy organizes Symposia/Seminars/Workshop/Conferences at national/international levels on topics of national importance. Based on the deliberations, INAE invariably brings out policy recommendations for suitable follow-up action by the concerned Ministry/Department/agency.

Engineers Conclave 2023

Engineers Conclave 2023 (EC-2023), an annual mega event organized by INAE jointly with major engineering institutions of the country, was organized from October 5th-7th, 2023 at the prestigious Raja Ramanna Centre for Advanced Technology (RRCAT) in Indore, India. The event was overall coordinated by RRCAT and jointly organized by INAE and UGC-DAE- Consortium for Scientific Research (CSR), Indore, with the DAVV and IIT Indore as the partner institutes. This year's Engineers Conclave was a grand celebration of engineering excellence, knowledge sharing, and collaboration. With the two themes focusing on " Laser Technologies for Emerging Engineering Challenges" and "Engineering and Technology for Clean and Green India @2047," the event aimed to bring together engineers, scientists, researchers, and industry leaders to explore and discuss cutting-edge technologies and sustainable solutions.

Panel Discussion in Progress during EC-2023

Release of Abstract Booklet during Inaugural Session of EC-2023

The Engineers Conclave 2023 started with an Inaugural Session on October 5th, 2023, at the RRCAT. The event witnessed a galaxy of eminent luminaries who graced the occasion with their wisdom and insights. The Inaugural Session commenced with a warm Welcome Address by Dr. A.J. Pal, Director, UGC-DAE-CSR, Indore. His Welcome Address promised to set the tone for a gathering of visionaries, reseachers and innovators. Following Dr. Pal's welcome, the audience had the privilege of listening to an enlightening Presidential Address by Prof. Indranil Manna, President, INAE. A Distinguished Guest Dr. K.N. Vyas, Former Chairman, Atomic Energy Commission (AEC) and Secretary, Department of Atomic Energy (DAE) & Former Director, Bhabha Atomic Research Centre (BARC) then took the stage. Dr. Vyas's address offered valuable perspectives on pertinent engineering issues, enriching the audience's understanding of the challenges and opportunities in today's engineering landscape. The event was further graced by an eminent Distinguished Guest, Dr. Anil Kakodkar, Chancellor, Homi Bhabha National Institute, Member, AEC and Chairman, Rajiv Gandhi Science & Technology Commission, Govt. of Maharash-

tra. Dr Kakodkar's eloquent and inspiring address made a profound impact on the audience by sharing his view points on important issues related to the Conclave. The Chief Guest for the Inaugural Session was Prof. M Jagadesh Kumar, Chairman, UGC who is a renowned personality in the domain of Nanoelectronic Devices, Nanoscale Device modelling and simulation, Innovative Device Design, and Power semiconductor devices. Prof Kumar highlighted key issues for the advancement of the thematic areas of the Conclave with his deep insight and vision. His presence emphasized the significance of Engineers Conclave 2023, as a premier platform for knowledge exchange and collaboration. His address was informative and insightful and inspired the august audience. This Inaugural Session was a unique opportunity for participants and delegates to gain insights and inspiration from some of the brightest and most eminent minds in the engineering field.

The event highlights were the Plenary Sessions. These sessions at EC-2023 offered attendees and delegates the opportunity to gain valuable insights and inspiration from esteemed experts. The plenary speakers addressed critical topics and emerging trends in engineering, providing attendees with a deeper understanding of the challenges and opportunities in today's rapidly evolving world. The Keynote Speakers were an impressive line-up of keynote speakers, including renowned domain experts from Academia, Industry and R&D. These thought leaders shared their insights on the latest advancements in their respective fields. The Technical Sessions featured a series of parallel technical sessions covering a wide range of topics, from artificial intelligence and robotics to renewable energy and environmental engineering. Attendees had the opportunity to deepen their knowledge and engage in meaningful discussions. The deliberations were aimed at arriving at actionable recommendations in terms of engineering interventions for advancing the growth of engineering and technology in chosen thematic areas. Engineers Conclave hosted interactive exhibition showcasing the latest engineering innovations, products, and services. Attendees could explore hands-on experiences and network with industry professionals. The event provided a platform for networking and collaboration. Engineers, researchers, and industry experts can connect, exchange ideas, and build meaningful relationships for future collaborative projects and initiatives in niche areas of engineering interest. Actionable recommendations are being compiled which shall be forwarded and progressed with concerned stakeholders from government departments/Agencies and Industry.

Seminars/Workshops/Conferences – International

(a) 6th INAE-NAEK, South Korea Workshop on "Perspective on Space Development"

INAE and NAEK, South Korea have been engaged in organizing the series of workshop since 2017. This year 6th INAE-NAEK Workshop was organized on August 29-30, 2023 in hybrid mode at two cities – New Delhi (for INAE participants) and Seoul (for NAEK participants). The theme of the workshop was "Perspective on Space Development" which covered two technical sessions viz. 'Technical Session I: Development of Satellite' and 'Technical Session II: Space exploration and policy'. Researchers and Academicians from the two countries were invited to participate in it. The workshop inaugurated with welcome address by Dr. Kinan Kim, President, National Academy of Engineering of Korea (NAEK), South Korea, and Prof. Indranil Manna, President INAE. Both presidents lauded the success of the recent Chandrayaan-3 mission. They emphasized on the vision of the two academies and called for increased international co-operation/collaboration encompassing industry and academia. The inaugural session was followed by two keynote speeches. Mr. S Somanath (Chairman ISRO; Secretary, Department of Space, Government of India; Chairman, Space Commission) presented the accomplishments of Indian space programme and future visions of ISRO. He stressed on PPP models as the way forward in the development of space infrastructure in the country. The second keynote speech by Dr. Sang-Ryool Lee (President, KARI) was on an overview of the National Space Program of Korea, and the current and future space missions of the country. He shared that a government agency KASA (Korean Administration for Space and Aeronautics) is set to be established for the promotion of the Space programs.

The technical talks of the workshop were split in two sessions with four presentations in each session. The theme of the first session was Development of Satellite. The session was moderated by Prof. Sanjay Mittal (IIT Kanpur) and Prof. Sung Hoon Ahn (Seol National University). It opened with the talk by Prof. Daegwon Kim (KARI) on the development and journey of the Korea Pathfinder Lunar Orbiter - Korea's first space exploration program. The next talk by Prof. Debasish Ghose (IISc Bangalore) was on the various space-tech start-ups in India, and their role in increasing the reach of the space programs to traditional sectors like agriculture, FMCG, etc. Prof. Hyochoong Bang (KAIST) elaborated on the challenges posed by increasing density of space debris, and proposed solutions for mitigating them. The final talk of the first session was delivered by Prof. Aloke Kumar (IISc Bangalore). He introduced Lab-on-Chip paradigm, and its utility regarding biological experiments, diagnostics and drug delivery during a space mission. The session closed with concluding remarks from the moderators.

Technical Sessions of the workshop in progress

The second technical session of the workshop was on Space Exploration and Policies. Dr. VR Lalithambika (IIT Madras) and Prof. Jai-ick Yoh (Seol National University) jointly moderated the session. The first talk in the session, delivered by Dr. Jongwook Park (KASI), was on current bilateral collaborations of Korea in space exploration, and need for promoting international co-operations. Dr. CVS Kiran (Skyroot Aerospace Private Limited) introduced Skyroot Aerospace and elaborated on company's mission of providing on-demand and reliable satellite launch. Dr. Sangwoo Shin (KARI) highlighted Korea's new space policy with emphasis on policies for international collaboration. He presented roadmap for future space programs and strategies for realizing it. The fourth talk of the workshop was delivered by Dr. V Adimurthy (VSSC-ISRO) on the role of multi-disciplinary design process in achieving safe and sustainable missions. He listed the various future planetary missions planned/envisaged by ISRO and elaborated on the strategies for planetary defense against asteroids.

The talks were followed by concluding remarks from the moderators. The final event of the workshop was a Valedictory Session, chaired by Prof. Manna and Prof. Song wherein the participants of the workshop had a detailed discussion on the way forward for collaboration between India and Korea on Space Development. Some of the proposals made towards the same were (a) identifying topics for joint space research, (b) promoting industry academia collaboration between the two countries, (c) explore funding opportunities, and (d) embrace possibilities of mobility of students and researchers.

The talks were followed by concluding remarks from the moderators.

(b) Seminar on "Green Hydrogen: Indian National Academy of Engineering (INAE)-Royal Academy of Engineering (RAEng), UK Exchange program" held at CSIR- NCL, Pune on January 31, 2024- February 2, 2024

INAE interacts and undertakes various bilateral programs with Member-Academies of CAETS. In this regard a Royal Academy of Engineering, UK (RAEnG)- INAE Seminar was held as part of Bilateral Policy Exchange on "Green Hydrogen" from January 31-Feb 2, 2024 at National Chemical Laboratory (NCL), Pune. The Program was steered by Dr Ashish K Lele, Director, CSIR-NCL, Pune from India and Prof Nigel Brandon, OBE FREng FRS & Dean of Faculty of Engineering, Imperial College London from UK respectively. The objective of this exchange program on Green Hydrogen was to explore opportunities for cross-national learning to aid acceleration towards Green Hydrogen transition in India and UK. The event commenced with the inaugural session which began with a welcome address by Dr. Ashish K Lele followed by a Presidential Address by Prof. Indranil Manna, President, INAE wherein he emphasized the importance of sustainability and role of green hydrogen economy. The Addresses by Mr JD Patil, Vice-President, INAE & Member of Executive Committee of Management & Advisor (Defence & Smart Technologies) to Chairman & Managing Director, Larsen & Toubro Limited gave an overview of the Indian scenario whereas the talks by the distinguished guests viz Prof Nigel Brandon and Dr Nick Starkey, Director of Policy and International Academy, RAEng UK highlighted the situation in UK and they emphasized that UK is focussing both on green and blue hydrogen and market intervention is one of the salient factors for the transition to hydrogen economy.

The invitees at the event were subject domain experts from a mix of Academia, Government Labs and Industry which contributed towards effective interactions and deliberations with meaningful outcomes. Subsequent to the inaugural session, participants had an opportunity to engage in a networking exercise thereby fostering connections and discussions. After the conduct of the inaugural session, a Panel Discussion – I on Green Hydrogen: Production, Storage, Mobility moderated by Dr. Ashish K Lele, was held. This session featured keynote lectures by Prof. RR Sonde, FNAE, Professor, Department of Chemical Engineering, IIT Delhi and Formerly Executive Vice President, CTO and Member on Board of Executive

Council, Thermax Ltd. representing INAE and Mr. Mahesh Natarajan, Vice President, Low Carbon Pathway Innovation, BP representing perspective from the UK side. Prof Sonde during his lecture has shared his thoughts on "Twin track on Hydrogen Value Chain: Pushing current state-of-art to next stage while deep dive into disruptive developments" covering topics related to technology elements, water electrolysis, beyond electrolyser, power electronics and proposed technologies, distributed hydrogen etc. Mr Mahesh Natarajan spoke on the topic pertaining to "Green Hydrogen Production, Storage, and End-Use" and covered the broad spectrum of future of global energy, production and transportation technology, customer and anchor demands, renewable energy, and shared key lessons across value chain. The keynote speakers set the stage for panelists to initiate the panel discussion. The Panelists included eminent experts from both countries from academia, Government Labs and organizations and Industry and discussed crucial aspects of Green Hydrogen, including production, storage, and mobility and the way forward.

A second Panel Discussion – II on Green Hydrogen: Standards, Policies, Hubs/Valleys, Industry Use Cases was held as the afternoon session, moderated by Prof Nigel Brandon. The deliberations during the panel discussion focused on standards, policies, and industry use cases. The Keynote speaker Mr. Antony Green FREng, Director - Future of Energy, SGN provided insights, followed by discussions with experts from India and the UK. During his keynote speech he focused on "the role of green hydrogen" from the Scotland perspective. The day concluded with remarks by Prof Indranil Manna, extended by the networking opportunities with a dinner event, fostering a collaborative atmosphere and allowed participants to further exchange ideas and build connections.

The second day started with the visit to CSIR's Hydrogen Technology (H2T) Mission Program and Pune Hydrogen Valley Innovation Cluster, which was coordinated by Dr. CS Gopinath, Outstanding scientist CSIR-NCL, Pune. Before proceeding to the visit to CSIR lab, an overview on (H2T) Mission Program was conducted by Dr Gopinath. The overview by Dr Gopinath was followed by a brief lecture by Dr. Vishal Dhavale, CECRI on "Low-Temperature Polymer Electrolyte Membrane Fuel Cells (LT-PEMFC) Components and Technology Advancement". Lectures were delivered by Dr. Kavita Joshi, NCL on "Machine Learning and Synthesis in Action: Paving the Way for Efficient Solid-State Hydrogen Storage Solutions", by Dr. Jayanta Mukhopadhyay, CGCRI on "Solid Oxide Fuel Cell and Electrolyser Cell Technology at CSIR-CGCRI: A Short Perspective in Indian Scenario", and Dr. K. Selvaraj, NCL on "Affordable AEM Water Electrolyser and Indigenous Technology Development Efforts at CSIR India" .

Subsequent to the presentation of overview and lectures, the participants explored CSIR's initiatives in Hydrogen technology and Pune's Hydrogen Valley Innovation Cluster. A Lab Visit for CSIR's Hydrogen Technology Mission Program, Incubator Visit, fuel cell testing lab, storage lab, utilization lab for hydrogen followed by the visit to Automotive Research Association of India (ARAI) were held. The participants toured and gained valuable insights into hydrogen-related research. The event concluded with the third day where in industry visits were planned to KPIT Technologies Ltd., Pune, ENPRO to H2E Power System Inc. The UK delegation met with leadership, and a visit to "Impact Automotive Solutions Ltd." was made wherein indigenously developed hydrogen buses and engines were showcased along with the fuel cylinders. The program concludes with exchange of knowledge achieving its objective. This comprehensive program facilitated knowledge exchange, networking, and collaboration, laying the foundation for future initiatives in the field of Green Hydrogen.

Prof Indranil Manna, FNAE, President, INAE delivering the Presidential Address during the event
***L to R**: Mr JD Patil,FNAE, Dr Nick Starkey, Prof Nigel Brandon, Lt. Col. Shobhit Rai (Retd) and Dr Ashish Lele, FNAE*

Dr Ashish Lele, FNAE, Director, CSIR-NCL, Pune delivering Address

Prof Nigel Brandon, OBE FREng FRS & Dean of Faculty of Engineering, Imperial College London from UK respectively delivering Address

Concluding Day-1: UK and Indian Participants at the event

Other Activities/Affairs of INAE

(a) INAE's Participation in the IISF 2024- Science, Technology and Innovation Exhibition held from January 17-20, 2024 at Faridabad, Haryana

In response to an invite from DST, INAE participated in the IISF 2024- Science, Technology and Innovation Exhibition held from January 17-20, 2024 at Faridabad, Haryana, coordinated by DST and the National Innovation Foundation. INAE took up a stall wherein nine posters were exhibited highlighting the background, objectives and major technical activities including joint international events undertaken with the mandate of fostering engineering and technology in the country. The posters of INAE were in consonance with the theme of IISF 2024 viz "Science and Technology Driven Nav Bharat in *Amritkal*".

Some Glimpses of INAE Stall at IISF-2024

INAE's Stall

Student Visitors at INAE's Stall

(b) 37th Foundation Day Function of INAE

The Indian National Academy of Engineering (INAE), founded on April 20, 1987 is an autonomous professional body partly supported by grant-in-aid from the Department of Science & Technology, Government of India. The 37th Foundation Day Function of Indian National Academy of Engineering (INAE) was held on 20th April 2023 (Thursday) at R&I Park, IIT Delhi in hybrid mode. The function commenced with a Welcome Address and short brief on INAE delivered by Lt Col Shobhit Rai (Retd), Officiating Executive Director, INAE followed by an Address by Prof Indranil Manna, President, INAE and Vice-Chancellor, BIT Mesra wherein he presented the major activities during the last one year. The Guest of Honour, Prof Rangan Banerjee, FNAE, Director, IIT Delhi then gave a thought-provoking talk on "The Challenge of Net Zero and India's Energy Transition" during which he covered the challenges and opportunities provided by this transition and focussed on the need for targeted and co-ordinated research and innovation to enable the sustainable growth of the Indian energy sector. This was followed by an enlightening address on "Climate Change and India's Pathway" by the Chief Guest, Dr VK Saraswat, FNAE, Member, NITI Aayog who spelt out the national priorities in the field of India's Energy Security covering all aspects about the transition to new and green energy technologies. He spoke about the Hydrogen Economy and the need to change to more environment- friendly ways to manufacture hydrogen on a large scale for deployment at national level, as a major source of energy. He also touched upon the introduction of electric vehicles and the infrastructure required for deployment on a large scale. The effect of greenhouse gases on climate change and mitigation of global warming by carbon capture and sequestration were emphasized during his address. His talk was a comprehensive delivery on the future path for India to strive towards Net Zero, reduce greenhouse gas emission and mitigate the effects of climate change for sustainable development of the economy. The Function was attended by about 60 INAE Fellows, Young Associates and Research Scholars of IIT Delhi in person 150 INAE Fellows, Young Associates and Invitees online and was an outstanding success.

Dr VK Saraswat, FNAE, Member, NITI Aayog welcomed by Prof. Indranil Manna, President, INAE

Prof Indranil Manna, FNAE delivering Address

Prof Rangan Banerjee, FNAE, Director, IIT Delhi delivering Talk

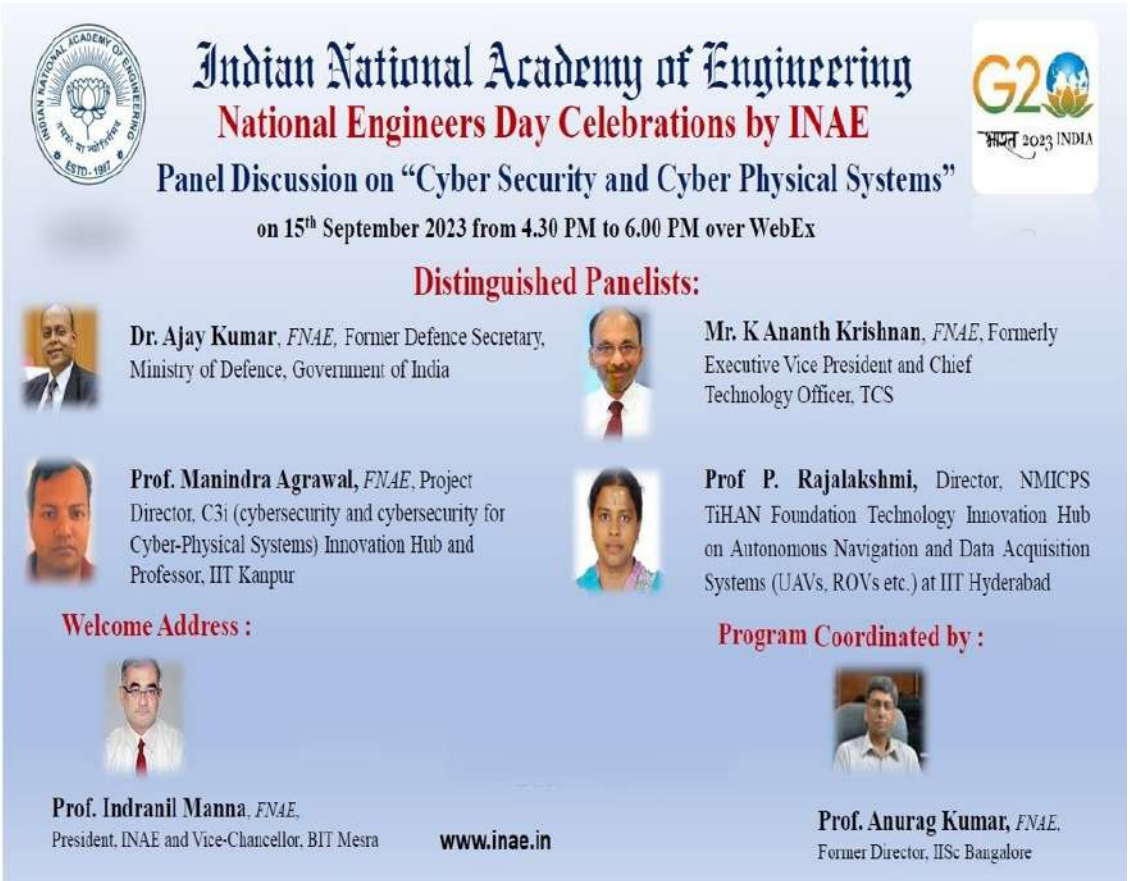
Dr VK Saraswat, FNAE delivering his Address

(c) National Technology Day celebration by INAE on 11th May 2023

INAE celebrated the National Technology Day on 11th May 2023 wherein Mr. MV Kotwal, FNAE, Ex-Member of the L&T Board & President Heavy Engineering delivered a special Talk online on "Technology – A Prime Mover for Growth". Prof. Indranil Manna, President, INAE delivered the Presidential Address. In his talk Mr MV Kotwal highlighted that every aspect of life is dependent upon technology and exponential growth has occurred not only in per capita GDP but also in human health & longevity as well as Education, Commerce, Construction, Infrastructure, Mobility, Exploration, Process Design, Manufacturing, Communication, Defence and almost every other area. He illustrated some outstanding technological achievements that have made a landmark change in the lives of man in recent times. Over 80 participants attended the talk which was well appreciated.

(d) National Engineers Day Celebrations on September 15, 2023

INAE celebrates the "National Engineers Day" every year on 15th September. To commemorate the occasion, INAE organized a Panel Discussion on "Cyber Security and Cyber-Physical Systems" on National Engineers Day 2023 i.e. 15th September 2023 (Friday) over WebEx. The following eminent experts in the subject domain participated as Panelists: Dr. Ajay Kumar, *FNAE,* Former Defence Secretary, Ministry of Defence, Government of India; Mr. K Ananth Krishnan, *FNAE*, Formerly Executive Vice President and Chief Technology Officer, TCS; Prof. Manindra Agrawal, *FNAE*, Project Director, C3i (cybersecurity and cybersecurity for Cyber-Physical Systems) Innovation Hub and Professor, Department of Computer Science & Engg., IIT Kanpur and Prof P. Rajalakshmi, Director, NMICPS TiHAN Foundation Technology Innovation Hub on Autonomous Navigation and Data Acquisition Systems (UAVs, ROVs etc.) at IIT Hyderabad and Professor, Department of Electrical Engineering, IIT Hyderabad. Prof. Anurag Kumar, *FNAE*, Former Director, Indian Institute of Science Bangalore steered the panel discussion as the Coordinator. Prof Indranil Manna, President, INAE also addressed the audience online on vital issues being addressed in the Panel Discussion meeting. The presentations were followed by a lively Q&A session in which the panelists addressed a plethora of queries on relevant issues pertaining to Cyber Security and Cyber-Physical Systems which have assumed importance in the present context. The topic of Industry 4.0 and its implementation in Indian industry was also touched upon. Over 60 Fellows, Young Associates, faculty and researchers attended the Panel Discussion meeting online.



(e) National Science Day 2024

A Talk by Prof Uday B Desai, Vice President INAE and Former Director IIT Hyderabad on "Innovations, Entrepreneurship and Creating an Ecosystem" was held on February 28, 2024 in virtual mode. This talk took a 40,000 feet view of how innovations and development in technology are shaping the future of society. The talk also delved into how innovations have historically evolved and what it takes to create an innovations ecosystem. It explored the current evolution of innovations through technologies like artificial intelligence, cyber physical systems, smart mobility, 6G communication, and some more. Then a brief mention of about how an innovative ecosystem can spur deep tech entrepreneurship was made. By and large the talk revolved around digital technologies, which are all pervasive and will remain so for the foreseeable future.

INAE Youth Activities

INAE takes great pride in shouldering the responsibility to encourage the engineering youth of the Country so as to enhance the engineering excellence, youth leadership, and encourage nation building.

The following two flagship events of INAE are held annually:

- **INAE Youth Conclave**

  With a view to encourage engineering students, INAE Youth Conclaves are organized each year since 2017. The objective of the Youth Conclave is to facilitate the engagement of Indian youth in engineering activities at national level and also to provide a platform to express their technological creativity and ingenuity and demonstrate their ability to innovate towards finding solutions that impact our collective future. In addition, participating in this event provides an excellent platform for students to interact with fellows of INAE and experts who have distinguished themselves with contributions in Engineering R&D, Industry and Academia.

  This year INAE Youth Conclave 2023 forming part of the SERB-INAE Collaborative Initiative in Engineering, was held under the aegis of SERB-INAE Innovation Hackathon during November 3-4, 2023 at GITAM University, Vishakhapatnam.

- **Symposium on National Frontiers of Engineering (NatFoE)**

  The Symposium on National Frontiers of Engineering (NatFoE) is one of the flagship events of INAE since 2006. The main objective of the event is to encourage Young Engineers (ages ~27-45) from industry, universities, and R&D labs to discuss leading-edge research and technical work across a range of engineering fields. This year, the 17th National Frontiers of Engineering (NatFoE-23) symposium forming part of the SERB-INAE Collaborative Initiative in Engineering was organized by INAE in collaboration with Birla Institute of Technology Mesra under the aegis of INAE-SERB conclave on *Atmanirbhar* Technologies- Engineering Secured Future during June 24-25, 2023.

  The details the above-mentioned flagship events are covered under the heading **"SERB-INAE Collaborative Initiative in Engineering"** of the said INAE Annual Report 2023-2024.

Reaching out to Policy Makers: Interaction with Government Agencies

Joint INAE Consultative Committees:

To align the activities of the Academy with the thrust areas of the Government of India in the policy domain, Joint Consultative Committees have been constituted with DST, DRDO, DAE, ISRO, CSIR, AICTE and SERB. INAE had taken an initiative to constitute joint consultative committees with eminent organizations so as to align activities of INAE in the areas of national engineering interest. INAE currently has several Consultative Committees with following departments/establishments of Government of India such as Department of Science & Technology (DST), Defence Research & Development Organisation (DRDO), Indian Space Research Organisation (ISRO), Department of Atomic Energy (DAE), Council of Scientific & Industrial Research (CSIR) and All India Council for Technical Education (AICTE) which meet periodically to facilitate interaction and identification of topics on thrust areas of engineering for conduct of technical activities and programmes. These consultative committees are co-chaired jointly by the President of INAE and Secretary/Director General of the organization. One such joint Consultative Committee was constituted with DST chaired by the President, INAE and the Secretary DST and key members from both INAE and DST. The recent meeting of the DST-INAE Consultative Committee was held on January 5, 2024 in the office of the Secretary, DST. During the meeting it was discussed to align the activities of INAE in light of *Amrit Kal* and to constitute a think tank and sub committees to implement a suitable mechanism for further modifying the activities of INAE.

Research Schemes

INAE Chair Professorship

INAE Chair Professorship was instituted in order to encourage engineers/technologists with outstanding research contributions, promote long-term participation in academic research and enhance the research standards in academic institutions. Nominations for the year 2023 were invited with the revised guidelines for the subject Schemes and last date of receipt of nominations was May 31, 2023. The following nominees were conferred the INAE Chair Professorship.

(a) Dr R Gopalan, Visiting Professor, IIT Madras

(b) Prof Krishnan Balasubramanian, Institute Professor, Mechanical Engineering, IIT Madras

INAE Distinguished Professors/Technologists

The objective of this Scheme is to utilize the expertise of INAE Fellows after superannuation and those not in regular employment primarily for research in Institutions/ Universities/ Research & Development establishments, and industry in India. The Fellows may choose any institution of their choice, which may be the same institution from where superannuated. Nominations for the year 2023 were invited with the revised guidelines for the subject Schemes and last date of receipt of nominations was May 31, 2023 however no valid nominations were received during 2023-24.

Mentoring of Engineering Teachers/Students by INAE Fellows/ Young Associates

INAE undertakes mentoring of Engineering Teachers from recognized Engineering institutions with a view to enhance the quality of Engineering education being imparted in the country. Applications for the year 2023 for Mentoring of Engineering Teachers by INAE Fellows/ Young Associates were invited with the revised guidelines with amendments in terms of the financial emoluments and last date of receipt of nominations was May 31, 2023. The nominations for were approved by the Governing Council in its 147th meeting held on June 30, 2023.

A total of 11 valid nominations were selected under the scheme Mentoring of Engineering Teachers by INAE Fellows/ YA for the year 2023-24:

S. No	Mentor Name	Name of Organization where INAE Fellow/ Young Associate (Mentor) is serving	Engg Teacher Name (Age as on Jan 1, 2023)	Name and Address of Institution/University
1	Prof. Radhakant Padhi	Indian Institute of Science, Bengaluru	Dr Mirza Khalid Baig	National Institute of Technology Rourkela, Odisha
2	Dr M Arunachalam	Retired, General Manager, BHEL, Bangalore	Mr P Balaji Chakravarthy	RNSIT, Channasandra, Bengaluru
3	Prof. N. K. Mukhopadhyay	Department of Metallurgical Engineering, IIT (BHU) Varanasi, Varanasi, Uttar Pradesh	Dr Sasikumar Chandrabalan	Department of Materials & Metallurgical Engineering, MANIT Bhopal, Madhya Pradesh
4	Prof. N. K. Mukhopadhyay	Department of Metallurgical Engineering, IIT (BHU) Varanasi, Varanasi, Uttar Pradesh	Dr Anil Kumar	Kamla Nehru Institute of Technology Sultanpur (U.P.)
5	Prof. (Dr.) Umapada Pal	CVPR Unit, Indian Statistical Institute, Kolkata, West Bengal.	Dr. Swalpa Kumar Roy	Department of Computer Science & Engineering, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal
6	Prof. (Dr.) Umapada Pal	CVPR Unit, Indian Statistical Institute, Kolkata, West Bengal.	Dr Mohammed Javed	IIIT Allahabad

S. No	Mentor Name	Name of Organization where INAE Fellow/ Young Associate (Mentor) is serving	Engg Teacher Name (Age as on Jan 1, 2023)	Name and Address of Institution/University
7	Prof Kantesh Balani	Professor, Department of Material Science and Engineering, Indian Institute of Technology Kanpur	Dr Ashutosh Tiwari	Rajkiya Engineering College Banda
8	Dr Rajeev Shorey	Former CEO, University of Queensland -IIT Delhi Academy of Research (UQIDAR) Adj Faculty, Dept of Computer Science & Engg, IIT Delhi	Dr Abhishek Appaji	B.M.S College of Engg, Department of Medical Electronice Engg, Bengaluru, Karnataka
9	Prof Sirshendu De	IIT Kharagpur, West Bengal	Mr Prasenjit Bhunia	Department of Chemistry, Silda Chandra Sekhar College, Jhargram, West Bengal
10	Dr. Lalit Kumar	Formerly, Director-MTRDC, Chairman, CEPTAM, DRDO, Delhi	Mr Mithun Mondal	BITS-Pilani, Hyderabad Campus, Jawahar Nagar, Kapra Mandal, Hyderabad, Telangana.
11	Prof. Sukumar Nandi	Indian Institute of Technology Guwahati, Assam	Mr Thejaswini P	JSS Academy of Technical Education, Bengaluru JSSATE-B Campus, Bengaluru, Karnataka, India

Mentoring of Engineering Students by INAE Fellows/ Young Associates (Internship Opportunity under the Mentoring of INAE Fellows/Young Associates)

INAE undertakes mentoring of meritorious 3rd /4th year B.E./B.Tech/BSc. (Engg.) students from recognized Engineering institutions, for two months during the academic year, with a view to provide them guidance so as to excel further in their field of study and improve the quality of engineering education. Applications for the year 2023 for Mentoring of Engineering Students by INAE Fellows/ Young Associates were invited with the revised guidelines with amendments in terms of the financial emoluments and last date of receipt of nominations was May 31, 2023. The nominations for were approved by the Governing Council in its 147th meeting held on June 30, 2023.

A total of 09 valid nominations were selected under the scheme Mentoring of Engineering Students by INAE Fellows/ YA for the year 2023-24:

S No	Mentor Name	Name and Address of Organization where INAE Fellow/Young Associate (Mentor) is serving	Student Name	Name and Address of Institution/University
1	Dr. Parag R. Gogate	Department of Chemical Engineering Institute of Chemical Technology Mumbai	Mr. Lakshay Vashishtha	Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India
2	Prof. N. K. Mukhopadhyay	Department of Metallurgical Engineering, IIT (BHU) Varanasi, Uttar Pradesh	Ms. Manvi	University Institute of Engineering and Technology,CSJM University, Kanpur U.P.
3	Dr. Rishi Raj	Department of Mechanical Engineering, Indian Institute of Technology Patna	Mr Amit Raj	Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh
4	Dr. Noel Jacob Kaleekkal	Chemical Engineering and MembraneTechnology, NIT Calicut, Kerala	Ms Sreelekshmi S	Saintgits College of Engineering, Kerala
5	Dr Rajeev Shorey	Former CEO, University of Queensland -IIT Delhi Academy of Research (UQIDAR) Adj Faculty, Dept of Computer Science & Engg, IIT Delhi	Ms Apoorva M S	BMS College of Engineering, Bangalore

S No	Mentor Name	Name and Address of Organization where INAE Fellow/Young Associate (Mentor) is serving	Student Name	Name and Address of Institution/University
6	Dr. Niraj Kumar	Principal Scientist, CSIR-Central Electronics Engineering Institute, Pilani, Rajasthan	Ms Aayushi Sinha	Amity Institute of Biotechnology, Amity University, Noida (U.P.)
7	Prof. (Dr.) Umapada Pal	Computer Vision and Pattern Recognition Unit, Indian Statistical Institute, Kolkata	Mr Atri Sukul	Jalpaiguri Government Engineering College, Jalpaiguri
8	Dr Sandip Ghosh Chowdhury	Materials Engineering Division, CSIR National Metallurgical Laboratory, Jamshedpur	Mr Nawal Agarwal	N.I.T Jamshedpur
9	Dr Sandip Ghosh Chowdhury	Materials Engineering Division, CSIR National Metallurgical Laboratory, Jamshedpur	Ms Ankita Nandi	IIEST, Shibpur, Howrah

INAE Expert Groups to Prepare Technology Roadmaps with Actionable Recommendations

The objective of the "INAE Expert Group to Prepare Technology Roadmaps with Actionable Recommendations" initiative launched in the year 2020, is development of a comprehensive engineering/ technology road map with actionable recommendations on selected engineering themes or domains to help the country formulate a policy/strategy for implementation. The following expert groups were approved by INAE Governing Council (i) 'Accelerated Materials Discovery, Scale-up and Exploitation Strategy for Strategic Materials Needs of India' with Principal Investigator: Dr. Biswajit Basu, Former Dy. CTO & Head, Aditya Birla Science & Tech Co. Pvt. Ltd; (ii) 'Industrial By-products (IBPs) for Sustainable Infrastructure Development' with Principal Investigator: Prof. DN Singh, IIT Bombay; (iii) 'Infrastructure and Resource Requirements for Introduction of Automation and its Adoption in the Mineral Sector of India: A Stakeholder Engagement' with Principal Investigator: Prof. Jayanta Bhattacharya, IIT Kharagpur, (iv) 'Technology roadmap for capture and conversion (CCUS) of CO2 to value added chemicals' with Principal Investigator: Prof KK Pant, Director, IIT Roorkee, and (v) 'Advanced Microwave- Terahertz wave Technology & Applications- Way ahead for India' with Principal Investigator: Dr Lalit Kumar, Adjunct Professor, BITS-Pilani, Hyderabad, Former Chairman, CEPTAM, Former Director, MTRDC-DRDO, Bangalore.

The Principal Investigators of the expert groups had since presented before the Steering Committee and the final report submitted are as follows:

I. Accelerated Materials Discovery, Scale-up and Exploitation Strategy for Materials Needs of India

Date of Start of the Project: September 21, 2020

Engineering Discipline: Mining, Metallurgical & Materials Engineering

Expert Group (names and affiliation):

Principal Investigator – Dr. Biswajit Basu

Co-Principal Investigators – Prof. K.A. Padmanabhan and Dr. S.V. Kamat

Working Group: Dr. Amarendra K Singh, Dr. Anand, Dr. Appa Rao, Dr. Balamuralikrishnan, Dr. BP Gautham, Dr. Debashish Bhattacharjee, Dr. Dipti Samantaray, Dr. DLVK Prasad, Dr. Gandham Phanikumar, Dr. Gerald Tennyson, Dr. Nilesh P Gurao, Dr. Partha Ghosal, Dr. Pradip, Dr. Pritam Chakraborty, Dr. Sankarasubramanian, Dr. Saswata Bhattacharya, Mr. Utpal Borah, Dr. Venugopal Shankar

Aims and Objectives: The objective is to "prepare technology roadmaps with actionable recommendations" for the implementation of an Integrated Computational Materials Engineering (ICME) approach for the accelerated development of new materials. This is consistent with the INAE 2020-25 vision statement, wherein it is stated that "INAE shall strive to help institutionalize the ICME/ MGI approach in our national materials development efforts".

Concluding remarks: To foster and accelerate the materials development to deployment it is necessary to adopt ICME/MG concepts to overcome current limitations in terms of timelines and facilities. This has motivated the need to establish an ecosystem and a national digital infrastructure to foster collaboration and exchange data and tools. It has been identified to work on technology demonstrator projects and demonstrate the benefits to the industry in terms of RoI. To overcome the need for test and pilot facilities, national facilities should be set up that can be leveraged by the industry, especially MSME. The workshops and surveys have shown that a critical mass of ICME/MG research in the country exists, but there is a need to bring the community together along with industry for greater benefits to the nation. To cater to the industry needs and accelerate the progress of the nation it is necessary to design specific educational programs for development of future workforce. Over and above, a need for an organization is being recognized, preferably a Section 8 company to drive some the identified aspects in a professional manner with a goal to be self-sufficient in 5 years.

II. Industrial By-products (IBPs) for Sustainable Infrastructure Development

https://www.civil.iitb.ac.in/~dns/MissionIBPSformywebsite.pdf

Date of Start of the Project: May 2020

Engineering Discipline: Civil Engineering

Expert Group (names and affiliation):

Principal Investigator: Prof. D N Singh, D.L. Shah Chair Professor for Innovation, Department of Civil Engineering., IIT Bombay

Members: Padmashri Dr. Y S Rajan; Dr. R K Bhandari, Ex-Director, CBRI, Roorkee; Prof. Nagesh Iyer, Ex-Director SERC Chennai, Presently Dean IPS, IIT Dharwad; Prof. Jaywant Arakeri, IISc Bangalore; Prof. S K Bhattacharya, Director-in-Charge, IIT Kharagpur; Dr. Indranil Chattoraj, Director, NML Jamshedpur; Dr. Alpa Sheth, MD VSM Consultants, Mumbai; Mr. Satish Pai, MD and Mr. Krishan Kumar, VP, M/S Hindalco Ltd., Mumbai; M/S Vedanta; Mr. Anil Counto, MD, M/S Alcofine Ltd., Goa; Mr. Ulhas Parlikar, Global Consultant, Waste Management, Circular Economy, Policy Advocacy, AFR & Co-processing, Mumbai; Mr. Narendra Dalmia, CEO, STRATA, Mumbai; Mr. Sydney Lobo, Chief-Business Collaboration, The Tata Power Company Limited; Mr. Nagesh Prabhu, Director, M/S Zigma Global Environ Solutions Private Limited; Mr. Tarjindar Singh, COO, M/S Antony Lara Enviro Solutions Pvt Ltd., Mumbai; Dr. S.M.R. Prasad, Advisor, JSW Ltd.

Aims and Objectives: The aim & objectives of the project are listed below:

1. Estimate the nature and scale of IBPs lying at major industrial units in India and their potential impact on the geo-environment (i.e., air, soils/rocks/groundwater) for:
    - Valorization of IBPs for different applications with particular reference to sustainable ecological and infrastructure development.
    - Develop mechanisms and methodologies for monitoring the impact of IBPs on the ecosystem both in (a) their native and (b) re-created states.

- Create policy guidelines through the Government of India (GOI) to identify IBPs as a manmade resource (viz. through in-situ or ex-situ neutralization, manmade soils, etc.)

2. Creation of policies through the GOI for transportation of IBPs in bulk, from the place of disposal/ stack to the place of utilization.
3. Creation of a task force in the 'mission mode' for the IBPs
4. Formulation of relevant codes/manuals/standards/guidelines
5. Facilitate the transition from policy to practice

Concluding remarks: INAE's vision in supporting a visionary project of this nature to mitigate the challenges associated with the management of IBPs needs to be applauded. This is an issue that has not been explored at all despite the associated ramifications to the people and the planet. The traditional 'profit only' attitude has resulted in a scenario where we are on the brink of a huge manmade disaster. However, given the fact that nothing on this scale has been attempted previously the funding needs to be calibrated to be able to support comprehensive research in this area. Provision for engaging qualified professionals who can gather reliable primary data is required. Moreover, given the fact that there are no reliable sources of available data on the quantum of the IBPs (legacy/current), there is no option left but to physically audit the sites and gather data. This will require time as the legacy IBPs are estimated to be in millions of tonnes across different locations. The current condition of these stockpiles is not known even by the generators leave alone the statutory authorities.

III. Title: Infrastructure and Resource Requirements for Introduction of Automation and its Adoption in the Minerals Sector of India: A Stakeholder Engagement

Objective:

1. Delineating the benefits of automation in the Mining and Minerals sector.
2. Review of the status of mineral industry automation around the world.
3. Understanding the requirements of skill set required for the education of automation in the professional courses.
4. Deriving the gaps existing in the equipment manufacturers and road blocks for implementation.
5. Understanding the industry's preparedness for implementation of automation, existing gaps and bridging the gaps.

Conclusion: Automation and digitalization are crucial elements in the evolution of industries across the globe. Their importance extends across various sectors, bringing about transformative changes that enhance efficiency, competitiveness, and sustainability. In this report, we have analysed the responses of participants of different age groups and from different industries (IOCL, NMDC, HPCL, MOIL, MCL, NTPC, UCIL, NACL, SAIL, CCL, BCCL, SECL, Tata Power etc.,) about their awareness and application of the digitalization/automation in their industries. Methodologically, we employed chi-square tests of independence to assess the impact of industry changes on participant responses. Stacked bar plots facilitated a visual representation of response distributions across different categories, aiding in uncovering patterns and relationships within the data effectively. In the results and discussion section, each question has been analysed with the obtained responses and compared with responses by different industries. We derived insights from statistical analyses, providing valuable conclusions to

inform future strategies and interventions in digitalization and automation within the industries.

IV. Technology roadmap for capture and conversion (CCUS) of CO2 to value added chemicals

Date of Start of the Project: 11 Sept. 2021

Engineering Discipline: Chemical Engineering

Principal Investigator: Prof KK Pant, Department of Chemical Engineering, IIT Delhi-

Aims and Objectives:

(i) Preparation of technology roadmap on CO2 capture and conversion covering the data base of CO2 emissions from various energy sectors

(ii) To identify the potential challenges of deploying CCUS technology and develop strategies to address them.

(iii) With the purpose of sharing experience and integrating knowledge across the entire CCUS chain (capture, transport, utilization and storage), the workshop will be conducted to bring together the experts in CCUS research from government departments, industry, scientific institutes and Non-Governmental Organizations (NGOs).

(iv) To meet the vision of this roadmap, apart from the technology development, recommendations will be provided to accelerate the progress in the each of the associated area.

Concluding remarks: CCS is an important area of research in view of low carbon products and there is a need to carry out further research. Scale up and economy analysis of the CO2 hydrogenation process should also be investigated. Green hydrogen either through solar based processes or electrochemical routes should also be investigated. Biomass gasification and WGS reaction are also being studied by several research groups.

The details of the respective reports are contained in the Appendix which can be downloaded from the link given below.

https://www.dropbox.com/scl/fi/whyo7je2g9tinyyafciqx/Appendix-Expert-Groups.docx?rlkey=867j0p6dy1wkqy427gsonqzl1&st=5bsalwmx&dl=0

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.

(a) INAE Forum on Civil Infrastructure

The forum was formed to address the subject area of INFRASTRUCTURE. The main objective of the forum is to carry out studied on issues of current National interest and, recommend needed actions related, Policy Initiatives, Engineering Development/Research, Education, and, so on. The first report entitled, "URBAN TRANSPORTATION: Challenges and Way Forward" was prepared by the Forum and released at the INAE Annual Convention held in December 2019 at Jaipur. Further, a study to address the subject of Housing in India was initiated by the Forum. The report, "HOUSING IN INDIA: Challenges & Way Forward" incorporating inputs from invited experts was released during the INAE Annual Convention 2022 held on December 14-16, 2022 at Bhabha Atomic Research Centre (BARC), Mumbai.

Following the above contributions, the Forum has undertaken a study on "Sustainability in Built Environment", which was approved by the INAE at its 147th Governing Council Meeting held on June 30, 2023. The objective of the study is to prepare a study report with recommendations on policies and actions required for sustainability in respect of civil infrastructure. Sustainability must be sought in all stages, like functional design, detailed engineering, selection of materials, construction methodology, construction management, and later for management of the asset. Recyclability, use of waste materials, flexibility in change of materials to be used and lower life cycle cost are important to achieve true sustainability in civil infrastructure. At this time, the building and construction sector account for 40% of energy related GHG emissions, out of which 11% is from construction materials and 28% from energy used for construction based on types of materials used.

The material for construction is the most important issue from sustainability points of view and the two conventional materials, steel and concrete and their variations, are not the best choices from the sustainability point of view. There is a plethora of R&D to find alternative materials, which even alleviate the problems of industrial waste disposal. Whereas there is need to continue the R&D and standardization efforts, the platform is ready to begin part replacement of conventional materials/technologies. Therefore, replacement of conventional materials to be the mainstream activity, shall require serious policy directive and associated education/enforcement initiatives.

The forum is constituted with Prof. Nagesh Iyer, Prof. P.K.Sikdar, Prof. N. Raghavan, Prof. S.K.Bhattacharyya, Er. Alok Bhowmick, Er. V.N. Heggade, FNAEs, Er. Sanjay Pant, DDG, BIS, Prof. M. Parida, Director CRRI, and, Dr. Mahendrakumar Madhavan, Professor IITH, as members, and, Prof Prem Krishna, Former Vice-President, INAE & Formerly Professor & Head of Civil Engg. Department, IIT Roorkee, as its chairman. Meetings of the forum have been organized regularly, from August 2023 onwards and the work is under progress satisfactorily to compile the report.

(b) INAE Forum on Technology Foresight and Management

INAE Forum on Technology Foresight and Management for addressing National Challenges was constituted with the mandate to evolve solutions keeping in view the issues of sustainable development, poverty reduction, and climate change in focus and suggest appropriate technologies accordingly. Further, suitable Engineering Management techniques will be employed to find cost effective and optimal solutions. The forum was re-constituted during the year.

(c) INAE Forum on Energy

Brainstorming Session on 'Innovative Pathways for Hydrogen Development' jointly organized by INAE Delhi Chapter, International Solar Alliance (ISA) and INAE Forum on Energy held on November 17, 2023 at India International Centre, New Delhi. Dr Kirit Parikh, Former Chairman, IRADe and Member, Planning Commission was the Guest of Honour. Green Hydrogen (GH2), i.e., hydrogen made using zero-carbon emission processes, is emerging as a major option for replacing fossil fuels in non-electricity applications in all net-zero scenarios. In the move towards a net-zero carbon world, solar, wind, biomass, hydro, and nuclear (or green) electricity, complemented by electricity storage, is already emerging as a cost-effective and carbon-free option. GH2, on the other hand, still requires technological and commercial development to be cost-competitive with fossil fuels used in sectors such as long-distance transport, steel, petrochemicals, etc., or for supplying heat in industrial applications. The ISA has launched a Green Hydrogen Innovation Centre (GHIC), during the current G-20 presidency, to provide up-to-date information on policies, technologies and initiatives on GH2 production, transport and utilization, as well as to provide certified training for GH2 management, and to link GH2 developers and financiers. An ISA and INAE partnership could *inter alia* explore engineering challenges in: Upgradation of electrolyzer technology; Development of GH2 production technology using heat from nuclear-reactors and concentrated solar power; Options for GH2 production using intermittent sources of green electricity; Utilization of hydrogen for the production of steel and petrochemicals; Utilization of hydrogen for the cost-effective production of industrial heat; Transportation of hydrogen as ammonia, urea, methanol, etc. The possible INAE-ISA partnership on GH2 was discussed at the brainstorming meet.

Brainstorming Session in progress on Nov 17, 2023 at New Delhi

(d) INAE Forum on Engineering Interventions for Disaster Mitigation

By fostering innovation and global cooperation among stakeholders, the forum aimed to address vulnerabilities specific to natural and manmade disasters, with specific focus on:

- Briefly catalogue the typical disasters which have affected typical Infrastructure projects in the recent past, so as to design mitigation measures for being kept in readiness (viz., landslides, tunnel collapses, cyclone attacks, flood attacks on bridges).
- Identify various types of Disasters which can impact various different types of infrastructure projects, with degrees of severity and likely frequency of occurrence,
- Know the possible Causes first to be able to design the mitigations effectively for various types of Infrastructure, identify how to build in mitigation measures a priori in Planning/ Design/ Construction stages for various kinds of infrastructure projects to minimize requirements for in-operation mitigation,
- Network with other agencies engaged in this area viz., NDMA; study their operations and publications/ newsletters - AAPDA SAMVAD,
- Build up existing BIS Code on Mitigation of Disasters; certificate course of BIS/NITS on Disaster Management;
- BIS's Webinars on Indian Standards for Disaster-Resilient Structures for disaster mitigation.

Emphasizing the importance of preparedness in context of climate change, a base document was prepared- "Climate Resilient Infrastructure Landscape: Are We Ready with Engineering Solutions?", which pertains to an important issue. This document outlines the current state of climate-resilient engineering solutions, identifying gaps and opportunities for improvement. Advocating for immediate and comprehensive transformations across interconnected infrastructure systems such as energy, land, water, waste, built environment, and transport.

The Forum recognized that engineer's crucial role in achieving net-zero through infrastructure planning, climate adaptation and financing. Embracing the principles of the fifth-industrial revolution, it envisions a world where engineers creating efficient and sustainable infrastructure that interfaces harmoniously with nature, striking a delicate balance between progress and preservation. The base paper was forwarded to INAE for further follow-up actions by Prof S.S. Chakraborty and Prof DN Singh on behalf of the Forum.

Active discussions will be held in near future on the following topics/themes:

1. Alternate Perspective for Strategic Framework: A Shift Towards Societal Resilience - A Strategic Framework for Engineering Interventions in Disaster Mitigation, proposed by Prof. Nagesh R. Iyer
2. The white paper on the man-made and unforced disasters in the built habitat, by Ms Alpa Sheth
3. Need for a Sharp Focus and SOPs for Specific Engineering Interventions for Disaster Mitigation, by Prof. N. Raghavan
4. Climate change and the enhancement in frequencies/intensities of natural disasters, by Prof. Dr U. C. Mohanty
5. Increasing flood frequencies under climate change and Digital Twin for Floods in Bangalore city, by Prof. P. P. Mujumdar
6. Disaster management and economic development, by Dr. B.C. Roy

Frugal Innovation Nurturing Programme

A brief update on the progress made during the last year under the subject programme is given below.

Introduction:

INAE, via letter number INAE/201/IPC dated August 8, 2018, had constituted an Innovation Promotion Committee for the implementation of a Frugal Innovation Nurturing Programme (FINP), with the objective of preparing a strategy to guide grassroots innovators on how to make their innovations suitable for commercialization and marketable products.

The FINP committee comprises of:

Chairman
Dr. V Bhujanga Rao, ISRO Chair Professor, NIAS Bangalore
Members
Prof. Prem Krishna, Past Vice-President, I NAE and Formerly Professor & Head of Civil Engg. Department, IIR Roorkee.
Dr. Surendra Pal, Former Vice Chancellor, Defence Institute of Advanced Technology (DIAT), Pune.
Dr. V Jayaram, Prof. Satish Dhawan Professor & Senior Advisor (Space Applications), ISRO Headquarters, Bangalore.
Prof. S Narayanan, Professor Emeritus (Adjunct), Indian Institute of Information Technology (Design and Manufacturing), Chennai.
Mr. P Venugopalan, Director, Defence Research and Development Laboratory (DRDL), Hyderabad.
Mr. M Kotwal, Ex-President, In-charge of the Heavy Engineering. Division of Larsen & Toubro Limited (L&T) (Co-opted).

The committee chairman worked from NIAS, IISc Campus, Bangalore, with NIAS providing technical and administrative support.

Grassroots innovations (GRIs) generally offer promising new ideas and practices but often need help to scale up and spread beyond developed locations. This fact should come as no surprise, as grassroots innovators, lacking formal engineering training, develop these innovations through trial and error, driven by their unwavering zeal within the limited local infrastructure. Mostly, grassroots innovations are bottom-up social innovations typically created at the bottom of the pyramid due to life's necessities. Even though India has a proven capacity for innovation, it does not translate into widely used products. On the TRL scale, they are generally between 2 and 4, whereas industries do not agree for production or marketing unless they are between 8 and 9. In terms of design optimisation, manufacturability, safety, standards, ergonomics, aesthetics, etc., GRIs need improvement. We expect this, given that grassroots innovations originating from the informal sector hold immense potential. However, it's critical to connect them with R&D experts and institutions in the formal sector. Realizing this aspect, INAE created the FINP committee to conduct a pilot study and develop an institutional and scalable strategy to benefit our grassroots innovators in large numbers.

Working in collaboration with NIF in Ahmedabad, the committee identified several GRIs that needed technology upgrades and worked with several engineering institutions to convert them into seamless commercial products. The list of these products is given below:

1. A Multi-Tool Agricultural Implement
2. Design Modification to Walnut Cracker
3. Design Optimization of Manual Paddy Transplanter
4. Foldable Trolley
5. Hand Lever-Based Tapioca Plant Uprooter
6. Intelligent glasses for the Visually Impaired
7. Laddu Making Machine
8. Maise Threshing and Grinding Machine
9. Motorised Pepper Harvesting Machine
10. Motorised Vegetable cutter
11. Semi-Automated Agricultural Pesticide Sprayer
12. Solar Based mini air cooler cum mosquito trap
13. Solar Ironing Cart
14. Rapid Compost Making Machine
15. Paddy Planter

Outcomes:

John Deere India has already accepted the paddy planter for production and marketing, providing the innovators with a royalty and a profit share. All other products are in various stages of negotiation with the industries under NIF's purview. The patent rights of all products remain with the innovators, irrespective of design modifications and improvements.

The pilot study had an ad hoc arrangement with a few engineering institutions. AICTE's assistance in establishing a robust arrangement will enhance its effectiveness. There are nearly 4,500 engineering colleges. By collaborating with these institutions, we can easily upgrade at least 1000 GREs into commercial products annually, with a project duration of 6–9 months for each product. During networking, all organisations, such as INAE, NIAS, NIF, academic institutions, industry partners, and GREs, worked in a non-hierarchical but rather horizontal mode as equal partners. All college faculty used students, treating this as their project work and doing it with a lot of enthusiasm and rigour. Students felt such practical projects gave them a feel for commercialization challenges. The project was completed, and accounts were settled with INAE in the stipulated time. The FINP's role is critical because it is required to regularly mentor and advise the faculty. The FINP team did this with a lot of commitment and a goal-oriented mind.

INAE "Satish Dhawan Chair(s) of Engineering Eminence"

INAE Satish Dhawan Chair of Engineering Eminence was instituted with the objective of enhancing the visibility of the Academy in the policy domain and establishing social connect. Eminent engineers who have contributed to some aspect of nation building are chosen for this esteemed position. The objective of the Chair is to utilize their competence to facilitate future growth of the nation in the engineering domain. Dr BN Suresh, Former President of INAE; Chancellor, Indian Institute of Space Science & Technology (IIST) and Honorary Distinguished Professor, ISRO Headquarters, Bangalore and Formerly Director, Vikram Sarabhai Space Centre, Trivandrum; and Formerly Member, Space Commission and Founder Director, Indian Institute of Space Science & Technology (IIST), Thiruvananthapuram had been chosen for holding Satish Dhawan Chair of Engineering Eminence for the year 2021, extendable up to one more year. He was associated with ISRO HQ for institutional support for carrying out the work under the aegis of the Chair. Dr BN Suresh had chosen the topic of "Contribution of Space for National Development and the Possible Future Areas to improve the Indian Economy", to work under the ambit of this Chair. The task entailed consolidating the utilisation of space technology-based tools so far in Governance and national development, which has made significant contributions in several areas of agriculture, energy, environment, forestry, water resources, communication and navigation, health, education, disaster management and many other areas. Further the report will include the possible areas of new applications of space for accelerating the national development thus contributing to the growth of the National Economy.

Dr BN Suresh commenced the work under the aegis of the subject chair w.e.f. January 1, 2021 at ISRO HQ, Bangalore and had been working on creating a compilation of articles and chapters on various

Release of Book on "Diverse Space Applications" by Dr BN Suresh, FNAE, former President, INAE

space related applications including satellites, remote sensing for agriculture and aerial mapping etc under the aegis of the subject Chair and his tenure under the Chair had been extended upto December 31, 2022, to complete the task at hand. Subsequently Dr BN Suresh brought out a book titled "Diverse Space Applications" based on the work undertaken under the aegis of the INAE Satish Dhawan Chair of Engineering Eminence which was released during the Inaugural Function of the INAE Annual Convention 2023 held in December 2023 at Bhubaneswar. The book is meant to showcase the contributions of Indian Space program towards National development and to highlight the benefits derived by the society in general and Nation in particular. The format chosen for the book has been kept simple and it is easily readable by common citizens of the Country. It is envisaged that this book also would help serve the administrators who are involved in the usage of space-based data in country's development. The book has been disseminated to key Government Secretaries and scientists from ISRO and other stakeholders.

Events Organized by Local Chapters

INAE Local Chapters organized a number of interesting webinars/activities in the last one year some of which are summarized below.

INAE Delhi Chapter

Brainstorming Session on 'Innovative Pathways for Hydrogen Development' jointly organized by INAE Delhi Chapter, International Solar Alliance (ISA) and INAE Forum on Energy held on November 17, 2023 at India International Centre, New Delhi.

(Already covered under the Section – INAE Forum on Energy)

INAE Mumbai Chapter

(i) INAE Mumbai Chapter organized a Webinar on "Indigenisation of On-Power Fuel Handling Equipment for Pressurised Heavy Water Reactors" by Mr. A Sanatkumar, FNAE, Formerly Distinguished Scientist and Sr. Executive Director (OP&TT), NPCIL, Mumbai held on April 1, 2023.

(ii) Talk on "Amazing Photovoltaics: From Research Curiosity to Technology Reality" was jointly organized by INAE Mumbai Chapter, PoTIC (Photovoltaic Technology and Innovation Centre) of IIT Bombay, IEEE EDS, and IEEE LMAG on November 8, 2023 and delivered by Dr. Lawrence L. Kazmerski, Foreign Fellow, INAE and Emeritus Research Staff Member of the National Renewable Energy Laboratory (NREL), Fellow, Renewable and Sustainable Energy Institute, University of Colorado, and Distinguished Visiting Professor at Department of Electrical Engineering IIT Bombay.

INAE Chennai Chapter

(i) INAE Chennai Chapter organized an online Webinar on "Liquid Green Hydrogen: Technology and Application" on Saturday, 15th July 2023 over WebEx wherein Prof. Sunil Kumar Sarangi, FNAE delivered the talk.

(ii) INAE Chennai Chapter organized a Webinar on "Asset & PROCESSS Integrity Monitoring: A Lab to Market Journey" on Saturday, 2nd September 2023 over WebEx wherein Prof Krishnan Balasubramaniam, FNAE, Institute Professor, IIT Madras delivered the said lecture. In this presentation, the journey of three technologies, all using ultrasonic guided waves as the fundamental physics of interrogation, from LAB to MARKET, were discussed. The three technologies are: 1. Higher Order Modes Clusters (HOMC) for inspection of hidden region corrosion inspection for Annular Plate of Storage Tanks and Pipe Support Locations. 2. Guided Ultrasonic Monitoring of Pipe Systems (GUMPS) for long term health monitoring of pipes in process industries and 3. Ultrasonic Waveguide based Sensors for measurement of temperature, rheology and levels.

(iii) INAE Chennai Chapter & IIT Madras joint Conference ICOM 2023 (The 1st Indian Conference on Micro Nano Fluidics -From Soft Matter to Bioengineering) was held on 29th September - 1st Oct 2023. ICOM 2023 was the first Indian conference on micro nano fluidics that aimed at bringing the entire micro nano fluidics community in India and distinguished researchers around the world to a single platform. It was envisaged that it would be a conference of the highest standard with some of the best researchers in the field as invited speakers, high-quality presentations selected through a rigorous review process, and a strong presence of industry. The conference provided academic researchers and industry professionals working on micro nano fluidics within the country and around the world a

platform to discuss some of the most recent research findings and exchange ideas on some of the field's emerging topics. The conference also attempted to examine current challenges and open questions and identify impactful research problems through a panel discussion session that resulted in a draft roadmap for future research.

INAE Bhubaneswar Chapter

(i) The 24th Lecture of the Distinguished Lecture series organized by INAE Bhubaneswar Chapter, jointly with SOA University, IMMT Bhubaneswar and IEEE Bhubaneswar Sub-section on April 18, 2023 on «Declining Interest in engineering education: quality concerns, causes and suggested policy interventions" by Professor Prem Vrat, Chairman Board of Governors of Indian Institute of Technology (ISM) Dhanbad. Prof. Prem Vrat's deliberation covers major imbalances in technical education system such as regional imbalance and branch imbalance. He suggested NEP 2020 has proposed a light but tight philosophy and single regulator under HECI. However quality needs to be nurtured rather than regulated. Myopic viewpoint in present managing institutions which is reflected in short term view of compromising with quality. Some suggestions suggested by him were: 1. Pro-active Industry Involvement in planning, running academic programs; joint project supervision. 2. Explore Implementing NEP-2020 provisions - flexibility, cross subsidizing; Australian Funding model of education. Postpone allocation to a specific branch to second year so that a person may choose based on the interest rather than follow the crowd model. NEP is a good hope if implemented effectively. It attempts to reduce the difference due to public vs. private but on performance and quality. 3. Medical education analogy - attach an Industry with the engineering college like a hospital with a medical college. 4. Broad base UG degrees - general engineering / multi-disciplinary inputs Instead of overspecializing at UG level. 5. Industry sponsored B.Tech program - specific core engineering programme select the person from the pool of applicants and support them throughout: pro-actively guiding about courses; projects to be taken and eventually they get employed there. Analogous to NCC, in which C-certificate holders could get into defense services directly from campus. A balanced engineering as per demand will be possible through. Prof. discussed two models of Cost of Quality (COQ).

You tube Link to the Video: https://youtu.be/VqKyF21_T5E

People Participated: 64

(ii) The 25th Lecture of the Distinguished Lecture series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, IMMT Bhubaneswar and IEEE Bhubaneswar Sub-section on 11th May 2023» wherein Dr. Jagannath Nayak, Centre for High Energy System and Science, Hyderabad delivered a lecture on "Lasers or Missiles- Which one to select for Air-Defence Applications". People Participated: 58

(iii) INAE Bhubaneswar Chapter jointly organized with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar and IEEE Bhubaneswar Sub-section the Lecture-26 of the Distinguished Lecture Series on "From Research to Innovation: A Way forward for India's Higher Educational Institutions" by Prof. V. Ramgopal Rao, Group Vice-Chancellor, BITS Pilani & Former Director, IIT Delhi online on 18th September 2023. People Participated: 68

https://www.youtube.com/watch?v=DNm4YBjR_Cg&t=3s

(iv) INAE, Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section organized - 27th Lecture of the Distinguished series online lecture was held on 14th October 2023 on «Advancing Science and Serving Humanity" by Dr. Tapan K. Gandhi, Professor in the Dept. of Electrical Engineering, Cadence Chair Professor of AI and Automation, Joint Faculty in School of AI, IIT Delhi. The Key points of the lecture were: The fields of neuroscience and artificial intelligence (AI) have a long and intertwined history. In more recent times, however, communication and collaboration between the two fields has become less commonplace. Understanding how the brain works is considered to be one of the greatest frontiers in modern science and technology. Research in this area is driven not only by curiosity, but also the possibility of making a profound impact on the real world. By advancing our knowledge about the brain, we can help the many millions of people who suffer from neurological disorders, and also realize the promise of artificial intelligence. Some of his work was highlighted that he had undertaken at the intersection of Neuroscience and AI in last few years. Through his work, he demonstrated how humanitarian research will help in advancement of fundamental science that has huge societal impact and in the same time will inspire in building intelligent machines for future applications. 45 people participated in the lecture

https://www.youtube.com/watch?v=wsuXGyrvkUU

(v) INAE, Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section organized - 28th Lecture of the Distinguished series online lectures was held on 26th Oct 2023 on «Empowering Renewable Energy Integration: A Smart Grid Initiative at IIT Roorkee" by Dr. Narayana Prasad Padhy, Director, MNIT Jaipur; 48 people participated in the lecture.

https://www.youtube.com/watch?v=DuwBADE30D0&t=2s

(vi) INAE, Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section organized -29th Lecture on 28th Oct 2023 on «Modeling, Analysis and Control of the National Air Transportation System" by Dr. P. K. Menon, Ph.D, Optimal Synthesis Inc., Los Altos, California, USA. People Participated: 52

https://www.youtube.com/watch?v=DuwBADE30D0

(vii) The 30th Lecture of Distinguished Lecture Series (Lecture-30) jointly organized by jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar and IEEE Bhubaneswar Sub-section was delivered by Dr. Debendra K. Das, Professor of Mechanical Engineering Emeritus, University of Alaska Fairbanks (UAF), USA on 31st January 2024 on "Experimental Evaluation of Nanofluids In Building Heating Coils (PartI). Computational Analysis of Nanofluids for Cooling in Microchannel Heat Exchangers (Part-II)."

People Participated: 45 . https://www.youtube.com/watch?v=umD90svX9R4

(viii) The 31st Lecture of Distinguished Lecture Series (Lecture-31) jointly Organized by INAE Bhubaneswar Chapter, SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar and IEEE Bhubaneswar Sub-section on February 17, 2024 which was delivered by Prof. Manoj Kumar Tiwari, FNAE, Director, IIM Mumbai, on the topic «Key Issues and Solutions Through Large Language Models in Supply Chain Management. There were 51 participants in the webinar. The YouTube Link to the Video is as follows: https://www.youtube.com/watch?v=jJiFXmi9oS4

People Participated: 51

(ix) The 32nd lecture of the distinguished Lecture Series was organized by INAE Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar on 1st March, 2024 featuring lecture by Prof. Deepankar Choudhury, Prof. T. Kant Chair Professor (HAG) and Head, Department of Civil Engineering, Indian Institute of Technology Bombay on «Foundation Design for ATAL SETU – An Engineering Marvel and Sustainable Foundation Solutions for various Mega Structures". Sixty-eight participants attended the lecture online.

(x) The 33rd Distinguished Lecture of the 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 on 20th March 2024 featuring lecture on «Building A Future Ready India: Vision, Plan & Strategy For Technical Education By 2047" delivered by Prof. (Dr.) TG Sitharam, FNAE, Chairman, All India Council for Technical Education (AICTE), New Delhi. There were 127 participants in the webinar. https://www.youtube.com/watch?v=DLI0zV0TTXs

(xi) INAE, Bhubaneswar Chapter, jointly with SOA University, CSIR-IMMT Bhubaneswar, IIT Bhubaneswar, NISER Bhubaneswar and IEEE Bhubaneswar Sub-section organized the 34th lecture of the Distinguished Lecture Series by Prof. Anupam Basu, Raja Ramanna Chair Professor, Jadavpur University on 21st March 2024 on «Where Language meets Technology" in virtual mode. 92 persons attended the online lecture.

https://www.youtube.com/watch?v=cid1mu2g7rA

INAE Kolkata Chapter

Celebrating the National Engineers' Day 2023 by INAE Kolkata Chapter

INAE Kolkata Chapter celebrated the National Engineers' Day on 15 September 2023 at MCKV College of Engineering, Liluah, Howrah. On this occasion, Prof. Sivaji Chakravorti, FNAE, FNASc, President WAST, and Professor of Electrical Engineering Department of Jadavpur University, delivered the Engineers Day Lecture on "Evolution of the frequency at which we get the electrical power supply". In his illuminating lecture, Prof. Chakravorti took the audience back to the origin of electric power distribution and how the value of grid frequency took its present values as the widely differing practices followed in different parts of the world gradually converged. The talk was not only unique, but also rich in content. It was an eye-opener for the budding engineers because it described how sustained engineering effort, through multiple iterations and optimization, goes into arriving at certain apparently sacrosanct things – the grid frequency is one of those – which common people generally take for granted. The lecture shed light on the evolution of electrical power systems in different parts of the world. The talk further highlighted how India secured its place in the global electric power map as early as in the nineteenth century. Immense engineering contributions of Sir Mokshagundam Visvesvaraya was also fondly remembered in this regard through the course of discussion that followed the lecture. The talk was attended by nearly eighty students, researchers and faculty members of different disciplines. The program was also attended by a few INAE Fellows. The talk was followed by a Q&A session and it ensued engaging discussions between the students, participants and the INAE Fellows present at the venue.

Prof. A. Lahiri, Principal, MCKV College of Engineering, formally welcomed the gathering at the outset, and Prof. Debatosh Guha, Chair, INAE Kolkata Chapter conducted the proceedings of the meeting. Prior to the talk of Prof. Chakravorti, Prof. Guha spoke a few words about the origin, mission and vision of INAE and highlighted the various programs and initiatives taken by INAE. Prof. Sivaji Chakravorti also

elaborated upon INAE activities, particularly the ones promoting innovations amongst the students, and briefly touched upon the processes of selection of INAE Young Associates and election of the Fellows of the Academy. The program ended with a formal vote of thanks offered by Prof. Ranjan Ganguly, Secretary, INAE Kolkata Chapter.

Glimpses of the National Engineers' Day on 15 September 2023 celebrated at MCKV College of Engineering.

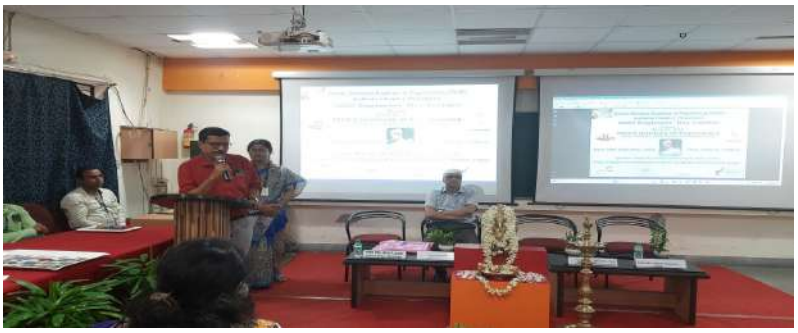
Prof. S. Chakravorti, FNAE briefing the audience about INAE activities

Prof. Debatosh Guha, FNAE conducting the proceedings

Audience listening to Prof. Sivaji Chakravorti, FNAE

Prof. Sivaji Chakravorti, FNAE delivering the lecture

Felicitation of the speaker



Vote of Thanks at the end of the program

INAE Bangalore Chapter

CSIR-National Aerospace Laboratories organizes Prof. Roddam Narasimha Memorial Lecture every year on July 20th, which happens to be Prof. Narasimha's birthday. This year, the second Prof. Roddam Narasimha Memorial Lecture was delivered by Prof. Sanjay Mittal**,** IIT Kanpur on 20th July 2023 (Thursday) at SR Valluri Auditorium, NAL, Bangalore held in a hybrid mode. The title of the lecture was "Swing, Reverse-Swing and Knuckle Ball: Transition of Boundary Layer".

INAE Kanpur Chapter

(a) Virtual Labs Nodal Centre Coordinators Meet (April 1, 2023)

The Virtual Labs Nodal Centre Coordinators Meet, held on April 1, 2023, at IIT Kanpur, in collaboration with the Indian National Academy of Engineering (INAE), and IIT Kanpur. This event brought together coordinators from various nodal centres to discuss the progress, challenges, and future roadmap of the Virtual Labs initiative, a key project under the Ministry of Education's National Mission on Education through ICT. A total of 50 Faculty members participated in the event. The event started with Lamp lighting followed by welcome address by Prof. Yogesh M. Joshi. After that Prof. Kantesh Balani addressed the audience.

Through a series of presentations and technical sessions, participants shared achievements, innovative approaches, and best practices, while also exploring strategies to increase adoption and effectiveness. The collaboration with INAE underscored the importance of interdisciplinary synergy, fostering an environment of knowledge exchange and networking, and reinforcing the collective commitment to advancing educational experiences through virtual laboratories.

Virtual Labs Nodal Centre Coordinators Meet (April 01, 2023)

(b) Materials Camp at IIT Kanpur (May 6-8, 2023)

Material Advantage @ IIT Kanpur, a student chapter in the Department of Materials Science and Engineering IIT Kanpur, was organized "Materials Camp" during May 06-08, 2023. This event was being co-organized in collaboration with ASM International Kanpur Chapter, INAE Kanpur Chapter, and IIM Kanpur Chapter. A total of 38 delegates participated in the event. This camp brought together students, researchers, and industry professionals to engage in hands-on workshops, interactive sessions, and expert-led lectures focusing on the latest advancements and applications in materials science. Through collaborative projects and real-world problem-solving activities, attendees gained valuable insights into the interdisciplinary nature of materials research and its critical role in technological innovation. The partnership with INAE highlighted the importance of academic-industry collaboration in driving forward the frontiers of knowledge and preparing the next generation of engineers and scientists for future challenges.

Materials Camp at IIT Kanpur (May 6-8, 2023)

(c) Virtual lab Workshop at IIT Kanpur (May 07, 2023)

The Virtual Lab Workshop at IIT Kanpur, conducted on May 7, 2023, in collaboration with the Indian National Academy of Engineering (INAE), A total of 38 participants was participated in the workshop. This workshop focused on demonstrating the practical applications and benefits of Virtual Labs in enhancing remote and interactive learning experiences in science and engineering. Participants engaged in hands-on sessions, gaining first-hand experience with cutting-edge virtual lab simulations and tools. Expert speakers from IIT Kanpur discussed the latest advancements, implementation strategies, and best practices for integrating Virtual Labs into the educational curriculum. The collaborative effort underscored the commitment to leveraging technology for improving education and fostering an environment of continuous learning and development.

Virtual lab Workshop at IIT Kanpur (May 07, 2023)

INAE Digital Platform

A Digital Platform for INAE was conceptualized during August 2018. Initially twenty-two modules were identified to facilitate acceptance of online nominations and online applications for INAE Schemes, AICTE Schemes and SERB scheme and their subsequent processing. The platform has been expanded over the years and plans include digitizing of INAE office activities. During the years 2020, 2021, all meetings and events of INAE were conducted online. In 2022, with easing travel restrictions meeting and events are being organized in hybrid mode, with complete support from the in-house platform. The nominations for INAE Fellowship were invited online and review of the nominations were also encouraged online so that each reviewer can go through the respective nominations beforehand and have an effective selection meeting together with other members of corresponding Review Committees. The response is satisfactory. With expansion of activities, the infrastructural changes have been made accordingly in the existing platform keeping in view directives.

INAE on Facebook and Twitter

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

(a) Facebook -link https://www.facebook.com/pages/Indian-National-Academy-of-Engineering/714509531987607?ref=hl

(b) Twitter handle link https://twitter.com/inaehq1

International Affairs

(a) CAETS 2023 Annual Meeting and Convocation

The CAETS 2023 conference on "e2-mobility. Solutions and Opportunities," was held in Zagreb in October 9-11, 2023, and brought together leading scientists, researchers and experts in the fields of mobility, electrification of transport, integration with energy systems, batteries, refueling, autonomous driving and changes in mobility modalities. Over the course of five sessions, 28 experts and scientists from around the world participated. INAE Delegation led by Prof Indranil Manna, President, INAE participated in the event. Prof Sushmita Mitra, FNAE participated in the CAETS Working Group: Diversity and Inclusion held online on 3 October 2023. Prof Indranil Manna also participated in the Twelfth Academy of Engineering President's Meeting at STS forum 2023 held online on October 2, 2023 wherein a discussion was held on 'AI and Human Society'. INAE's contribution in CAETS activities was appreciated.

(b) Panel Discussion on CAETS Energy Report 2022 - "Buildings and Smart Cities"

INAE organized an online Panel Discussion on CAETS Energy Report 2022 - "Buildings and Smart Cities" on 27th May 2023 (Saturday) wherein the following five persons played a leading role viz Dr. Yves Bamberger, Vice-President, French Academy of Engineering and Chairman, Energy Committee of CAETS presented the CAETS Energy Report 2022; Prof. Indranil Manna, FNAE, President, INAE and Vice-Chancellor, BIT, Mesra delivered the Presidential Address; Dr. Ajay Mathur, FNAE, Chairman, INAE Forum on Energy; Director-General, International Solar Alliance (ISA), Gurugram delivered Welcome Note; Dr. Bibek Bandyopadhyay, FNAE, Senior Advisor, International Institute of Energy Conservation, New Delhi made a brief supplementary presentation on "Buildings" and the concluding remarks were delivered by Mr. Pradeep Chaturvedi, FNAE, Vice-President, World Environment Foundation, New Delhi. The CAETS 2022 Energy Report on "Towards Low-GHG Emissions from Energy use in Selected Sectors" was released during the CAETS 2022 Annual Meetings and International Conference on "Engineering a better world: Breakthrough Technologies for Healthcare" hosted by the National Academy of Technologies of France (NATF) in Versailles, near Paris, France on September 27-28, 2022. During the event, the contributions of INAE Fellows in preparation of the said report was highly appreciated.

(c) CAETS Engineering Education Working Group

The International Council of Academies of Technological Sciences (CAETS) Engineering Education Working Group (EEWG) has been created 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. As requested by CAETS, Prof Indranil Manna, President, INAE is the Chair of the Working Group with Vice-Chair Dr Katherine Frase, Retired Senior Executive from IBM who is active in the US National Academy of Engineering. The Overall objectives of the EEWG are: (i) to create a community across the academies to be able to determine common points of interest concerning status updates on the current framework and priority areas; (ii) to create reports of best practices and policy recommendations to address the concerns and challenges perceived by our member academies in Engineering Education; (iii) to author specific reports related to education delivery methods (physical, virtual, simulation, hybrid); sustainable development goals, engineering ethics, technology forecasting, and engineering pipeline/demographics; and (iv) to develop a virtual platform for networking to facilitate cooperation and collaboration on engineering education among the member academies. Academies' representatives from twenty-two countries are the members of this Working group. Prof GK Ananthasuresh (FNAE), IISc Bangalore and Prof Amit Agrawal (FNAE), IIT Bombay are also members

of the EEWG from INAE. It is envisaged to prepare a combined report to cover the topics in engineering education such as flexibility, adaptability, problem-solving, gender parity, ethics / social responsibility / global awareness, promoting quality and mobility etc. Several meetings have been held online so far to arrive at the recommendations based on the laid down objectives of the Working Group.

Four meetings of the CAETS EEWG, comprising of representatives from 22 Member Academies, have been organized so far and a recent meeting was held on February 15, 2024 covering the important aspects pertaining to Medium of instruction for engineering education and Application of AI & ML in engineering practices. During the meetings, the representatives shared their experience pertaining to their respective countries. It emerged that many of the countries have English as a medium of instruction in engineering institutions, but there are others which deploy native languages and have textbooks and reference books in their respective languages. The report by the Working Group incorporating recommendations from the Members is under preparation for review and finally submission.

(d) CAETS Communication Committee

INAE being an only engineering academy in the country represents the Country at the CAETS as one of its member academies. INAE actively participates in CAETS activities and INAE Fellows are invited to represent in various committees. One such committee is the CAETS Communication Committee which is constituted with an objective of the Committee is to develop and maintain a CAETS Style Guide that sets content and style guidelines and defines templates for all CAETS Communications (statements, reports, videos, website, etc.). The committee also supports review of draft documents. Prof Amit Agrawal, IIT Bombay, FNAE is INAE representative at the CAETS Communication Committee. A recent meeting of the subject Committee was held on July 7, 2023 to provide feedback on CAETS Energy Committee report on e-mobility which is to be launched shortly. CAETS Communications Committee quarterly meeting was held online on March 25, 2024 to discuss updates on the status of nominations for the CAETS Communications Prize.

The Fellowship

The selection process for election to the Fellowship was reviewed a few years back and modified wherein two stage selection process had been introduced. The comments from the Fellowship on the nominations received are also obtained prior to the first meeting of the Sectional Committees. In the first stage, the nominations are initially shortlisted to seek peer review reports from the recommended Fellows/domain experts. In the second stage, the peer review reports received are considered by the Sectional Committees to recommend nominations for election to the Fellowship for approval of the Governing Council. The following were elected as Fellows of the Academy w.e.f. November 1, 2023.

Newly Elected Fellows

Engineering Section-I (Civil Engineering)

1. **Prof. TG Sitharam**, Chairman, All India Council of Technical Education, New Delhi.

2. **Prof. Indumathi M Nambi**, Professor, Department. of Civil Engineering, IIT Madras, Chennai.

3. **Prof. Deepankar Choudhury**, Prof. T. Kant Chair Professor (HAG) and Head, Department of Civil Engineering, Indian Institute of Technology Bombay, Mumbai.

Engineering Section-II (Computer Engineering &Information Technology)

1. **Prof. Balaraman Ravindran**, Professor, Department of Computer Science and Engineering & Head, Robert Bosch Centre for Data Science & AI, Indian Institute of Technology Madras, Chennai.

2. **Prof. Utpal Garain**, Professor, Computer Vision and Pattern Recognition (CVPR) Unit, Indian Statistical Institute, Kolkata.

3. **Prof. Sudeshna Sarkar**, Professor, Computer Science & Engineering and Centre of Excellence in Artificial Intelligence, Indian Institute of Technology Kharagpur.

4. **Prof. Madhava Krishna Krishnan**, Professor, The Robotics Research Center, Hyderabad.

5. **Mr. Sreenivas Subramoney**, Intel Fellow, Director, Processor Architecture Research, Intel Corporation, Bangalore.

6. **Mr. Ajai Chowdhry**, Founder – HCL, Chairman – EPIC Foundation, New Delhi.

7. **Mr. Rajendra Singh Pawar**, Founder & Chairman, NIIT Group, NIIT Limited, Gurgaon.

8. **Mr. Satya Narayana Nadella**, Chairman and CEO, Microsoft Corporation.

Engineering Section-III (Mechanical Engineering)

1. **Prof. Dilip Kumar Pratihar**, Professor (HAG) Scale (Institute Chair Professor), Mechanical Engineering Department, Indian Institute of Technology Kharagpur.

2. **Dr. Kanakasabapathi Subramanian**, Senior Vice President, Ashok Leyland Ltd., Chennai.

3. **Dr. Jaiteerth Raghavendra Joshi**, Outstanding Scientist & Programme Director, Programme LRSAM, Defence R&D Laboratory, Hyderabad.

4. **Dr. Nagahanumaiah**, Director, Central Manufacturing Technology Institute, Bengaluru.

5. **Mr. K. Krithivasan**, Chief Executive Officer and Managing Director, Tata Consultancy Services (TCS).

Engineering Section-IV (Chemical Engineering)

1. **Prof. Sanjay M Mahajani**, Tata Chair Professor of Frugal Technology & Professor, Department of Chemical Engineering, Indian Institute of Technology Bombay.

2. **Prof. Sunil Subhash Bhagwat**, Director, Indian Institute of Science Education and Research (IISER), Pune.

3. **Dr. Chetan Prakash Kaushik**, Sr Professor, HBNI Nuclear Recycle Group, Bhabha Atomic Research Centre (BARC). Mumbai.

4. **Mr. Madhukar Parekh**, Chairman, Pidilite Industries Ltd., Mumbai.

5. **Dr. Yusuf K. Hamied**, Chairman, Cipla Ltd.

Engineering Section-V (Electrical Engineering)

1. **Prof. Udaya Kumar**, Chair, High Voltage Lab, Department of Electrical Engineering, Indian Institute of Science, Bangalore.

2. **Prof. Kishore Chatterjee**, Professor, Electrical Engineering Department, IIT Bombay, Mumbai.

3. **Dr. Tapan Sahoo**, Executive Director (Engineering), Maruti Suzuki India Limited, Gurgaon.

Engineering Section-VI (Electronics & Communication Engineering)

1. **Prof. M. Jaleel Akhtar**, Chair Professor, Department of Electrical Engineering, Indian Institute of Technology Kanpur.

2. **Dr. Kamla Prasan Ray**, Professor and Head, Department of Electronics Engineering, Defence Institute of Advanced Technology (DIAT) Ministry of Defence, DRDO, Govt. of India, Pune.

3. **Prof. Chandra Ramabhadra Murthy**, Professor, Department of Electrical Communication Engineering, Indian Institute of Science, Bengaluru.

4. **Dr. Dhananjay Ashok Gore**, Vice-President Engineering, Qualcomm India Pvt. Ltd., Bengaluru.

5. Dr. Hirendra Nath Ghosh, Director, National Institute of Scientific Education and Research (NISER), Bhubaneswar.

6. **Mr. Sunil Bharti Mittal**, Founder and Chairman, Bharti Enterprises.

Engineering Section-VII (Aerospace Engineering)

1. Mr. Jitendra Jaishingrao Jadhav, Director & Programme Director (Combat Aircraft), Aeronautical Development Agency, (Ministry of Defence, Govt. of India), Bengaluru.

2. **Dr. Rajeev Jyoti**, Director Technical, IN-SPACe and Distinguished Scientist, Ex- Associate Director, Space Applications Centre, Ahmedabad.

Engineering Section-VIII (Mining, Metallurgical and Materials Engineering)

1. **Prof. Pralay Maiti**, Professor (HAG), School of Materials Science and Technology, IIT (BHU), Varanasi.

2. **Dr. Rajkumar Prasad Singh**, Sr Director – KCTI, Bharat Forge Limited, Kalyani Centre for Technology and Innovation (KCTI), Pune.

3. **Dr. T. Bhaskar**, Chief Technology Officer, Tata Steel, Jamshedpur.

4. **Dr. Avanish Kumar Srivastava**, Director, CSIR-Advanced Materials and Processes Research Institute (AMPRI), Bhopal.

5. **Mr. Bhadresh K Shah**, Managing Director, AIA Engineering and the Distinguished Alumnus of IIT Kanpur.

Engineering Section-IX (Energy Engineering)

1. **Mr. Pramod Madhukar Chaudhari**, Executive Chairman, Praj Industries Ltd., Pune.

2. **Dr. Sugilal Gopalakrishnan**, Outstanding Scientist , Fuel Reprocessing Division, Nuclear Recycle Group, Bhabha Atomic Research Centre, Mumbai.

3. **Dr. Umasankari Kannan**, Former Outstanding Scientist and Head, Reactor Physics Design Division (RPDD), Bhabha Atomic Research Centre, Mumbai.

Engineering Section-X (Interdisciplinary and Special Engineering Fields and Leadership in Academia, R&D and Industry)

1. **Prof. Rekha Satishchandra Singhal**, Professor of Food Technology, Institute of Chemical Technology, Mumbai.

2. **Dr. Jhillu Singh Yadav**, Provost, Director and Trustee, Indrashil University, Ahmedabad.

3. **Dr. Ramesh Datla**, Chairman & Managing Director, Elico Ltd, Hyderabad.

4. **Mr. Girish Arun Wagh**, Executive Director, Tata Motors Ltd., Mumbai.

5. **Mr. Chander Prakash Gurnani**, Managing Director and CEO of Tech Mahindra, Gurgaon.

6. **Dr. Chitra Rajagopal**, Director, Centre for Excellence in Process Safety & Risk Management, Indian Institute of Technology Delhi, New Delhi.

7. **Dr. M. Ravichandran**, Secretary to the Govt. of India, Ministry of Earth Sciences, Govt. of India, New Delhi.

8. **Mr. Purnendu Chatterjee**, Chairman, Lummus Technology, USA and Former Chairman & Founder, The Chatterjee Group

Newly elected Foreign Fellows

1. **Prof. Alan Conrad Bovik**, Cockrell Family Regents Endowed Chair in Engineering, The University of Texas at Austin, USA.

2. **Prof. Gerald G. Fuller**, Fletcher Jones II Professor, Chemical Engineering, Shriram Center, Stanford University, USA.

3. **Prof. Khaled B. Letaief, New** Bright Professor of Engineering, Electronic and Computer Engineering Dept., Hong Kong University of Science & Technology.

4. **Prof Vigor Yang**, Ralph N Read Chair and Regents' Professor, School of Aerospace Engineering, Georgia Institute of Technology, USA.

5. **Prof Hyoung Seop Kim,** Professor, Pohang University of Science and Technology (POSTECH), Graduate Institute for Ferrous and Energy Materials, POSTECH, South Korea.

Honours and Awards

1.	Mr T.V. Narendran, FNAE, CEO & MD Tata Steel Ltd was conferred the IIM-JRD Tata Award 2023 for 'Excellence in Corporate Leadership in Metallurgical Industries' at the 7th Annual Technical Meeting of the Indian Institute of Metals (IIM) at Bhubaneswar on November 24, 2023. Read more at: https://www.tatasteel.com/media/newsroom/press-releases/india/2023/tata-steel-ceo-md-t-v-narendran-conferred-the-iim-jrd-tata-award-2023-for-excellence-in-corporate-leadership-in-metallurgical-industries/
2.	Dr VR Lalithambika, FNAE, Formerly Distinguished Scientist and Director, Directorate of Human Space Programme, ISRO, Bangalore; Formerly Deputy Director, Vikram Sarabhai Space Centre, Thiruvananthapuram was conferred the top French civilian honour of Légion d'Honneur or her contribution to space cooperation between France and India in November 2023. Read more at: https://www.deccanherald.com/india/karnataka/bengaluru/top-french-civilian-honour-for-isro-scientist-vr-lalithambika-2788542
3.	Prof Kaushik Rajasekhara, FNAE, Professor University of Houston, USA was conferred the prestigious Global Energy Prize for outstanding contributions to transportation electrification and energy efficiency technologies while reducing power generation emissions. Read more at : https://timesofindia.indiatimes.com/nri/other-news/indian-american-engineering-professor-wins-global-energy-prize/articleshow/93027237.cms?from=mdr
4.	The Infosys Prize 2023 in Engineering and Computer Science was awarded to Prof. Sachchida Nand Tripathi, FNAE, Professor, Joint Faculty in Civil Engineering and Sustainable Energy Engineering, Indian Institute of Technology, Kanpur for the deployment of large-scale sensor-based air quality network and mobile laboratory for hyper local measurements of pollution, data generation and analysis using AI+ML for effective air quality management and citizen awareness, and for the discovery of new pathways of aerosols formation and growth that provide mechanistic understanding of haze formation.
5.	Prof Nagesh Iyer, FNAE, Dean (IPS) & Visiting Professor Indian Institute of Technology Dharwad was conferred the Eminent Engineer Award at the 38th National Convention of Civil Engineers held under the auspices of the Institution of Engineers (India) in recognition of his eminence and contribution to the profession of Civil Engineering on October 8-9, 2023. Read more at: https://www.inae.in/wp-content/uploads/2023/10/NIR.pdf
6.	Prof Cato T. Laurencin, FNAE, University Professor and Albert and Wilda Van Dusen Distinguished Endowed Professor of Orthopaedic Surgery at The University Of Connecticut was named 2023 Inventor of The Year by the Intellectual Property Owners Education Foundation (IPOEF) for his ground-breaking innovation in Regenerative Engineering in August 2023. Read More at : https://today.uconn.edu/2023/08/regenerative-engineering-pioneer-professor-cato-t-laurencin-named-2023-inventor-of-the-year/

7.	Prof Subra Suresh, FNAE, Professor at large at Brown University's School of Engineering and former director of the National Science Foundation, FNAE was awarded the National Medal of Science, the highest honour accorded to a US scientist, by President of USA, Mr John Biden in a ceremony at the White House on 24 October 2023: "For pioneering research across engineering, physical sciences, and life sciences. Read More at: https://www.brown.edu/news/2023-10-24/suresh-medal-science
8.	Mr Manmath Kumar Badapanda, FNAE, Scientific Officer-H, Raja Ramanna Centre for Advanced Technology, Indore has received "IEI NMLC FCRIT Research Excellence Awards, National Category"- 2023. This award is on individual's research excellence contribution in national level and jointly given by The Institution of Engineers (India), Navi Mumbai Local Centre (IEI NMLC) and Fr. C. Rodrigues Institute of Technology (FCRIT), Vashi.
9.	Dr V Narayanan, FNAE, Director, LPSC, Thiruvananthapuram was conferred Dr APJ Abdul Kalam 2023 Award on July 27, 2023 at Bangalore.
10.	Prof Ganapati D. Yadav, National Science Chair (SERB/DST/GOI), Emeritus Professor of Eminence and former Vice Chancellor, Institute of Chemical Technology, Mumbai has been acknowledged as a distinguished patent holder by the Government of India and is invited as a distinguished guest to attend the Republic Day Parade and witness the historic occasion of the commemoration of the 75th Republic Day on January 26, 2024. SusChemE 2023 was organized in honour of Prof GD Yadav, FNAE celebrating his excellence in Chemical Engineering and Research on September 14-16, 2023 at Institute of Chemical Technology, Mumbai. Read More at: https://www.suscheme.in/pdf/SusChemE-2023-Brochure.pdf
11.	Prof. Rajendra Prasad Mohanty, FNAE, Chief Consultant, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar was selected by Central Council of the Operational Research Society of India at its meeting held on 6th December 2023 for ORSI Fellowship Award 2023 for his outstanding contributions towards the promotion and development of Operational Research in the country. The award was presented on 18th December 2023 in the inaugural ceremony of the forthcoming ORSI Convention held at J. N. Tata Auditorium, IISc, Bangalore during 18-20 December 2023.
12.	Amity University Rajasthan honoured Prof Purnendu Ghosh, Former Vice-President, INAE and Executive Director, Birla Institute of Scientific Research, Jaipur with the Doctor of Science (D.Sc.) -Honoris Causa for his distinctive and extraordinary accomplishments and increasing and selfless contributions to the nation; his deep commitment to research and scientific enquiry, continuous exemplary efforts in innovating and improving the status of planning and execution of several teaching and research programs.
13.	Mr Sunil Bharti Mittal, FNAE the founder and chairperson of Bharti Enterprises, was conferred an Honorary knighthood by King Charles III of the United Kingdom on February 28, 2024 for services to UK and India business relations. Mr Mittal has become the first Indian to receive the Knighthood from King Charles. He was made a Knight Commander of the Most Excellent Order of the British Empire. The Knighthood is one of the highest civilian awards bestowed by the British sovereign. Foreign nationals receive it as an honorary award.

14.	On the occasion of the National Science Day on February 28, 2024, Prof GD Yadav, FNAE, National Science Chair and Emeritus Professor of Eminence, JC Bose National Fellow at the Institute of Chemical Technology, Mumbai was bestowed with the SASTRA CNR RAO Award for excellence in Chemistry and Material Science in SASTRA University Thanjavur TN. Prof GD Yadav was also named among Asia's top 100 most outstanding researchers during April 2024. For details click on the link below https://www.indianchemicalnews.com/people/professor-dr-g-d-yadav-named-among-asias-top-100-scientist-21370
15.	Prof. Mahesh Chandra Tandon, FNAE, Managing Director, Tandon Consultants Pvt. Ltd, New Delhi has been honoured with the Lifetime Achievement Award on February 9, 2024, by the Institution of Bridge Engineers.
16.	Prof. Sankar K. Pal, FNAE, Member, European Academy of Sciences & Arts, National Science Chair, SERB, Govt. of India and President, Indian Statistical Institute, Kolkata is Vice-President, International Artificial Intelligence Industry Alliance (AIIA), 2023 and Fellow, Web Intelligence Academy (WIA), 2023. Prof Pal received the 30th Prasanta Chandra Mahalanobis Memorial Lecture award, Department of Science and Technology and Biotechnology, Government of West Bengal, 2023 and delivered the Prof. P.C. Mahalanobis Memorial Lecture, World Meteorological Day, India Meteorological Department (IMD), Govt. of India, Regional Meteorological Center, Calcutta, 2023. He also was conferred the Distinguished Alumni Award 2023 from Ramakrishna Mission Vivekananda Centenary College, Rahara, Calcutta. (This award was given first time to an alumnus in the history of 60 years of the college since its inception in 1963).
17.	Prof. Krishna B. Misra, FNAE, Founder and Past Editor-in-Chief, International Journal of Performability Engineering; Editor, Book Series on Performability Engineering, RAMS Consultants, Jaipur received the Lifetime Achievement Award 2024 from the Society for Reliability and Safety on February 22, 2024 for his pioneering contributions to R&D and Academics in Reliability Engineering.

News of Fellows

1.	During an exclusive interview on Linkedin, Dr. B. N. Suresh, FNAE, Chancellor, Indian Institute of Space Science & Technology (IIST); Former President, INAE and former Director of Vikram Sarabhai Space Centre briefly spoke about his life journey starting from a small village to his joining ISRO, the India's premier organization. Dr. Suresh mentioned invaluable insights into his contributions to the Indian space program, from launch vehicles to Space Capsule Recovery Experiments (SRE). https://www.linkedin.com/posts/apalak-ghosh-3105074_india-vision-2030-dr-bn-suresh-activity-7110168696941129728-DtXX?utm_source=share&utm_medium=member_ios
2.	A book by Mr RD Kale, FNAE, Formerly Outstanding Scientist (Rtd) Group Director Fast Reactor Technology Group and Director Engineering Services Group, IGCAR, Kalpakkam and Dr BK Sreedhar, FNAE, Outstanding Scientist & Head, Sodium Experiments & Hydraulics Division, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam- on "Centrifugal Pumps for Sodium Cooled Reactors" was launched on Nov 21, 2023. The book was published by CRC Press, Taylor and Francis group was launched on Nov. 21, 2023.
3.	BITS Pilani appoints Prof Soumyo Mukherji, FNAE, Professor, IIT Bombay as the Director of the Hyderabad Campus. Read More : https://www.hindustantimes.com/education/news/bits-pilani-appoints-prof-soumyo-mukherji-as-the-director-of-the-hyderabad-campus-101698908657376.html
4.	Prof DN Singh, FNAE, has co-Authored a Book on "Cricket Pitches: The Science Behind The Art of Pitch-Makin-"An Integrated Pitch Management (I.P.M) Approach" published by Springer Nature in December 2023. Further details are available at the link https://link.springer.com/book/10.1007/978-981-99-2913-9
5.	Dr. Ajit Kumar Mohanty, FNAE, BARC Director took charge of Secretary to the Government of India, Department of Atomic Energy on May 03, 2023.
6.	Prof. U. Kamachi Mudali, FNAE, and formerly Vice Chancellor of VIT Bhopal University & Chairman and Chief Executive of Heavy Water Board, took over as the Vice Chancellor of Homi Bhabha National Institute (HBNI), a deemed to be University affiliated to the Department of Atomic Energy from May 11, 2023.
7.	Shri Vivek Bhasin, FNAE, Distinguished Scientist took over as Director, Bhabha Atomic Research Centre (BARC), Mumbai from September 15, 2023 onwards.
8.	Mr Manmath Kumar Badapanda, FNAE, Scientific Officer-H, Raja Ramanna Centre for Advanced Technology, Indore has been granted Indian patent No. 436206, titled "High voltage DC power supply for high power radio frequency amplifiers", as its sole inventor. The USP of his invented topology is that it uniquely achieves full range 24-pulsed, 11 kV input system with full range 36 kV ripple free output voltage capability, irrespective of the input line voltage variations and output voltage requirements.

9.	Captain NS Mohan Ram, FNAE, Former Consultant, TVS Motor Company Ltd., Hosur (Tamil Nadu) has published a new book "A Captain in Corporate Wonderland' and is available in Amazon and major bookstores. It is an account of his thirty-six long year career in private sector after retiring from the Navy.
10.	Prof SN Upadhyay, FNAE, Ex-Director and Emeritus Professor, Department of Chemical Engineering & Technology, IIT (BHU) Varanasi has authored a book entitled "जल एवं अपजल के वशि्लेषण की मानक वधियिाँ" published in May 2023. This is the first book in Hindi on this subject and is in conformity with the NEP-2020.
11.	Prof. Dr. S.N. Mukhopadhyay, FNAE, Former Professor, DBEB, IIT Delhi; Former Professor & Head, BERC, IIT Delhi; has been invited by the Biometrics & Biostatistics International Journal (BBIJ) to be a member of its Editorial Board. Also, he has been invited to review a Research Article "Contribution of Coincidence Detection to Speech Segregation in Noisy Environment. He with his wife Sakuntala have written their Biography under the title "*Anande Jeebansrote*" in Bangla Medium by AD Print Studio.
12.	A book titled "Nuclear Fuel Cycle" Edited by Dr PR Vasudeva Rao, FNAE, Former Director, Indira Gandhi Centre for Atomic Research, Kalpakkam; Former Vice-Chancellor, Homi Bhabha National Institute, Mumbai; Dr SB Roy, FNAE, Former Raja Ramanna Fellow (RRF, DAE), Former Director, ChEG and RRF, DAE and Head, UED, BARC; and other editors was published on 16 May 2023 by Springer Publishers.
13.	Prof Purnendu Ghosh, FNAE, Executive Director, Birla Institute of Scientific Research, Jaipur released his book on "*Vaigyanik Vichar Dwipo Ke beech samajik Kavya Putro Ka nirman*" on August 18, 2023 at India International Centre, New Delhi.
14.	Dr. Sanak Mishra, FNAE, Former Managing Director, SAIL Rourkela Steel Plant; Former President, INAE delivered the Fifth Dr. Baldev Raj Memorial Lecture on "Evolution of Steel Technology and Current Indian Steel Scenario" on 10th April 2023 organized by IIM-Human Resources Development Centre, Kalpakkam-Chennai; IIM Coimbatore Chapter in association with PSG College of Technology, Coimbatore.
15.	Dr Rajiv K Tayal, FNAE, formerly: Advisor - DST, Govt. of India has published a new book in March 2024 titled "Who Am I: The Eternal Quest of Human Existence" The Amazon link for the book is https://amzn.eu/d/a4y1LUb
16.	Prof. Dr. S.N. Mukhopadhyay, FNAE, Former Professor, DBEB, IIT Delhi; Former Professor & Head, BERC, IIT Delhi; was an invited speaker in GPB-2024 International Conference held in Singapore in March 2024, for virtual presentation based on the abstract of his talk on "GPB in advancing Bioengineering and Biotechnology (BEBT)".
17.	Prof. K Ramesh, FNAE, Department of Applied Mechanics and Biomedical Engineering, IIT Madras is Conference Chair for the International Conference on Experimental Mechanics 2024 organized by IIT Madras in association with Asian Society of Experimental Mechanics (ASEM) and Indian Society for Applied Mechanics. This will be held at IC&SR conference facilities, IIT Madras. The conference will be from 20th to 23rd October 2024 with a pre-conference workshop on Digital photoelasticity - Advances and Applications. For further details click on the link https://ge.iitm.ac.in/icem-2024/

18.	Prof Prem Vrat, FNAE, Pro-Chancellor; Professor of Eminence and Chief Mentor, The Northcap University, Gurgaon and formerly Former Founder Director, IIT Roorkee; Former VC, UPTU, Lucknow; Former Professor & Director-in-Incharge, IIT Delhi; Former Vice-Chancellor and Professor of Eminence, ITM University, Gurgaon has been featured in the prestigious publication "100 Great IITians Dedicated to the Service of the Nation" edited by Commander VK Jaitly. His profile was titled "An Academician par Excellence".
19.	Three INAE Fellows out of the six Professors appointed as IIT Directors in April 2024 are INAE Fellows. Prof Manindra Agrawal, FNAE, professor from the Department of Computer Science and Engineering at IIT Kanpur, has been appointed as the Director of IIT Kanpur; Prof Avinash Kumar Agarwal, FNAE professor at IIT-Kanpur's Department of Mechanical Engineering, has been appointed as the Director of IIT-Jodhpur and Prof Sukumar Mishra, FNAE has been appointed as the Director of IIT Dhanbad.

Fellows Deceased in Last one Year

During the year 2023-2024, it was learnt about the sad demise of the following INAE Fellows. Deepest Condolences have been expressed to the families of the deceased Fellows on behalf of INAE and prayers were offered for their souls to rest in peace. Brief Obituaries as a mark of respect for the departed INAE Fellows are given below.

Prof. Kumar Mitter

(***December 9, 1933 – June 26, 2023***)

Prof Sanjoy Kumar Mitter, FNAE born on December 9, 1933 passed away on June 26, 2023. He was elected to INAE Foreign Fellowship in the year 2015 and affiliated to Engineering Section -II (Computer Engineering and Information Technology).

Prof Sanjoy Kumar Mitter, Professor of Electrical Engineering, Massachusetts Institute of Technology, USA had made outstanding research contributions in the areas of Systems & Control Theory. He had furnished proofs in nonlinear filtering and optimal control theory, as well as carrying out more applied work in image analysis, computation of optimal controls and reliability of electrical power systems. He was elected as member of the National Academy of Engineering, USA "for outstanding contributions to the theory and applications of automatic control and nonlinear filtering". He received both the Richard E. Bellman Control Heritage Award from the American Automatic Control Council (2007) and the IEEE Control Systems Award (in 2000).

May God bless his soul to rest in peace

Prof Satya N Atluri

(***October 07, 1945– August 5, 2023***)

Prof Satya N Atluri, FNAE born on October 7, 1945 passed away on August 5, 2023. He was elected to INAE Foreign Fellowship in the year 1997 and was affiliated to Engineering Section VII (Aerospace Engineering).

Prof SN Atluri, Distinguished Professor Emeritus of Aerospace Engineering, University of California, USA had made fundamental contributions to the development of finite element methods, boundary element methods, Meshless Local Petrov-Galerkin (MLPG) methods, Fragile Points Methods (FPM), Local Variational Iteration Methods, for general problems of engineering, solid mechanics, fluid dynamics, heat transfer, ferromagnetics, nonlinear dynamics, micromechanics of materials, structural integrity and damage tolerance, Astrodynamics, digital Twins of Aerospace Systems, etc. He mentored about 600 undergraduate and graduate students, post-doctoral scholars, visiting scholars, and visiting professors at various universities around the world. Prof Atluri authored or edited 65 research monographs and authored more than 800 archival research papers.

May God bless his soul to Rest in Peace

Dr V S Arunachalam

(***November 10, 1935- August 16, 2023***)

Dr VS Arunachalam, FNAE, former President, INAE, born on November 10, 1935 passed away on August 16, 2023. He was a Founding Fellow of INAE and elected to the Fellowship in 1987 in Engineering Section VIII (Mining, Metallurgical and Materials Engineering). Dr Arunachalam was the second President of INAE during 1991-1992.

Dr Arunachalam, Formerly Secretary, Department of Defence Research and Development (Ministry of Defence, Govt. of India) and Director General, Defence Research and Development Organisation (DRDO), was the Scientific Adviser to the Raksha Mantri, from 1982 to 1992. Under his guidance, the Light Combat Aircraft Program (TEJAS) and the Integrated Guided Missile Program were initiated in DRDO, amongst many others. He was conferred the Shanti Swarup Bhatnagar Award, Padma Bhushan, and Padma Vibhushan for his contributions to engineering science and technology. He was also conferred with The Lifetime Achievement Award of the Indian Institute of Metals in 2007; INAE Lifetime Contribution Award in Engineering in 2011 and DRDO's Lifetime Achievement Award in 2015. He founded the Centre for Study of Science, Technology and Policy (CSTEP), a not-for-profit think-tank, with a mission to enrich policymaking with innovative approaches using science and technology for a sustainable, secure, and inclusive society. He was the first Indian to be elected as Fellow of the Royal Academy of Engineering (UK). Dr Arunachalam championed the notion of "*Atmanirbhar Bharat*" throughout his life.

May God bless his soul to Rest in Peace

Dr. TC Rao

(*September 18, 1940 - September 5, 2023*)

Dr TC Rao, FNAE born on September 18, 1940 passed away on September 5, 2023. He was elected to INAE Fellowship in the year 1992 and affiliated to Engineering Section – VIII (Mining Metallurgical and Material Engineering).

Dr TC Rao, Former Director of Regional Lab at Bhopal; Former Head of Mineral Engineering at Indian School of Mines was a renowned stalwart in the area of Mineral Engineering in both academic and industrial spheres for his outstanding contribution for process development and optimisation of mineral processing industries. He had published more than 225 research papers in international and national journals. His pioneering works on modelling of unit operations in coal and mineral processing are being extensively used by academic institutions and industries across the world for process simulation and optimisation. Rao-Lynch equation of hydrocyclone for classification of minerals is also well known adopted. He was the recipient of many awards/citations like National Mineral Award from Ministry of Mines, Govt. of India; National Metallurgist Award from Ministry of Steel, Govt. of India; Coal Preparation Innovation Award from Coal Preparation Society and many others from various professional bodies.

May God bless his soul to rest in peace

Prof Sameer Khandekar

(*November 10, 1971 – December 22, 2023*)

Prof Sameer Khandekar, Sir M Visvesvaraya Chair Professor, Department of Mechanical Engineering and Dean of Student Affairs, Indian Institute of Technology Kanpur born on November 10, 1971 passed away on December 22, 2023. Prof Khandekar was affiliated to Engineering Section – III (Mechanical Engineering) and elected to INAE Fellowship in the year 2019.

Prof Khandekar had made significant research contributions in the areas of Two-phase heat transfer, Heat Pipes and Thermosyphons and Energy systems. His contributions towards the understanding of Pulsating Heat Pipes are noteworthy and have enabled the development of the device for large-scale as well as specialized applications. His research blended theory and experimental exploration. He had served as an invited faculty member at five international universities at Germany, France, Brazil, Russia and Thailand. He had over eighty-five research publications in international journals, over one hundred

publications/presentations in international conferences, including 16 keynote lectures/ Invited Talks, and had eight patents and four books to his credit. Prof Khandekar won the Young Scientist Award by the Department of Atomic Energy, Government of India in 2005. He was a recipient of P. K. Kelkar Research Fellowship from IIT Kanpur in 2008, DAAD Fellowship (2011), Prof. K. N. Seetharamu Award from the Indian Society of Heat and Mass Transfer in 2010, George Grover Medal from the International Heat Pipe Committee in 2007, and Young Scientist Award (Department of Atomic Energy, Indian, 2005). He also served as the Associate Dean (Innovation and Incubation) and coordinator of the SIDBI Innovational and Incubation Center, IIT Kanpur from 2015-2017. He was also the President of Shiksha Sopan, a voluntary organization (registered NGO), serving the underprivileged sections of the society in and around IIT Kanpur.

May God bless his soul to Rest in Peace

Mr Prabhakar Shankar Deodhar

(*September 25, 1934– January 28, 2024*)

Mr Prabhakar Shankar Deodhar, FNAE, born on September 25, 1934 passed away on January 28, 2024. He was elected to INAE Fellowship in the year 2002 and was affiliated to Engineering Section VI (Electronics and Communication Engineering).

Mr PS Deodhar, Chairman Aplab Limited, Mumbai and Formerly Chairman, Electronics Commission, Govt. of India; Formerly Advisor (Electronics) to the P.M. has made significant contributions to the growth of the Electronics Industry in the country. In 1962, he set up the first private laboratory and Aplab Limited, founded by him developed ATMs for banks and machines for modernization of the retail sector, automated petrol pumps and cable fault detection machines. He also created a device that removes defects in cables and was responsible for manufacturing about 650 electronic devices and products. Along with his notable achievements in the industrial sector, he held the post of Chairman of the Central Government Electronics Commission from 1986 to 1988. He also was the chairman of the broadcast council in 1992-93 which set in motion the privatisation of the electronic media with metro channels. Mr Deodhar left a legacy of pioneering achievements in the country's Electronics and Information Technology sector as an engineering-scientist, industrialist and national policy maker.

May God bless his soul to Rest in Peace

Dr. Gopalakrishna Thyagarajan

(*2 May 1934 - 24 March 2024*)

A Visionary and Enigmatic Leader

When my revered friend, Dr T. Ramasami, a former Secretary of the Department of Science and Technology of the Government of India broke to me the sad news of the passing away of Dr Gopalakrishna Thyagarajan on the 24 January 2024, my highly disturbed mind quickly scanned the images of some of my legendary friends who, by their departure, have created a void in my life. The news brought tears in my eyes and a smile on my face at the same time. Tears naturally came because, we were both fellow travellers for nearly five decades and I will miss him immensely as he has aborted the journey creating a void in my life. The smile on my face came to remind me that our lives on this planet are indeed short, give and take a few years and there are no goodbyes for true friends in the emotional space.

Dr Thyagarajan was my most respected friend, philosopher, and guide. As a friend, he always opened his heart to me and encouraged me in difficult times. As a philosopher, he never failed to share his depth of knowledge and wisdom. And as a guide and mentor, fortuitously, he came to my life right in the formative stage of my professional career, as far back as 1975, to stir my imagination and underscore by his own example that there is no summit of human excellence and deeper we dig, the bigger is the haul. Slowly I discovered that such noble thoughts can be traced back to the Upanishads.

Thyagarajan was born on 2 May 1934 at Tiruvarur in Tamil Nādu. He obtained the degree of M.Sc. in 1956, and Ph. D in 1962, from the Osmania University. Thereafter, he worked as a Post-Doctoral Fellow at the University of California at Berkeley in 1964-65. He was a visionary leader who always thought way beyond the boundaries of his chosen field of speciality making notable contributions in the fields of Chemical Process Industries; synthetic drugs; organo-phosphorous pesticides; leather processing; Chemical Safety; Technology Management and Technology Forecasting. Because of his outstanding academic and professional track record, recognitions and awards naturally followed him as his shadow. He became a Fellow of the Royal Society of Chemistry, London; a Fellow of the Indian National Academy of Engineering, New Delhi; a Honorary Fellow of the Indian Institute of Chemical Engineers, and received KG Naik Gold Medal for Industrial Contributions; Vasvik Award for his contributions to Chemical Sciences &Technology, and the Leather Media Award.

In my very long stint with the CSIR spanning over four decades, I find Dr Thyagarajan as the only colleague who had the distinction of heading three national laboratories, stepping from one to the other. In 1974, none other than Dr Y. Nayudamma, the then Director General of CSIR, interviewed, and selected him to serve as the Director of CSIR's Regional Research Laboratory in Jorhat, later renamed as North East Institute of Science and Technology. In the year 1981, when Dr G.S. Sidhu, the then Director

of CSIR's Regional Research Laboratory in Hyderabad (now Indian Institute of Chemical technology or IICT) moved to CSIR Headquarter in New Delhi to take charge as Director General of CSIR, Dr Thyagarajan was appointed as the Director of RRL, Hyderabad (IICT) on 2 February 1981. Finally, he served as Director of Central Leather Research Institute in Chennai in two spells- from 1984-87, and from 1990-94. His mission at CLRI was to turn around CLRI from a position of weakness to one of global leadership. His contributions to CSIR Coordinated Programmes including the integrated development of the rural areas of Karim Nagar in Andra Pradesh were significant.

During the period 1987-90 between the two spells, he served as the Science Advisor to Commonwealth Secretary General and Secretary of the Commonwealth Secretariat in London. It is heart-warming to recall that he was picked for this coveted position out of the candidature of about 50 Commonwealth Countries.

In the formative period of my career as a CSIR Scientist, I first formally met Dr Thyagarajan at the 4th CSIR Management Training Programme held in the campus of Central Scientific Instruments Organization in Chandigarh during July 21-31, 1975. The entire training programme was built around the young and charismatic Dr Thyagarajan. The lessons he taught us at that time, reverberates in my ears even today. He was very forthright in his statement that Research and Development work at CSIR must address the real-life problems and must necessarily address the felt needs of the society. He convinced us that what we cannot do individually, we can achieve by working as a team regardless of the degree of challenge. Among other things, he laid emphasis on pooling of scattered resources, leveraging of institutional capacities and synergising strengths of the expertise within and between the CSIR laboratories with the objective of taking science to the doorstep of the users. His views resonated with the vision of Dr R.A. Mashelkar, as the Director General of CSIR and of Dr Ramasami as the Secretary, Department of Science and Technology. On several occasions, I heard Dr Ramasami demanding focus on the 'outcome' whenever he came across long list of promises, activities, and outputs in any of project plans or progress reports!

What I learned from Thyagarajan in 1975, once again captured my imagination in December 2005, when I read his speech delivered on the CSIR Foundation Day function of the National Chemical Laboratory in Pune. Speaking on CSIR in India's life, he laid emphasis on invigorating work culture, establishing CSIR Staff College to harnessing new talent, reinventing the international cooperation and preservation of the autonomy of CSIR. I was particularly impressed by his advocacy for recourse to golden handshake to encourage respectful weeding out unwilling professionals and his call for introspection on missed opportunities to see more than that usually meets the eye.

As a fellow traveller, I recall my most rewarding engagement with Dr Thyagarajan during the period 1988-2000 which include his tenure with the Commonwealth Science Council. I particularly recall my meetings with him in the United Kingdom during 17-30 July 1988 and 15-16 June 1989. My first visit, as Director of Central Building Research Institute was aimed at advancing India's ongoing cooperation with the Building Research Establishment of the UK in the area of Fire Research, and my second visit was to participate in an interactive meeting of Directors of Building Research Organisations of Building Research Organisations (DESBRO) from England, New Zealand, Australia, Canada, South Africa, and the USA. Both times, my meetings with Dr Thyagarajan and his Deputy Dr Raul Vicencio, in the office of Secretary Commonwealth Council, were insightful and productive. We also agreed to exchange publications with Commonwealth Secretariat in the areas of Building Materials and Disaster Management. Dr Thyagarajan introduced me to Ms Janet R Stradran, CSC's Executive Officer for Information sharing. The ensuing discussion generated very useful inputs and insights into the rapidly evolving power of information in the modern world of science and the importance of effectively connecting the laboratories of

CSIR; nationally and internationally. I also came to know from Dr Thyagarajan a lot about the Software of importance accessible in the public domain.

Some of these ideas developed at our meetings, however, had to be kept on the backburner because, within months of my last meeting with Dr Thyagarajan, I left CSIR to join United Nations-Habitat. Five years later, in 1995, soon after my return to CSIR, on day one, the idea of establishing International Science and Technology Directorate (ISTAD) at the CSIR Headquarters struck my mind. It got instant seal of approval, thanks to the vision of the then DG, CSIR- Dr RA Mashelkar. Interestingly, Dr Thyagarajan was the Chairman of the Committee which interviewed new recruits for ISTAD and selected Dr Rama Bansal and Dr Purnima Rupal to strengthen it. The former is currently the Head of ISTAD, after serving as India's Science Counsellor in Russia. And the later has recently retired after serving as India's Science Counsellor in Japan and as Director of Indo-French Centre in New Delhi.

By hind sight, I recall that the idea of harnessing the power of Information which had germinated in my meetings with Dr Thyagarajan in the UK, resurfaced and fructified in a different uniform, when in the year 2000, I proposed creation of Disaster Knowledge Network to the High-Powered Committee on Disasters constituted by the Government of India. I defended my proposal at the National Workshop hosted by the Disaster Management Institution of Bhopal at the behest of the High-Powered Committee on 14 and 15 July 2000. As the luck would have it, my proposal was fully backed by Dr Mashelkar, DG CSIR via his letter of 1 September 2000 addressed to Shri J.C. Pant, the Chairman of the High-Powered Committee. The unstinted support to the proposal received from Dr Anil Kakodkar, the then President of the Indian National Academy of Engineering gave wings to the proposal. On 16 November 2000, Shri J. C. Pant, while addressing the media on National Press Day, acknowledged the support to DKN received from Dr Kakodkar and, finally, the HPC included the recommendation in its report submitted to the Government of India in October 2001.

Simultaneously, reminded of my meetings with Dr Thyagarajan in the UK, I also submitted a proposal to the Commonwealth Science Council, on creation of Commonwealth Disaster Knowledge Network. On 28 September 2000, the successor of Dr Thyagarajan at the CSC secretariat wrote to me conveying sanction of 5,000 pounds plus travel to kick-start the DKN activity. The letter also suggested partnering the project with the UNESCO.

Hazardous Waste Management was yet another area of vital national importance on which Dr Thyagarajan made significant contributions. It was in the year 1985 that he served as a Technical Advisor to the Indian side in the Bhopal case before the UN Court and liaised with the American Law Firm representing the Indian case. Subsequently, he laid emphasis on assessment of Industrial Safety in hazardous areas.

During 2003-2004, he served as a Consultant to Joint Parliamentary Committee on pesticide residues in soft drink, and later, during 2004-7, he Chaired a Supreme Court Monitored Committee on Hazardous Waste Management. He availed of every possible opportunity to highlight the staggering contrast between- Industrial Planning as practiced and Environmental Safety. In his lecture on Hazardous Waste Management in India-Ground Realities, delivered in March 2005, at the National Environment Engineering Research Institute, Nagpur, he highlighted the role of Regulatory agencies and Pollution control boards in exercising control over the abuse of the prescribed Codes and Standards. He was particularly critical of the unorganised development of industries such as pharmaceuticals, pesticides, mining, and metallurgy.

As a Science Administrator, he saw the need for giving meaning to the pursuit of science, by fostering, promoting, and sustaining the culture of science, pro bono publico. Towards that end, he endeavoured to improve institutional infrastructure, modernise laboratories, lay emphasis on team building and on finding

a down to earth connection between the research outputs and fulfilment of the felt needs of the end users.

Interalia, he also played a significant role in giving fillip to sports promotion activities in the CSIR and I was also motivated to host CSIR's Shanti Swarup Bhatnagar tournament in the campus of Central Building Research Institute in Roorkee.

Though both of us were separated by the geographic distance and rather infrequent meeting opportunities, we remained in touch with each other. The last time I met him in person was at the International Conference on Science and the Small Nations Bridging the Gaps: A Science diplomacy Initiative" held in New Delhi on November 14-16, 2017. It was organised by Zaheer Science Foundation, (ZSF) of which he was the Chairman. While inviting me to be a speaker at the conference, he expressed his deep concern about the plight of the small nations. Of the 197 independent nations at that time, 135 had population of 10 million or less. Of these 135, 45 were small island nations with population of one million or less. Despite these island nations being principal contributors of data and information to feed countless global projects on climate change, extreme weather events, sea level rise, natural disasters, and trans-boundary pollution, they faced the threat of science and technology marginalization. In my presentation, he specifically asked me to suggest what should be done to rectify the imbalances and what policies and strategies can help integrate the small and disadvantaged nations with the ongoing and perceived global scientific initiatives.

In an article on Technology Policy for Global Competition: Lessons from the East Asia, published in the International Journal of Engineering Education (1994, Vol10), Thyagarajan jointly with P.N. Desai underscored that "the third world countries need to examine closely the connection between technology, population growth, environment, and development. It is necessary for them to lay emphasis on quality, design, R & D market research, information, and communication technology, and above all, commercialization, and global competitiveness". What he clearly saw three decades ago, continues to be as relevant even today.

Dr Thyagarajan, while paying tribute to his mentor Dr Yelavarthy Nayudamma via his article titled *Calm and Composed-Even in Crisis* published in his Centenary Volume, wrote: - "He was a man with great deal of patience, could keep cool even in worst circumstances and think clearly. Whatever he did in life, he did gracefully and left a deep imprint on whosoever came in contact with him." The above qualities were his ornaments too, by which we will all remember him for all times to come!

I salute Dr Thyagarajan who will always live in the heart of all those who were fortunate enough to come in his contact. May his soul rest in peace.

R.K. Bhandari
A friend, an admirer, and a colleague of Dr G Thyagarajan at CSIR
Email: rajmee@yahoo.com

May God bless his soul to Rest in Peace

INAE Expert Pool

Constituting of accomplished and eminent group of engineers, engineer-scientists, and technologists across India as fellows, spanning all engineering specialties, INAE advances in engineering, technology, and allied scientific disciplines. INAE facilitates the application of these fields' expertise to national importance issues and challenges.

With the aim of bringing together experts from different engineering disciplines across India on a single platform, INAE wishes to create a web-based directory or expert pool in engineering (subject domain wise) which is hosted in INAE website. The year book containing a similar list of fellows is not according to their domain expertise or specialization, hence the requirement of this expert pool.

The expert pool acts as a platform towards connecting the industry (covering private, government, public sector and strategic departments) with the experts from academia and R&D, promoting industry-academia interaction. The lack of such mechanism is a loss to the nation than to any individual.

Expert pool features:

- Platform to gain access and seek advice from our experts from different fields
- Simple-to-use search engine that links the experts (FNAEs) listed on this portal with the people or organizations looking for their services.
- Providing an online domain specific consultancy service to the industry and agencies,
- Single authenticated web portal of national experts in all branches of Engineering and Technology
- Provision for on line submission of inquiry or questions (free of charge)

The link for the expert pool can be located on the top right corner of the INAE website wherein the list of experts can be located based on the domains or specialization. Currently, out of 964 Indian fellows and 103 Foreign Fellows, 413 Indian fellows and 21 foreign fellows are part of the INAE Expert Pool. Additionally, 48 Young Associates are also part of the INAE Expert Pool.

INAE Annual Convention 2023

The Indian National Academy of Engineering (INAE) organized its Annual Convention 2023 on December 9-11, 2023 at Siksha 'O' Anusandhan University, Bhubaneswar in association with Siksha 'O'Anusandhan University, Bhubaneswar; Indian Institute of Technology (IIT) Bhubaneswar; CSIR- Institute of Minerals and Materials Technology (IMMT) Bhubaneswar and INAE Bhubaneswar Chapter. The INAE Annual Convention 2023 was a mega event attended by Fellows, Foreign Fellows, Young Associates and Invitees and this year, there was an overwhelming attendance at Bhubaneswar, which has rich cultural heritage and famous historic temples. The convention commenced with the Inaugural Session on December 9, 2023 wherein the Welcome Address was delivered by Prof Damodar Acharya, FNAE, Chairman, Advisory Board, SOA University, Bhubaneswar and Prof PK Nanda, Vice- Chancellor, SOA University. Prof Indranil Manna, President, INAE and Vice Chancellor, Birla Institute of Technology (BIT), Mesra and former Director, IIT Kanpur delivered the Presidential Address and gave an overview of INAE highlighting the major ongoing and forthcoming technical activities undertaken with the objective of fostering the growth of engineering & technology and enhancement of engineering education in the country. He highlighted that in view of the Prime Minister's vision of an *Atmanirbhar* Bharat by 2047, technological self-reliance is an absolute necessity in all sectors including energy, habitat, transportation, defence and communication etc. He also mentioned that the Academy being a pool of most eminent engineering professionals can play a vital role in the technological progress of the nation. For example, in the thematic area of energy, the average per capita consumption of energy in the country needs enhancement. Prof Manna highlighted that India having the largest population in the world and being a young and aspiring nation requires the widescale deployment of green renewable energy technologies to meet the increasing demand for power and energy. In addition, to achieve further technological progress and advancement in the country and increase the Human Development Index in terms of health, education and living standards as a function of per capita energy consumption, there is a need to create engineering professionals from grassroot level itself to improve the quality of living. INAE can play an important role in these areas by promoting the cause of engineering and technology.

Mr. TV Narendran, FNAE, CEO and Managing Director of Tata Steel Limited, was the Chief Guest of the event and delivered the Inaugural Lecture. Mr Narendran is also currently on the Board of Tata Steel Limited and the Chairman of Tata Steel Europe. He spoke of the vital role of steel industry in the economic development of a nation. He brought out that India is the second largest producer of steel in the world, but it has a carbon footprint and there is a need to deploy greener technologies for sustainability. He spoke on the current challenges, futuristic technologies and role of interdisciplinary areas in development of greener technologies for the future of the steel manufacturing industry in the country. He emphasized that green hydrogen is key to decarbonising India's steel industry. He said that India is blessed with wealth of Iron ore and geological richness which can be leveraged for growth of the steel industry by adding steel capacity, which is pervasive requirement for other industries and growth of GDP in the nation. There is a need to find India-centric futuristic solutions to overcome technological and operational challenges for sustainability in the steel manufacturing process. He also touched upon other themes of importance such as the manufacturing industry, digitization and the contributions of the engineering fraternity in this regard. He expressed that attracting young engineering talent to core engineering areas is essential since many engineers choose other areas. Also, the industry professionals and academicians should work together to enhance the R&D activities on a larger scale and a stronger capital goods industry is desirable for progress. Mr Narendran expressed that multidisciplinary activities is the need of the hour and INAE can play an active and holistic role in this regard.

Chief Guest Mr TV Narendran, FNAE, CEO & Managing Director, Tata Steel Limited Delivering Inaugural Talk

A Book on "Diverse Space Applications" authored by Dr. BN Suresh, FNAE, Former President, INAE & Chancellor, Indian Institute of Space Science & Technology (IIST), Thiruvananthapuram was released which is a compilation meant to showcase the contributions of Indian Space program towards National development. The event features several important meetings wherein INAE Fellows participated such as the Governing Council Meeting, Annual General Meeting featuring a Brainstorming Session on pertinent issues for the way forward for the Academy and a Special General Meeting of Fellows wherein amendments to Rules & Regulations were deliberated. Forty-eight Fellows and five Foreign Fellows were elected this year. Some of the eminent luminaries inducted as Fellows during the Annual General Meeting of Fellows include Mr. Satya Narayana Nadella, Chairman and Chief Executive Officer of Microsoft; Mr. Sunil Bharti Mittal, Founder and Chairperson of Bharti Enterprises; Mr. K. Krithivasan, Chief Executive Officer and Managing Director of Tata Consultancy Services (TCS); Prof. TG Sitharam, Chairman, All India Council of Technical Education (AICTE), New Delhi; Mr. Ajai Chowdhry, Co-Founder- HCL, Chairman – EPIC Foundation; Mr. Girish Arun Wagh, Executive Director, Tata Motors Ltd., Mumbai; Dr. Pramod Madhukar Chaudhari, Executive Chairman, Praj Industries Ltd., Pune; Mr. Chander Prakash Gurnani, MD and CEO, Tech Mahindra; Dr. Tapan Sahoo, Executive Director (Engineering), Maruti Suzuki India Limited, Gurgaon; Mr. Sreenivas Subramoney, Intel Fellow, Director of Processor Architecture, Intel Corporation, Bengaluru; Dr. Kanakasabapathi Subramanian, Senior Vice President, Product Development, Ashok Leyland Ltd., Chennai and Prof. Indumathi M Nambi, Professor in Environmental Engineering, Department of Civil Engineering, Indian Institute of Technology Madras, Chennai . Other prominent newly inducted Fellows are Dr. M. Ravichandran, Secretary to the Govt. of India, Ministry of Earth Sciences; and Dr. Purnendu Chatterjee, Founder and Chairman of The Chatterjee Group (TCG). The newly elected Fellows, Foreign Fellows and Young Associates of INAE were inducted during the Annual General Meeting and they were presented their Fellowship/ Young Associateship Certificates accordingly. They also made brief Technical Presentations on their most significant scientific/ engineering contributions which shall be of interest for all delegates. The list of newly elected Fellows and Foreign Fellows is contained under the heading "The Fellowship" appearing in this Report. The list of INAE Young Associates 2023 is given below.

INAE Young Associates 2023

1. **Dr. Dhanya C.T.**, Rama Kanta Chair Professor, Department of Civil Engineering, Indian Institute of Technology Delhi. (ES-I – Civil Engineering).
2. **Dr Arnab Banerjee**, Assistant Professor, Civil Engineering Department, Indian Institute of Technology Delhi. (ES-I – Civil Engineering).
3. **Dr Sikhar Patranabis**, Staff Research Scientist, IBM Research India, Bengaluru. (ES-II-Computer Engineering and Information Technology).
4. **Dr Palash Dey**, Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur. (ES-II-Computer Engineering and Information Technology).
5. **Dr. A R Harikrishnan**, Assistant Professor, Department of Mechanical Engineering, Birla Institute of Technology and Science Pilani, (ES-III- Mechanical Engineering).
6. **Dr Poonam Sundriyal**, Assistant Professor, Department of Mechanical Engineering, Indian Institute of Technology Kharagpur. (ES-III- Mechanical Engineering).
7. **Dr Ananth Govind Rajan**, Assistant Professor and Infosys Young Investigator, Department of Chemical Engineering, Indian Institute of Science, Bengaluru. (SC-IV – Chemical Engineering).
8. **Dr Vedanta Pradhan**, Senior R&D Engineer, Hitachi Energy Bengaluru (SC-V-Electrical Engineering).
9. **Dr. Ashish Ranjan Hota**, Assistant Professor, Department of Electrical Engineering, Indian Institute of Technology Kharagpur. (SC-V – Electrical Engineering).
10. **Dr. Shubham Sahay**, Assistant Professor, Department of Electrical Engineering, Indian Institute of Technology Kanpur. (SC-VI- Electronics and Communication Engineering).
11. **Dr. Soumya Prakash Dash**, Assistant Professor, School of Electrical Sciences, Indian Institute of Technology Bhubaneswar. (SC-VI- Electronics and Communication Engineering).
12. **Dr Shourya Dutta Gupta**, Associate Professor, Materials Science & Metallurgical Engineering, Indian Institute of Technology Hyderabad. (SC-VIII- Mining, Metallurgical & Materials Engineering).
13. **Dr Neha Sardana**, Assistant Professor, Metallurgical and Materials Engineering, Indian Institute of Technology Ropar. (SC-VIII- Mining, Metallurgical & Materials Engineering).
14. **Dr. Naga Vara Aparna Akula**, Principal Scientist, CSIR-Central Scientific Instruments Organisation, Chandigarh. (SC-X- Interdisciplinary & Special Engineering Fields and Leadership in Academia, R&D and Industry).
15. **Dr Sathya R**, Scientist, Leather Process Technology Department, CSIR-Central Leather Research Institute, Chennai. (SC-X- Interdisciplinary & Special Engineering Fields and Leadership in Academia, R&D and Industry)

The Annual Convention provided a golden opportunity for networking amongst Fellows and Young Associates and was a memorable event and is eagerly awaited by all concerned every year. The other technical highlights of the INAE Annual Convention 2023 were the First Panel Discussion on "New Tech industry"; Brief Presentations on Technical Report by Conveners, Sectional Committees; Special Talk on "Chandrayaan 3: The Mission and its Accomplishments" by Mr. S Somanath, Chairman, Space Commission, Chairman, ISRO and Secretary, Department of Space; Plenary Talk on "Green Hydrogen" by Prof. GD Yadav, FNAE, Emeritus Professor of Eminence, ICT and JC Bose National Fellow, Institute of Chemical Technology, Mumbai and Second Panel Discussion on "Artificial Intelligence in Industry 4.0

and Sustainability". The Cultural Programme - Performance on Evolution of Odissi Dance; Audio-Visual Presentation on Culture & Heritage of Odisha and Local Excursion tour to heritage sites in Bhubaneswar enthralled all the participants and delegates. The cultural events conducted also delighted the august audience.

Selected Photographs of Inaugural Session

Inaugural Session: L to R: Lt Col Shobhit Rai, Prof Indranil Manna, Mr TV Narendran, Prof Damodar Acharya and Prof PK Nanda

Release of Book on "Diverse Space Applications" by Dr BN Suresh, former President, INAE

For photographs of Induction Ceremony during Annual General Meeting of Fellows and other events held during the INAE Annual Convention are available at INAE website which can be viewed at the link given below.

https://www.inae.in/inae-annual-convention-2023/

Some Glimpses of Technical Sessions in Progress

Panel Discussion on "Artificial Intelligence in Industry 4.0 and Sustainability"

Presentations on Technical Report by Conveners, Sectional Committees

Technical Presentation in Progress

Glimpses of Audience

INAE Publications

(i) **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 8, Issue 2, June 2023; Volume 8, Issue 3, September 2023 and Volume 8, Issue 4, December 2023** were published through Springer Publishers during the period April 2023 to January 2024. **Transactions of INAE Volume 9, Issue 1, March 2024** was published through Springer Publishers during the period January to March 2024.

(ii) **Book on "Diverse Space Applications"**

Based on the study carried out under the aegis of INAE Satish Dhawan Chair of Engineering Eminence, Dr BN Suresh, Former President, INAE brought out a book titled "Diverse Space Applications" which was released during the Inaugural Function of the INAE Annual Convention 2023 held in December 2023 at Bhubaneswar.

(The details of the book are covered under the section on "INAE Satish Dhawan Chair of Engineering Eminence")

(iii) **Technical Reports on "Technology Review / Forecasting / Gap Analysis" by Sectional Committees**

In the present context of Government directives, wide ranging discussions were held with high ranking officials and eminent personalities during the last over one year and the issue of how INAE is serving the engineering fraternity of the nation was bought up. In this backdrop, several meetings of Sectional Committee Conveners with President INAE held this year on March 27, 2023 and June 30, 2023 and it was requested that each sectional committee should identify up to three (at least one) topic of current interest in the respective domains and come out with a report/policy document/future roadmap of unique quality within 2023. These will then be taken up with the appropriate authorities with due diligence by INAE.

This year Meetings were held of 10 INAE Sectional Committees to discuss the way forward to generate quality expert report on contemporary issues related to Engineering & Technology relevant to the country, that are the outcome of deeply researched studies or surveys on contemporary challenges in engineering and technology and are neither published anywhere nor available in any public domain; but are of immense value to an entrepreneur, a government department, an industrial organization, or a policy making unit. This exercise is to be carried out by exploiting the most eminent talent and expert pool in the Fellowship to offer the most effective, timely and exclusive service to the nation and the profession and do justice to the existence and standing of INAE. The Sectional Committees are progressing this initiative and it is envisaged that several reports shall be prepared within the year.

The suggested yardsticks for preparing technical report(s) on topic(s) of contemporary interest/ importance were drawn out. It was recommended that each Engineering Section may produce one or more technical report/technology road map in the current calendar year and that the Report(s) being prepared should be unique. The main Report could be of about 10 pages or so, with required appendices with references & data sources etc. listed out. The quality of Report should be such that

these could be used by Government/other agencies for formulation of Policy, Regulations/ Guidelines for Engineering and Technology domain. It should be a value addition Report which can be taken cognizance of.

During the meeting held on 15th November 2023 of President, INAE with Conveners/Reps the broader Guidelines for preparing Technology Review / Forecasting / Gap Analysis Reports (up to 20 pages with references and figures, if any), out of which the sectional committees may choose any 5/6 or more were listed out. Presentations were held by the Conveners/Reps Sectional Committees during Annual Convention 2023 held at Bhubaneswar. The task of publication of the reports prepared by the Sectional Committees last year is undergoing.

Donations to INAE Corpus Fund

Prof Indranil Manna, President, INAE has written several letters addressed to the Fellowship in which he recalled that the Department of Science and Technology (DST), as directed by the Department of Expenditure, Government of India (GoI) is in the process of disengaging itself from the activities of INAE including providing the annual financial support w.e.f. 01st April 2025. To address the issue of sustainability of INAE, several meetings were held with high level Government officials, former Presidents and senior Fellows of INAE, and industry leaders in the last 10 months since the formal letter from DST (dated 6.5.22) was served to INAE about disengagement. While efforts would continue to impress upon the Government that INAE is essential to realize the country's agenda on engineering and technology, it had become amply clear that INAE must undertake a serious effort to generate an adequate Corpus Fund and attain financial self-sufficiency.

He further brought out that Engineering is all about evolving viable solution to prevailing or future challenges and aspirations. Hence, the present crisis may be viewed as an opportunity for INAE to emerge stronger and more resolute to fulfil its core objective of serving the profession and the nation in a more comprehensive manner. He hoped that each Fellow would agree that the onus of confronting the current crisis and eventually winning over can rest neither on a few office bearers nor only on a nominated committee. If INAE has to tide over this unprecedented and most unfortunate crisis, every single Fellow, Associate, Awardee and mentor of INAE must come forward and make a useful and decisive contribution. In this direction, he apprised that after sustained efforts, INAE has been given the approval by the Competent Authority for the creation of a new corpus fund from INAE's own resources (internal accruals) in accordance with the Rule 229 (iv) & (v) of General Financial Rules (GFR), 2017 of the GoI on 24th March 2023. Contributions have since been received for INAE Corpus Fund from INAE Fellowship and the process is ongoing. The details for forwarding of donations and tax benefits to donors are given below:

Bank Details for receipt of donation to INAE:

Name of beneficiary: **INAE Corpus Fund**

Account Number: **41790835603**

Bank Address: **Jawaharlal Nehru University, New Mehrauli Road, New Delhi**

Type of Account: **Savings**

IFSC: **SBIN0001624**

Tax benefits for donors

The contribution to the **INAE Corpus Fund** qualifies to be considered under the category of donation and is eligible for 50% tax deduction under section 80G for those under old tax regime. The donors will get a receipt and the 80G certificate within a quarter.

INAE is extremely grateful to all Fellows who have generously contributed to the INAE Corpus Fund and welcomes further contributions/donations from Fellows, Young Associates, Awardees; Industry Leaders and Industry Houses etc with a view to achieving self-sufficiency in functioning in the near future.

A list of individual donors up to 31st March 2024 is as under :

S No.	Name of the Donor	S No.	Name of the Donor
1	Prof. Indranil Manna	36	Professor Arindam Ghosh
2	Prof. GD Yadav	37	Prof. BVA Rao
3	Mr. Raghavan Muralidharan	38	Dr T K Alex
4	Prof. Meenakshi Balakrishnan	39	Prof Maithili Sharan
5	Prof. N.K. Mukhopadhyay	40	Prof M Seetharama Bhat (Rtd)
6	Prof. Rabindra Nath Ghosh	41	Prof. Vasant A Matsagar
7	Dr. DR Prasadaraju	42	Prof. A W Date
8	Dr. VR Lalithambika	43	Prof. Munjal
9	Dr. Rajiv Kumar Tayal	44	Mr N Venkatesh
10	Prof. Sivaji Chakravorti	45	Dr Vijay Shah
11	Prof. Purnendu Ghosh	46	Mr AK Anand
12	Prof. C. Venkatesan	47	Dr. CP Ravikumar
13	Dr. BN Suresh	48	Dr. Guruswamy
14	Dr. BL Deekshatulu	49	Dr. Pradip
15	Dr. VK Aatre	50	Dr. B S Rawat
16	Mr. R Nagappa	51	Dr Krishnan Jalpesan
17	Mr. M. Gopalakrishnan	52	Prof Sirshendu De
18	Prof. SK Ray	53	Dr. C Ranganayakulu
19	Prof. KG Ranga Raju	54	Dr. Rajappa Balasubramaniam
20	Prof. Kamala Krithivasan	55	Dr. Subramanian Narayanan
21	Prof. SS Chakraborty- CEE-ES Development Consultants Private Limited	56	Dr. H. S. Maiti
22	Mr. RN Jayaraj	57	Prof Jyotsana Dutta Majumdar
23	Mr. S Pandian	58	Dr BC Roy
24	Prof U B Desai	59	Dr Tessy Thomas
25	Dr Sanak Mishra	60	Dr. Lalit Kumar
26	Prof. S Narayanan	61	Prof. Ahindra Ghosh
27	Prof Soumitro Banerjee	62	Prof Udaya Kumar
28	Prof Juzer M. Vasi	63	Prof Sankar Kumar Pal
29	Prof Suresh Chandra Srivastava	64	Prof Krishnan P Madhavan
30	Prof Sushmita Mitra	65	Dr Sugilal Gopalakrishnan
31	Prof Vikram Jayaram	66	Mr Madhukar Vinayak Kotwal
32	Dheepa Srinivasan	67	Prof V Chander
33	Prof. M Shojaei Baghini	68	Dr Sathya Prasad Mangalaramanan
34	Prof. SC Dutta Roy	69	Prof. Anindya Deb
35	Prof J Mukhopadhyay	70	Prof K Muralidhar

A donor wall containing names and photographs of Fellows who have generously donated is posted on INAE website at the link https://www.inae.in/donor-wall/

Brainstorming Meetings and Other Meetings organized on the way forward for INAE

INAE is in the process of working towards self-sustenance and financial autonomy in light of fact that the Department of Science and Technology (DST), as directed by the Department of Expenditure, Government of India (GoI) is in the process of disengaging itself from the activities of INAE including providing the annual financial support w.e.f. 01st April 2025. A series of actions have been taken by INAE since then to address the issue. Two Brain Storming Meetings were held at Bangalore on August 5, 2023 in physical mode to discuss the current challenges being faced by the Academy. The first Brainstorming Meet on "INAE Mission, Vision and Objectives – An Assessment for Future Readiness" was held in the forenoon at Indian Institute of Science, Bangalore organized jointly with INAE Bangalore Chapter, which was attended by about 30 Fellows. A follow-up Special Meeting of selected INAE Fellows on "INAE's roadmap for Financial and Functional Autonomy" was also organized during the same evening at Bangalore which was attended by about 20 Fellows. Meaningful suggestions and action -plans on the way forward emanated from the deliberations of both meetings.

Brainstorming Meeting at Bangalore on August 5, 2023

A meeting of INAE Delhi Chapter was organized to seek views, suggestions, and help to formulate a strategy for future sustenance on 21st September 2023 at office of Director IIT Delhi in physical mode. A similar meeting was also organized on 22nd September 2023 at IIT Bombay**.** A Brainstorming session hosted by Dr Manish Gupta, FNAE was also held on 7th December 2023 at the Google RMZ Infinity office, Bangalore.

Meeting of INAE Delhi Chapter at IIT Delhi on September 21, 2023

Group Photo During Brainstorming Session at Bangalore on December 7, 2023

Important Meetings related to Disengagement and Corpus fund Generation during the Year

Meetings with Government Bodies regarding Corpus Fund generation

Between April 2023, and March, 2024, the President of INAE and the leadership were actively engaged in formulating and executing a comprehensive strategy to strengthen and enhance the funding opportunities to make INAE financially and functionally autonomous. The period began with strategic meetings aimed at expanding INAE's Membership base.

On April 3rd, 2023, the President met with the Chairman of UGC and the Secretary of Ministry of Education to discuss strategies for enhancing Institutional Membership within INAE, focusing on generating crucial funds to support the organization's initiatives.

Continuing this momentum, on April 10th, 2023, the President held an online meeting with Directors of IITs who Fellows of INAE are, aiming to align their perspectives and garner support for INAE's Institutional Membership program. This meeting underscored the importance of academic collaboration in bolstering INAE's membership initiatives.

Key engagements in April included a meeting on April 24th, 2023, with the Chairman of NBA to address issues surrounding Institutional Membership among AICTE institutions, further solidifying INAE's outreach within the regulatory framework. On April 25th, 2023, the President met with the Director of IIT Delhi to discuss the INAE's Institutional Membership, enhancing visibility and partnership opportunities within premier educational institutions.

Financial strategy became a focal point on May 4th, 2023, when the President wrote a letter to the Finance Secretary & Secretary (Expenditure), seeking audience and support for INAE's strategic initiatives and funding needs.

A significant milestone occurred on May 15th, 2023, when INAE signed an MOU with DST's International Cooperation Division regarding the India-Taiwan Joint Programme, enabling INAE to access overhead charges for contributions to its Corpus Fund. Subsequently, the President engaged with the Secretary of DST to discuss future funding strategies, demonstrating INAE's proactive approach to financial sustainability.

On June 2nd and 3rd, 2023, the President pursued industry and governmental collaborations, meeting with the Director of IIT Bombay, Director of IIM Mumbai, Chairman AEC & Secretary DAE, Vice Chancellor of HBNI, and L&T Leadership to explore avenues for support and contributions to INAE's Corpus Fund.

As part of ongoing efforts to secure financial backing, on June 21st, 2023, the President urged the DST-Integrated Finance Division representative to provide adequate support during the RE stage of FY 2023-24, underscoring the importance of sustained funding for INAE's operations.

In response to organizational changes, on June 27th, 2023, the President met with the Secretary, DST and Chairman, AICTE to discuss funding strategies post-disengagement from government activities, followed by a letter to the Secretary of DST seeking special funding considerations.

Transitioning into 2024, on January 5th, 2024, the DST INAE Consultative Committee Meeting reviewed INAE's activities, the Cabinet decision on disengagement, and the organization's fund position. February 16th, 2024, marked a milestone with an interactive video conferencing session at AICTE Head-

quarters, organized by the President and Chairman AICTE, introducing INAE's Institutional Membership to 270 Engineering Colleges. This initiative aimed to expand INAE's membership base and foster collaboration within the academic community.

The President, INAE met the Secretary DST on March 20th, 2024 to discuss ongoing issues and strategies concerning disengagement of INAE.

Meetings with Corporate Bodies regarding Corpus Fund generation

The President met with the CEO & Managing Director of Tata Steel Limited, on May 17th , 2023 who also serves in the INAE's Advisory Committee, to explore avenues for boosting the INAE Corpus Fund and outline industry contributions. A virtual session on May 18th, 2023 with an Industry Leader from L&T to discuss potential support mechanisms for corpus fund generation was held.

On June 22nd, 2023, the President engaged with the CEO & MD of Tata Steel to present the Corpus Membership Scheme aimed at securing financial backing for INAE's initiatives. Continuing the momentum, a meeting on September 22nd, 2023, in Mumbai saw the President convene with industry stalwarts from Godrej Industries Ltd. and Larsen & Toubro Ltd. to strategize on enhancing the Corpus Fund through industry partnerships. Later in December 2023, the President met with former Executive Chairman of Cyient, Hyderabad to discuss potential contributions towards INAE's initiatives.

On December 15th, 2023, the President held discussions with the Chairman of Tata Sons Ltd. and the Chairman of Space Commission and Secretary, DoS emphasizing collaborative efforts and financial support for INAE's projects.

Strategic meetings continued in 2024, with discussions on January 4th, 2024 with the Chairman of Tata Sons Ltd. regarding corporate contributions to INAE, and on January 31st, 2024 with the Chairman & Managing Director of Bharat Forge Ltd. to explore strategies for advancing engineering activities.

On March 4th, 2024, the President again engaged with the CEO & MD of Tata Steel to discuss opportunities for Corporate Membership, further strengthening ties with key industry partners. Closing the period on March 23, 2024, the President met with a prominent business leader from Infosys to discuss potential corporate donations and membership engagements.

Internal Meetings regarding Corpus Fund generation

During the last financial year, the President of INAE spearheaded a series of strategic meetings and initiatives aimed at addressing organizational disengagement, fostering financial autonomy, and enhancing the INAE Corpus Fund. Beginning on June 9th, 2023, the President convened an online meeting with former Presidents of INAE to navigate the disengagement issues between INAE and DST (GoI), setting the stage for strategic planning and future directions.

On June 21st, 2023, the second meeting of the Steering Committee was held, focusing on strategies to bolster the INAE Corpus Fund through targeted initiatives. Subsequently, on June 30th, 2023, the 147th Governing Council Meeting of INAE in New Delhi provided a platform to deliberate extensively on Corpus Fund generation and the sustainability of INAE. A separate session with selected Governing Council members allowed for brainstorming on fundraising modalities. Ahead of this, the President and Vice Presidents engaged with Conveners of Sectional Committees to redefine roles and operational models within INAE.

Two critical meetings in Bangalore were held on August 5th, 2023: one with Fellows to update on the status of INAE's disengagement from DST and a Brainstorming Meet on "INAE Mission Vision and

Objectives," hosted at IISc, Bangalore. The second meeting involved selected Fellows to chart INAE's roadmap for financial and functional autonomy. Building on this, the 148th Governing Council Meeting and 35th Annual General Meeting held on August 18th, 2023, reviewed the current status of Corpus Fund raising efforts and resolved key issues pertaining to the same.

In September 2023, meetings in Delhi (IIT Delhi) and Mumbai (IIT Bombay) engaged INAE Fellows to strategize on presenting progress and generating support for the Corpus Fund. October 5th and 6th, 2023, witnessed a gathering of Former Presidents of INAE during the 10th Engineers Conclave in RRCAT Indore, focusing on refining strategies and formats for Corpus Fund development.

Further efforts continued with the December 7th meeting in Bangalore, where the President engaged with selected Fellows from diverse sectors at Google Research India to garner support for Corpus Fund generation. January 30th and 31st, 2024, included an Apex Committee Meeting to implement INAE's sustainability schemes and an interactive session with Pune-based Fellows specifically aimed at advancing the Corpus Fund agenda. On February 10th, 2024 a Steering Committee Meeting dedicated to Corpus Fund generation strategies was held.

On February 21st and 23rd, 2024, meetings with Fellows of Pune and Delhi Chapters respectively were held, focusing on enhancing Membership Schemes. March 11th and 14th, 2024, involved committee meetings discussing "INAE Institutional Membership" and coordinating with local chapters on executing INAE schemes for Corpus Fund generation. Concluding this phase, the March 21st, 2024, Governing Council Meeting reviewed progress on Corpus generation schemes, emphasizing INAE's commitment to sustainable growth and financial independence.

These efforts highlight INAE's resolve to address the challenges and become financially and functionally autonomous so that INAE could focus on its primary objective of advancement in engineering profession.

Statement of Accounts 2023-24

Indian National Academy of Engineering

P K M B & Co.
Chartered Accountants

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Tel: +91 1140528391-92
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Independent Auditor's Report

To
The Members
Indian National Academy of Engineering
Ground Floor, Block-II,
Technology Bhavan,
New Mehrauli Road,
New Delhi-110016

Opinion

We have audited the financial statements of M/s Indian National Academy of Engineering, which comprises the balance sheet at March 31st, 2024 and also the income and expenditure account for the year ended and notes to the financial statements, including summary of significant accounting policies.

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements give a true and fair view in conformity with the accounting principles generally accepted in India, of the state of affairs of the Society as at March 31, 2024, and its income over expenditure for the year ended on that date.

Basis of Opinion

We conducted our audit in accordance with the Standards on Auditing (SAs) issued by ICAI. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of Financial Statements section of our report. We are independent of the Society in accordance with the ethical requirements that are relevant to our audit of Financial Statements in [jurisdiction], and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of matters

We draw attention to note number 1 of Schedule 25 of the financial statements, which describes that during the financial year 2022-23, the office of Principal Director of Audit (Environment & Scientific Division) conducted an inspection on compliance audit for the period from 2017-18 to 2021-22. The report majorly indicates the following liabilities which may devolve on the Society:

A) Rs. 8.87 crores lying under corpus fund & General fund with INAE in contravention to the directions for the creation of such funds by Government of India.

This matter was deliberated in INAE Governing Council on March 21, 2024 and it was decided to comply with the directions of audit and transfer the following to CFI:

a) An amount of Rs. 5,06,33,990/- available in INAE Corpus Fund as on 31.3.2022 comprising of interest earned on corpus fund balance and voluntary contributions to be transferred to Consolidated Fund of India through Bharat Kosh. To close INAE Corpus Fund as at 31st March 2024, the balance amount of Rs. 50,90,085/- pertaining to INAE Corpus Fund has been shown as payable to DST under current liabilities.

b) Other funds available with INAE on 31.03.2022 amounting Rs. 3,80,67,098/- also to be transferred to Consolidated Fund of India through Bharat Kosh, which consisted of following two components, namely:
   i) Balance of accumulated depreciation as on 31.3.2022 of Rs. 3,34,03,328/- set apart against interest earned;
   ii) Accumulation of surplus out income over expenditure due to voluntary contributions, sponsorships of events and interest on INAE General Fund during the financial years from 2015-2022 amounting to Rs. 46,63,770/- available in INAE General Fund; and
   iii) The accretions during FY 2022-23 due to depreciation and accretions FY 2022-23 & 2023-24 due to interest earned on savings bank balance & investments are shown as payable to DST under current liabilities.

Accordingly, INAE deposited Rs. 5,06,33,990/- from INAE Corpus fund and Rs. 3,80,67,098/- from other funds on 29th March 2024 in Bharat Kosh.

B) As per the direction received from Principal Director of Audit (Environment & Scientific Division), the DKRC Fund is closed and an amount of Rs. 26,82,863/- (i.e. the unspent balance as on 31 Mar 2022, Rs. 26,12,303/- along with interest for FY 2022-23, Rs.70,533/-) has been refunded by depositing this amount to CFI through Bharat Kosh, on 1st December 2023.

Our opinion is not modified in respect of this matter.

Society's Governing Council Responsibility for the Financial Statements

The Governing Council of Society is responsible for the preparation of financial statements that give true and fair view of the financial position and Income and Expenditures of the Society in accordance with the accounting principles generally accepted in India, including the accounting standards, to the extent applicable, issued by the Institute of Chartered Accountant of India including the relevant provision of the Act and Rules. This responsibility also include maintenance of adequate accounting records for safeguarding the assets of the Society and for preventing and detecting the frauds and other irregularities; selection and application of appropriate accounting policies; making judgements and estimates that are reasonable and prudent; and design, implementation and maintenance of

P K M B & Co. Chartered Accountants Jasola, New Delhi

adequate internal controls that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Governing Council of Society is responsible for assessing the ability to continue as going concern, disclosing, as applicable, matters related to going concern and using going concern basis of accounting unless the Members either intend to liquidate the Society or cease operations, or have no realistic alternative, but to do so.

Auditor's Responsibilities for the Audit of Financial Statement

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatements, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

For **P K M B & Co.**
Chartered Accountants
Firm's Registration No. 003611N

P K M B & Co. Chartered Accountants Jasola, New Delhi

Mayank Gaur
Partner
Membership No. 518183
UDIN: 24518183BKFEYP4207

Place: New Delhi
Date: 28th June, 2024

INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

	Schedule	Current Year 2023-24	Previous Year 2022-23
Corpus/Capital Fund And Liabilities			
Corpus/ General Fund	1	4,81,64,494	12,51,75,344
Reserve And Surplus	2	-	-
Earmarked/ Endowment Funds	3	3,31,978	30,19,447
Secured Loans And Borrowings	4	-	-
Unsecured Loans And Borrowings	5	-	-
Deffered Credit Liabilities	6	-	-
Current Liabilities And Provisions	7	26,10,12,052	28,16,44,209
Total		**30,95,08,524**	**40,98,39,000**
Assets			
Fixed Assets	8	1,62,55,498	1,80,70,485
Investments - From Earmarked/Endowment Funds	9	20,03,10,000	20,04,44,836
Investments - Others	10	2,80,00,000	10,31,00,000
Current Assets, Loans, Advances	11	6,49,43,026	8,82,23,679
Miscellaneous Expenditure (to the extent not written off or adjusted)		-	-
Total		**30,95,08,524**	**40,98,39,000**
Significant Accounting Policies	24		
Contingent Laibilities And Notes To Accounts	25		

As per our report of even date
For **P K M B & Co.**
Chartered Accountants
Firm Reg. No.: 005311N

P K M B & Co. Chartered Accountants Vasola, New Delhi

Mayank Gaur
Partner
Membership No.: 518183

Place: New Delhi
Date: 28/06/2024

On behalf of the Council:

President : .....

Vice-President .....
(Finance & Establishment)

Deputy Executive Director .....

Manager (F&A).....

INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2024

(Amount in Rs.)

Income	Schedule	Current Year 2023-24	Previous Year 2022-23
Income from Sales/Services	12	-	-
Grants / Subsidies	13	17,99,31,758	13,59,63,381
Fees/ Subscriptions	14	1,22,00,000	-
Income from Investments	15	1,12,868	25,61,637
Income from Royalty, Publication	16	3,35,292	3,80,821
Interest Earned	17	2,11,34,991	1,32,67,333
Other Income	18	1,27,19,244	26,58,102
Total (A)		**22,64,34,153**	**15,48,31,274**
Expenditure			
Establishment Expenses	20	1,47,93,188	2,03,59,761
Other Administrative Expenses	21	34,36,438	44,29,978
Expenditure on Grants, Subsidies :			
Utilization towards Engineering Programes and Activities against DST Grants etc.	22-A	1,95,28,685	2,77,73,363
Utilization towards SERB Grant for Abdul Kalam TIN Fellowship Scheme	22-B	8,54,67,028	7,29,76,127
Utilization towards SERB Grant for Digital Gaming Research Initiative	22-C	4,13,51,797	28,09,559
Utilization towards SERB-INAE Collaborative Initiative in Engineering	22-D	66,81,141	69,84,841
Utilization towards AICTE Grant for Distinguished Visiting Professorship Scheme	22-E	-	4,51,093
Utilization towards AICTE- INAE Travel Grant Scheme	22-F	-	2,00,631
Utilization towards India-Taiwan Co-operation Program	22-G	1,59,51,605	-
Expenditure towards Administative Overheads	22-H	3,66,811	-
Interest	23	2,01,10,279	94,88,197
Depreciation	8	18,54,587	20,49,835
Total (B)		**20,95,41,560**	**14,75,23,386**
Balance being excess of Income over expenditure (A-B)		**1,68,92,593**	**73,07,888**
Transfer to DKRC Development Fund		-	(70,533)
Transfer to Prof. Roddam Narsimha Memorial Lecture Endowment Fund		(20,394)	(11,584)
Transfer to Corpus Fund		-	(24,79,520)
Transfer to New Corpus Fund (refer note 6 of Schedule 25)		(92,474)	-
Transfer to Fixed Assets (Grant utilised for Capital Assets)	8	(9,97,960)	(4,78,319)
Balance Being Surplus / (Deficit) Carried To General Fund		**1,57,81,765**	**42,67,932**
Significant Accounting Policies	24		
Contingent Liabilities And Notes On Accounts	25		

As per our report of even date
For **P K M B & Co.**
Chartered Accountants
Firm Reg. No.: 005311N

P K M B & Co. Chartered Accountants Jasola, New Delhi

Mayank Gaur
Partner
Membership No.: 518183

Place: New Delhi
Date: 28/06/2024

On behalf of the Council:

President : .....

Vice-President .....
(Finance & Establishment)

Deputy Executive Director .....

Manager (F&A).....

INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

Schedule 1 - Corpus/General Fund	General Fund	INAE Corpus Fund	INAE New Corpus Fund*	General Fund	INAE Corpus Fund	INAE New Corpus Fund*	Total Current Year	Total Previous Year
	2023-24			2022-23			2023-24	2022-23
Balance as at beginning of the year (including Notional value of Depreciable Fixed Assets Rs. 5,35,15,131/-)	7,16,16,833	5,31,13,510	4,45,000	6,73,48,901	5,06,33,990	-	12,51,75,343	11,79,82,891
Less: Remitted to DST	(3,80,67,098)	(5,06,33,990)	-	-	-	-	(8,87,01,088)	-
Less: Other withdrawal	(84,883)	-	-	-	-	-	(84,883)	-
Less: Other withdrawal for depriciation during the year 23-24	(18,54,587)	-	-	-	-	-	(18,54,587)	-
Less: Payable to DST (Depreciation and Interest for FY 2022-23)**	(37,79,135)	(24,79,520)	-	-	-	-	(62,58,655)	-
Add: Corpus Contibutions received	-	-	40,14,125	-	-	4,45,000	40,14,125	4,45,000
Add: Transferred (to)/from Income and Expenditure A/c	1,57,81,765	-	92,474	42,67,932	24,79,520	-	1,58,74,239	67,47,452
Balance at the Year End	**4,36,12,895**	-	**45,51,599**	**7,16,16,833**	**5,31,13,510**	**4,45,000**	**4,81,64,494**	**12,51,75,344**

* Refer note 12 of Schedule 25.

** Refer note 2 of Schedule 25.

(Bhuwan Adhlakha)
Manager (F&A)

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 2 - Reserves and Surplus	Current Year 2023-24		Previous Year 2022-23	
1. Capital Reserve				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
2. Revaluation Reserve :				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
3. Special Reserves				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
4. General Reserve				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
Total		Nil		Nil

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

Schedule 3- Earmarked/Endowment Funds	Current Year 2023-24	Previous Year 2022-23
DKRC Development Fund (A)		
a. Opening balance	26,82,863	26,12,330
b. Additions to the funds		
i Transferred (to)/from Income and Expenditure A/c	-	70,533
c. Remited to DST	(26,82,863)	-
Sub-total A=(a+b-c)	-	**26,82,863**
Prof. Roddam Narsimha Memorial Lecture Endowment Fund (B)		
a. Opening balance	3,36,584	-
b. Additions to the funds		
i Contribution Received	-	3,50,000
ii Transferred (to)/from Income and Expenditure A/c	20,394	11,584
c. Utilisation/ Expendiutre towards objectives of Funds		
i Expenditure for the purpose	(25,000)	(25,000)
Sub-total B=(a+b-c)	**3,31,978**	**3,36,584**
Balance at the Year End Total : (A+B)	**3,31,978**	**30,19,447**

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 4 - Secured Loans and Borrowing	Current Year 2023-24		Previous Year 2022-23	
1. Central Government		-		-
2. State Government (Specify)				
3. Financial Institutions		-		-
a) Term Loans	-		-	
b) Interest accrued and due	-	-	-	-
4. Banks :				
a) Term Loans	-		-	
- Interest accrued and due	-		-	
b) Other Loans (Specify	-		-	
- Interest accrued and due	-	-	-	-
5. Other Institutions and Agencies		-		-
6. Debentures and Bonds		-		-
7. Others (Specify		-		-
Total		Nil		Nil
Note : Amounts due within one year				

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 5 - Unsecured Loans and Borrowing	Current Year 2023-24	Previous Year 2022-23
1. Central Government	-	-
2. State Government (Specify)	-	-
3. Financial Institutions	-	-
a) Term Loans	-	-
b) Interest accrued and due	-	-
4. Banks :		
a) Term Loans	-	-
b) Other Loans (Specify	-	-
5. Other Institutions and Agencies	-	-
6. Debentures and Bonds	-	-
7. Fixed Deposits	-	-
8. Others (Specify	-	-
Total	Nil	Nil
Note : Amounts due within one year		

SCHEDULE 6 - Deferred Credit Liabilities	Current Year 2023-24	Previous Year 2022-23
a) Acceptance secured by hypothecation of capital equipment and other assets	-	-
b) Others	-	-
Total	Nil	Nil
Note : Amounts due within one year		

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

Schedule 7 - Current Liabilities And Provisions	Current Year 2023-24		Previous Year 2022-23	
A. Current Liabilities				
1. Salary Payable	7,88,001		5,98,370	
2. TDS & GST Payable	8,18,594		82,388	
3. Expenses/Bills Payable	14,32,892		5,38,225	
4. Audit Fee Payable	82,600	31,22,087	70,800	12,89,783
5. Payable to DST	1,31,75,392		1,49,211	
6. Unspent AICTE Grant for DVP Scheme	-		-	
7. Unspent AICTE Grant for Travel Grant Scheme	-		7,13,566	
8. Unspent SERB Grant for Digital Gaming Initiative	21,84,34,143		25,58,68,112	
9. Unspent SERB Grant for Colaborative Activities	9,77,931		6,05,430	
10. Unspent SERB Grant for Abdul Kalam TIN Fellowship	1,05,96,125		92,33,640	
11. Unspent grant India Taiwan Co.program	5,71,023	24,37,54,614	-	26,65,69,959
B. Provisions				
1. Provision for Gratuity	85,97,350		73,84,894	
2. Provision for Leave Encashment	55,38,001	1,41,35,351	63,99,573	1,37,84,467
Total		**26,10,12,052**		**28,16,44,209**

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH , 2024

Schedule 8 - Fixed Assests

(Amount in Rs.)

Description	Original cost of Asset as on 01.04.23	Asset Purchased during the year	Value of assets Disposed off/ sold	Original cost of Asset as on 31.03.24	Total Dep. Upto 01.04.23	Dep. for the Year	Depriciation on Aseets Disposed off / sold	Utilisation of Grant U/s 11(1)	Total Depriciation Upto 31.03.24	Net Block of Asset as on 31.03.24	Value of Asset as on 31.03.23
Fixed Assets	1	2	3	4	5	6	7	8	9	10	11
Part -I Equipments	55,49,728	9,97,960	-	65,47,688	49,31,145	93,554	-	9,97,960	60,22,659	5,25,029	6,18,583
Part - II Furniture	1,33,39,499	-	-	1,33,39,499	1,03,91,044	2,94,848	-	-	1,06,85,892	26,53,607	29,48,455
Part - III Building	5,37,41,479	-	-	5,37,41,479	3,92,38,032	14,50,345	-	-	4,06,88,377	1,30,53,102	1,45,03,447
Part - IV Equipment out of Project Grant	-	-	-	-	-	-	-	-	-	-	-
Part-V Sofrware -Digital Plateform	57,65,600	39,600	-	58,05,200	57,65,600	15,840	-	-	57,81,440	23,760	-
Total	**7,83,96,306**	**10,37,560**	**-**	**7,94,33,866**	**6,03,25,821**	**18,54,587**	**-**	**9,97,960**	**6,31,78,368**	**1,62,55,498**	**1,80,70,485**

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

Schedule 9 - Investment From Earmarked/Endowment Funds	Current Year 2023-24	Previous Year 2022-23
1. Prof. Roddam Narasimha M L Endowment Fund (Term Deposit with SBI)	3,10,000	3,25,000
2. SERB-INAE Digital Gaming Intiative Funds (Term Deposit with SBI)	20,00,00,000	20,01,19,836
Total	**20,03,10,000**	**20,04,44,836**

Schedule 10 - Investments - Others	Current Year 2023-24	Previous Year 2022-23
1. Corpus Fund (Term Deposit with SBI)	-	5,06,00,000
2. New Corpus Fund (Term Deposit with SBI)	42,00,000	-
3. Institutional Membership (Term Deposit with SBI)	1,18,00,000	-
4. Others (Term Deposit with SBI)	1,20,00,000	5,25,00,000
Total	**2,80,00,000**	**10,31,00,000**

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

Schedule 11 - Current Assets, Loans, Advances Etc.	**Current Year 2023-24**		**Previous Year 2022-23**	
A. Current Assets:				
1. Cash balances in hand (Including Cheque/ Draft, Revenue Stamps and Imprest)	11,772	11,772	14,322	14,322
2. Bank Balance:	-			
a) With Scheduled Banks:				
- On Saving Account	6,06,39,284	6,06,39,284	8,25,60,490	8,25,60,490
Total (A)		**6,06,51,056**		**8,25,74,812**
B. Loan, Advances And Other Assets (Unsecured, Considered Good)				
1. Advances and other amounts recoverable in cash or in kind or for value to be received:				
a) Pre-payments *	75,017		2,76,957	
b) Advance to Expert Groups*	18,55,333		22,29,993	
c) Advance for SERB-INAE Collaborative Initiatives**	6,80,039		5,22,000	
d) Others*	24,76,306	50,86,695	41,31,688	71,60,638
2. Income Accured				
a) On Investment from Earmarked/Endowment Funds	12,673		60,080	
b) On investments - others	8,33,389	8,46,062	28,25,031	28,85,111
3. Claims Receivable				
a) TDS	29,07,408		7,78,956	
b) Interst receivable	-		19,46,300	
c) Grant receivable from SERB	5,00,000		-	
d) Security Deposit	38,500	34,45,908	38,500	27,63,756
Total (B)		**93,78,665**		**1,28,09,505**
* Advances out of DST Grant treated as utilisation during the Year		(44,06,656)		(66,38,638)
** Advances out of SERB Grant for -Collaborative Initiative treated as utilisation during the Year		(6,80,039)		(5,22,000)
Total		**6,49,43,026**		**8,82,23,679**

(Bhuwan Adhlakha)
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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 12 - Income from Sales/Services	Current Year 2023-24	Previous Year 2022-23
1) Income from Sales		
a) Sale of Finished Goods	-	-
b) Sale of Raw Material	-	-
c) Sale of Scrap	-	-
		-
2) Income from Services		
a) Labour and Processing Charges	-	-
b) Professional /Consultancy Services	-	-
c) Agency Commission and Brokerage	-	-
d) Maintenance Services (Equipment/Property)	-	-
e) Others (Specify)	-	-
Total	Nil	Nil

(Bhuwan Adhlakha)
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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

Schedule 13 - Grants/Subsidies (Irrevocable Grants & Subsidies Received)	Current Year 2023-24	Previous Year 2022-23
1. Central Government -Department of Science and Technology	2,99,80,187	5,05,41,130
2. Government Agencies		
SERB Grant for Abdul Kalam Technology Innovation National Fellowship Scheme	8,54,67,028	7,29,76,127
SERB Grant for Digital Gaming Research Initiative	4,13,51,797	28,09,559
SERB Grant for Collaborative Initiative	66,81,141	69,84,841
AICTE Grant for Distinguished Visiting Professor Scheme	-	4,51,093
AICTE Grant for Travel Grant (TG) Scheme	-	2,00,631
DST-India Taiwan Cooperation in S&T Program	1,59,51,605	-
3. Other		
Contribution received from ISRO HQ-Engineers Conclave 2022	-	4,00,000
Contribution received from SERB-INAE Annual Convention	5,00,000	5,00,000
Surplus of Engineers Conclve 2022 received from Organising Comm. ISRO-LPSC Trivendrum	-	11,00,000
Total	**17,99,31,758**	**13,59,63,381**

Schedule 14 - Fees/Subscriptions	Current Year 2023-24	Previous Year 2022-23
1. Annual fees/ Subscriptions		
Institutional Membership fees - Diamond	1,20,00,000	-
Institutional Membership fees - Coral	2,00,000	-
Total	**1,22,00,000**	-

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SCHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

Schedule 15 - Income From Investments (Income On Invest.From Earmarked/Endowment Funds Transferred To Funds)	Investment from Earmarked		Investment - Others	
	Current Year 2023-24	PreviousYear 2022-23	Current Year 2023-24	PreviousYear 2022-23
1. Others (Interest from Term Deposit)	20,394	82,117	92,474	24,79,520
Total	**20,394**	**82,117**	**92,474**	**24,79,520**
Transferred To Earmarked/Endowment Funds	**20,394**	**82,117**	**92,474**	**24,79,520**

Schedule 16 - Income From Royalty, Publication Etc.	Current Year 2023-24	PreviousYear 2022-23
1. Income from Royalty	3,35,292	3,80,821
Total	**3,35,292**	**3,80,821**

Schedule 17 - Interest Earned	Current Year 2023-24	PreviousYear 2022-23
1. On Term Deposits:		
a) With Scheduled Banks	1,70,17,108	65,24,706
2. On Savings Accounts:		
a) With Scheduled Banks	41,17,883	67,42,627
Total	**2,11,34,991**	**1,32,67,333**
Note - Tax deducted at source to be indicated	17,01,711	6,52,471

Schedule 18 - Other Income	Current Year 2023-24	PreviousYear 2022-23
1) Profit on Sale/disposal of Assets: (Net)		
a) Owned Assets	-	(616)
2) Miscellaneous Income	8,282	59,407
3) Institutional Overhead collected on implementation of Schemes	25,00,000	20,71,511
4) Research and experimental development overhead	6,83,360	-
5) Deffered revenue Grant (AS12) -Depreciation on asset out of Grants	18,54,587	-
6) Withdrawal form Roddam Narasimha MLEF	25,000	-
7) Prior period income 2022-23	60,31,625	-
8) Rents	16,16,390	5,27,800
Total	**1,27,19,244**	**26,58,102**

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(Amount in Rs.)

SCHEDULE 19 - Increase/(Decrease) in Stock of Finished Goods & Work in Progress	Current Year 2023-24	Previous Year 2022-23
a) Closing Stock		
- Finished Goods	-	-
- Work-in-progress	-	-
b) Less: Opening Stock		
- Finished Goods	-	-
- Work-in-progress	-	-
NET INCREASE/(DECREASE) [a-b]	Nil	Nil

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INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

Schedule 20 - Establishment Expenses	Current Year 2023-24	PreviousYear 2022-23
1. Salaries and Wages	1,13,66,047	1,55,31,963
2. Contribution to NPS out of DST Grant (12.80%)	13,20,294	27,29,505
3. Contribution to Gratuity and Leave Encashment	10,92,715	2,77,164
4. Staff Welfare Expenses	-	42,500
5. Leave Travel Concession (LTC)	20,672	1,62,548
Sub-total	**1,37,99,728**	**1,87,43,680**
Add: Contribution to NPS out of Internal Resource (1.20%)	1,23,780	5,96,179
Add: Contribution to Gratuity and Leave Encashment out of Internal Resource	8,69,680	10,19,902
Total	**1,47,93,188**	**2,03,59,761**

Schedule 21 - Other Administrative Expenses Etc	Current Year 2023-24	PreviousYear 2022-23
1. Electricity and power	6,13,557	4,53,320
2. Water Charges	37,746	26,666
3. Insurance	31,483	31,484
4. Repairs and maintenance	4,61,163	14,38,375
5. Rent, Rates and Taxes	88,244	68,603
6. Postage, Telephone and communnication Charges	1,35,593	6,58,155
7. Printing and Stationary	2,18,535	1,29,737
8. Travelling and Conveyance Expenses	20,874	16,809
9. Subscription Expenses	1,94,700	1,77,000
10. Auditors Remuneration	82,600	70,800
11. Professional Charges	13,13,698	11,81,601
12. General Expenses	1,20,338	1,37,237
13. Bank Charges	5,443	2,031
14. Books and Periodicals	1,600	2,910
15. Nikshya Mitra Contibution	1,980	1,733
16. Training of Staff	33,000	19,454
17. Advetisement and Publicity	75,885	14,063
Total	**34,36,438**	**44,29,978**

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

Schedule 22-A -Engineering Programmes and Activities out of DST Grant Etc.	Current Year 2023-24		Previous Year 2022-23	
	Details	Total	Details	Total
Expenditure on INAE Seminars/Conferences/Symposiyum/Workshops				
Conferences :-		21,02,603		24,35,302
INAE Youth Conclave/National Science Day Release of Compendiums	-		70,818	
INAE Foundation Day	52,585		13,91,121	
Engineers Conclave	20,50,018		9,73,363	
Symposium:-		-		14,55,925
Innovation in Manufecturing Practices (IMP)	-		2,12,355	
National Frontiers of Engineering	-		12,43,570	
Seminars :-		5,17,070		4,13,220
Online Exposition of Innovation by Startups @NIT, Calicut	-		4,13,220	
Brain stroming meet - Mumbai chapter	45,020		-	
Brain stroming meet on Mission Vision - Banglore	2,16,719		-	
India International Science Festival	2,12,261		-	
Session on Innovative Pathways for Hydrogen Development	43,070		-	
Workshops/Events:-		2,89,627		8,23,622
Roddam Narasihma Memorial Endowment Lecture	25,000		-	
INAE-NAEK Workshop on High Temp Materials, Kolkata	2,15,212		4,89,972	
Participation in International Tradefare @DST Pavallion, New Delhi	-		3,05,877	
INAE- Local Chapter Mumbai	500		1,200	
IEH- Metallurgy	6,903		-	
INAE- Local Chapter Bangalore	1,366		7,155	
INAE- Local Chapter Delhi	33,990		6,244	
INAE - Local Chaper Exp- Kolkata	6,656		-	
INAE- Local Chapter Kanpur- 100 Second Vedio Competition	-		13,174	
INAE Schemes		21,53,508		50,89,730
Distinguished Techonologists / Professors	3,90,000		36,00,000	
INAE Chair Professorships	7,20,000		10,58,516	
Mentoring of Engineering Teachers	1,30,286		1,12,370	
Mentoring of Engineering Students	72,000		2,94,324	
INAE Travel Grant Scheme	-		24,520	
Frugal Innovation Nurturing Programme- FINP	8,41,222		-	
Research Studies / Projects		3,46,873		28,23,299
Expert Group By Prof. DN Singh on Industrial By Product for Sustainable Infistructure Development	-		1,703	
Expert Group By Prof. Jayanta Bhattacharya on IRRI of Automationon Mineral Sector	-		2,40,476	
INAE Satish Dhawn Chair of Engineering Eminence	-		13,50,000	
Expert Group Microwave-THz Wave Tech- Lalit Kumar	3,46,873			
Landmark Compendiums on Aazadi ka Amrit Mahotsav	-		12,31,120	
INAE Forums		61,239		-
Academy Meetings		13,86,016		15,21,785
Annual Convention		28,92,230		24,54,263
International Affairs		19,74,929		11,03,904
INAE Publications		1,76,018		7,18,979
INAE Digital Platform Maintaince		32,21,917		22,94,697
Advances towards Engineering Programmes and activities		44,06,656		66,38,638
Total		**1,95,28,685**		**2,77,73,363**

P K M B & Co. Chartered Accountants Jasola, New Delhi

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 22-B -Expenditure out of SERB Grant for Abdul Kalam TIN Fellowship Scheme	Current Year 2023-24		Previous Year 2022-23	
	Details	Total	Details	Total
SERB-INAE Abdul Kalam Technology Innovation National Fellowship		8,54,67,028		7,29,76,127
Abdul kalam TIN Fellowship- Research Grant	8,39,04,681		7,18,23,078	
Abdul kalam TIN Fellowship- Advt	98,991		42,668	
Abdul kalam TIN Fellowship- Manpower	7,34,221		6,16,081	
Abdul kalam TIN Fellowship- Misc exp	1,93,721		1,00,000	
Abdul kalam TIN Fellowship- Meetings	5,35,414		3,94,300	
Total		**8,54,67,028**		**7,29,76,127**

SCHEDULE 22-C -Expenditure out of SERB Grant for Digital Gaming Research Initiative	Current Year 2023-24		Previous Year 2022-23	
	Details	Total	Details	Total
SERB-INAE Digital Gaming Research Initiative		4,13,51,797		28,09,559
SERB-INAE Digital Gaming Conclave	-		17,62,899	
SERB-INAE Digital Gaming -Advertisment	49,713		46,660	
Digital gaming - Expense Research Grant - General	1,67,56,660		-	
Digital gaming - Expense Research Grant - SC	6,45,000			
Digital gaming - Expense Research Grant - Capital	2,14,28,549			
Digital gaming - Expense Research Grant - Manpower	18,42,084			
Digital gaming - Expense Research Grant - Meeting	6,29,791			
SERB-INAE Digital Gaming -Technical Service & Const	-		10,00,000	
Total		**4,13,51,797**		28,09,559

SCHEDULE 22-D -Expenditure out of SERB Grant for Collaborative Initiatives in Engineering	Current Year 2023-24		Previous Year 2022-23	
	Details	Total	Details	Total
SERB-INAE Collaborative Initiative in Engineering				
i. SERB-INAE Conclave -Atmanirbhar Technologies - Engineering Secured Future		16,95,386		18,97,293
a. Youth Conclave on Technology Self Reliance during Sept 15-18, 2022 at IIT Jodhpur	-		15,47,293	
b. Engineering Secured Future Nov 05-06, 2022 at IIT Kanpur	-		3,50,000	
c. SERB-INAE Atmanirbhar Technology Initiative - NatFoE 2023	16,95,386		-	
ii. SERB INAE Women Engineers Program		7,18,671		5,98,048
a. Workshop on Writing R&D Proposals for Women Engineers During Nov 10-11, 2022 at IIT Tirupati	-		4,90,011	
b. Workshop on Writing R&D Proposals for Women Engineers during Feb 23-24,2023 at IIT Gandhinagar	-		1,08,037	
c. Symphosium in North-East for Young Women - Tezpur University	1,96,439		-	
d. Women WS on Sustainibility in Water & Environment - IIT Banaras Hindu University	5,22,232		-	
iii. SERB-INAE Outreach Programs for NE, J&K and Ladakh		13,37,052		14,51,577
a. Innovation Contest and showcasing during Nov 3-5, 2022 NIT Arunachal Pradesh	-		3,92,048	
b. Outreach Prog Sept 26-30, 2022 NIT Mizoram	-		3,71,674	
c. Skill Development Idea to Prototype during Nov. 26-30, 2022 at NIT Nagaland	-		3,01,051	
d. Outreach Prog Feb 1-2,2023 at NIT Manipur	-		3,86,804	
e. Entp & Skill development WSRT startups- University of Ladakh	4,09,934			
f. Workshop on Pedagogy Training for Teaching- IIT Guwahati	3,95,619			
g. Workshop on Self Employmnt - NIT Silchar	2,91,456			
h.Workshop on Skilling, Reskilling & Upskilling - NIT Srinagar	2,40,043			
iv. SERB-INAE Innovation Hackathon		14,99,993		17,65,923
a. SERB-INAE Hackathon during Sept 3-4, 2022 at Jadavpur University	-		4,00,000	
b. Gaming JAM during Sept 15-18, 2022 at IIT Jodhpur	-		13,65,923	
c. Conclave	14,99,993		-	
v. Institutional Overheads		7,50,000		7,50,000
Advance for Workshops		6,80,039		5,22,000
Total		**66,81,141**		**69,84,841**

P K M B & Co. Chartered Accountants Jasola, New Delhi

(Bhuwan Adhlakha)
Manager (F&A)

INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

SCHEDULE 22-E -Expenditure out of AICTE Gtant for Distinguished Visiting Professorship Scheme	Current Year 2023-24		PreviousYear 2022-23	
	Details	Total	Details	Total
AICTE-INAE Distinguished Professorship Scheme		-		4,51,093
Payment of Honorarium to Distinguished Professors	-		3,34,374	
Secretarial Assistance for Overheads	-		1,16,719	
Total	-	-		4,51,093

SCHEDULE 22-F -Expenditure out of AICTE- INAE Travel Grant Scheme	Current Year 2023-24		PreviousYear 2022-23	
	Details	Total	Details	Total
AICTE- INAE Travel Grant Scheme		-		
Reimbursement to Students under Travel Grant Scheme	-		95,839	2,00,631
Secretarial Assistance for Overheads	-		1,04,792	
Total		-		2,00,631

SCHEDULE 22-G - Expenditure out of India-Taiwan S&T Cooperation Program	Current Year		PreviousYear	
	Details	Total	Details	Total
Disbursement of Research Grant		1,38,72,628	-	-
IIT Guwahati-Dr. Sudip Biswas	16,24,834			
IIT Guwahati-Dr. gopinandan Kalon	16,70,834		-	
IIT Guwahati-Dr. Ankush Barg	16,77,334		-	
IIT Guwahati-Dr. Kuntal dheka	15,58,834		-	
IIT Jammu - Dr. satya shekar bhogilla	7,05,834		-	
Indian institute of Science - Prof.Prabal k. Maiti	20,34,634		-	
SSN college of Engg. Chennai-Dr. Manikaran Srinivа	4,15,500		-	
IRD Accounting IITD-Dr. Bhani Ray	8,95,490		-	
IRD Accounting IITD-Dr. Leena Nebhani	11,11,500		-	
Pondichery university Dr. Mohane Coumar	11,05,000		-	
Registrar CUSAT - Dr. Preetham Elumalai	10,72,834		-	
Administrative Expenses		18,26,000		
India- Taiwan PEMC Meeting	76,000			
Program Implemtation Fee -Overheads to INAE	17,50,000			
India- Taiwan Joint Committee Meeting	2,52,977	2,52,977	-	
Total		1,59,51,605		-

SCHEDULE 22-H -Expenditure towards Administative Overheads	Current Year		PreviousYear	
	Details	Total	Details	Total
INAE-IIT Jodhpur Joint Outreach Activity Centre		1,73,908	-	-
R&E Conveyance exp	5,412			
R&E Electricity Exp	14,382		-	
R&E office maintenance	1,54,114			
Overhead Expenditure on Taiwan S&T Cooperation Program	40,000	40,000	-	-
SERB-INAE Collaborative Initiative Overhead Exp on Manpower cost	1,52,903	1,52,903	-	-
Total		3,66,811		-

P K M B & Co. Chartered Accountants Jasola, New Delhi

(Bhuwan Adhlakha)
Manager (F&A)

INDIAN NATIONAL ACADEMY OF ENGINEERING, NEW DELHI

SCHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31ST MARCH, 2024

(Amount in Rs.)

Schedule 23 - Interest	Current Year 2023-24	Previous Year 2022-23
a) On Fixed Loans	-	-
b) On Other Loans (including Bank Charges)	-	-
c) Interest accrued on DST Grants- added in unspent DST Grant	53,08,403	21,112
d) Interest accrued on SERB Grant for Abdul Kalam TIN Fellowship-added in unspent SERB Grant	20,47,305	6,80,383
e) Interest accrued on AICTE Grant for DVP Scheme-added in unspent AICTE-DVP Grant	-	-
f) Interest accrued on AICTE Grant for TG Scheme-added in unspent AICTE-TG Grant	-	18,760
g) Interest accrued on SERB Grant for Digital Gaming Research Initiative	1,25,95,499	86,77,671
h) Interest accrued on SERB Grant for Collaborative Initiative	1,59,072	90,271
Total	**2,01,10,279**	**94,88,197**

(Bhuwan Adhlakha)
Manager (F&A)

P K M B & Co. Chartered Accountants Jasola, New Delhi

INDIAN NATIONAL ACADEMY OF ENGINEERING

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2024

Schedule-24

ACCOUNTING POLICIES

1. **Basis of Accounting**
   These accounts are prepared on the basis of historical cost convention and on the accrual method of accounting.

2. **Grant-in-aid**
   Grant received from the Department of Science & Technology and others are accounted to the extent utilized and unspent grant has been shown under current liabilities. Grants relating to fixed assets have been shown under Income and Expenditure Account and its utilization has been transferred to fixed assets under section 11(1) of the Income Tax Act, 1961.

3. **Fixed Assets**
   Fixed Assets are stated at cost of acquisition including inward freight, duties and taxes and direct expenses related to acquisition.

4. **Depreciation**
   Fixed Assets are depreciated on written down value according to Deferred Income Method as per Accounting Standard (AS)-12. Depreciation is calculated as per following rate prescribed in Income Tax Rules

Building	: 10%	Office Furniture	:10%
Office Equipment	:15%	Computers	:40%

   However, no depreciation has been provided on assets purchased from 01.04.2017 and applied u/s 11(1) of The Income Tax Act, 1961 and in fixed assets schedule it has been shown as utilization under section 11 (1) of Income Tax Act 1961.

5. **Interest on Investments**
   Interest is earned on two types of Investments, one against Corpus and General Funds and the other against Earmarked Funds. The interest earned on all the mentioned funds is included in Income and Expenditure account and thereafter interest related to Corpus and Earmarked Funds is transferred to respective funds.

6. **Gratuity & Leave Encashment**
   Provision for Gratuity is made as per the payment of Gratuity Act, 1972 and provision for accumulated leave and encashment is made on the basis of number of days of leave accumulated for employee. Actuarial valuation is not made to ascertain such liability.

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Schedule-25

CONTINGENT LIABILITIES AND NOTES TO ACCOUNTS

1. During the year the office of Principal Director of Audit (Environment & Scientific Division) conducted an inspection on compliance audit for the period from 2017-18 to 2021-2022. The report majorly indicates the following liabilities which may devolve on the Trust:

   A) Rs. 8.87 crores lying under corpus fund & General fund with INAE in contravention to the directions for the creation of such funds by Government of India.
   This matter was deliberated in INAE Governing Council on March 21, 2024 and it was decided to comply with the directions of audit and transfer the following to CFI:

      a) An amount of Rs. 5,06,33,990/- available in INAE Corpus Fund as on 31.3.2022 comprising of interest earned on corpus fund balance and voluntary contributions to be transferred to Consolidated Fund of India through Bharat Kosh. To close INAE Corpus Fund as at 31st March 2024, the balance amount of Rs. 50,90,085/- pertaining to INAE Corpus Fund has been shown as payable to DST under current liabilities.

      b) Other funds available with INAE on 31.03.2022 amounting Rs. 3,80,67,098/- also to be transferred to Consolidated Fund of India through Bharat Kosh, which consisted of following two components, namely:
         i) Balance of accumulated depreciation as on 31.3.2022 of Rs. 3,34,03,328/- set apart against interest earned;
         ii) Accumulation of surplus out income over expenditure due to voluntary contributions, sponsorships of events and interest on INAE General Fund during the financial years from 2015-2022 amounting to Rs. 46,63,770/- available in INAE General Fund; and
         iii) The accretions during FY 2022-23 due to depreciation and accretions FY 2022-23 & 2023-24 due to interest earned on savings bank balance & investments are shown as payable to DST under current liabilities.

      Accordingly, INAE deposited Rs. 5,06,33,990/- vide transaction ref No 2603240026332 and Rs. 3,80,67,098/- vide transaction reference No 2603240027520 both dated 29 March 2024 in Bharat Kosh.

   B) Rs. 0.26 crores lying unspent with Digital Knowledge Resource Centre (DKRC) Fund, not created with due approval.

      As per the direction received from Principal Director of Audit (Environment & Scientific Division), the DKRC Fund is closed and an amount of Rs. 26,82,863/- (i.e. the unspent balance as on 31 Mar 2022, Rs. 26,12,303/- along with interest for FY 2022-23,

P K M B & Co. Chartered Accountants Jasola, New Delhi

Rs.70,533/-) has been refunded by depositing this amount to CFI through Bharat Kosh, vide UTR No. SBIN423335064642 dated 1st Dec 2023.

2. Refunds received against the advances & project expenditure during Previous year amounting to Rs. 16,08,333/- will be surrendered to DST, which has been credited to 'Payable To DST' for further transfer of funds to Consolidated fund of India through 'Bharat Kosh'. Accordingly total payable to DST is an amount of Rs.1,31,75,392/-, as per the details given below:

Details	**Amount (Rs.)**
Return of Honorarium -Prof. Hari Hablani, Dist. Technologist- IIT Indore	9,00,000
Return of unspent amount by CSIR-CEERI, Pilani- Expert Group by Prof. Lalit Kumar	27,787
Return of Rolling Advance by M/s Balmer & Lawrie	2,00,000
Return of Unspent Balance from NIAS- FINP	4,80,546
Interest transferred to Old Corpus fund for FY 2022-23	24,79,520
Depreciation for FY 2022-23	20,49,835
Interest out of Surplus transferred to General Fund 2022-23	17,29,301
Interest Payable to DST for FY 2023-24	
Interest Payable to DST - old Corpus Fund investments	26,10,565
Interest Payable to DST - General Fund Investments	26,48,364
Interest Payable to DST - Unspent DST	1,578
Interest Payable to DST - Unspent DKRC Development Fund	47,896
Total	**1,31,75,392**

3. Balance Sheet and Income and Expenditure account have been prepared as per uniform format of accounts for Central Autonomous Bodies prescribed by the committee of expert constituted with the approval of Hon'able Finance Minister.

4. Figures in Income and Expenditure Account and Balance Sheet have been given as applicable to INAE as per uniform format. Utilization against the grants has been shown under schedule 22A to H, this includes expenditure incurred and advances given for activities/programs.

5. During the year ended March 31, 2024 a sum of Rs. 10,00,000/- has been received from DST as Grant-in-aid towards capital asset creation as allocation through Treasury Single Account (TSA) in RBI Zero Balance Account. Out of the said balance, a sum of Rs. 9,97,960/- has been utilized towards procurement of Fixed Assets and balance amounting Rs. 2,040/- remained unspent and surrendered/Lapsed to CFI at the end of March 31, 2024.

6. The balance of security deposits and advances are subject to confirmation/reconciliation.

7. A) During the Governing Council meeting held on June 13, 2019 it was informed that the implementation of the Recommendations of the 7th Central Pay Commission for INAE employees applicable from January 01, 2016 was pending due to the fact that the relevant letter

P K M B & Co. Chartered Accountants Jasola, New Delhi

from DST has not yet been received till date. The matter was being pursued earnestly by INAE with DST.

Under the circumstances, the Governing Council considered to pay the interim relief and accordingly, an amount of Rs.1,16,03,895/- has been withdrawn towards payment of Interim Relief as arrears (contingent upon implementation of the Recommendations of 7th Central Pay Commission) from Jan 1, 2016 to May 31, 2019 amounting Rs.90,97,616/- and interim relief as additional monthly recurring expenditure amounting Rs. 25,06,279/- (against the total additional monthly recurring expenditure of Rs. 42,00,170/- after charging off Rs.10,00,000/- as manpower grant from SERB under Abdul Kalam TIN Fellowship and Rs.6,93,891/- as Secretarial Assistance grant from AICTE.)

Since INAE had applied to Department of Science and Technology (DST) for sanction of Grant and pending release of this grant, the sum of Rs. 1,16,03,895/- had been drawn from INAE Corpus Fund and the same was to be recouped on receipt of the above grant from DST.

B) Subsequently, DST raised an observation for giving interim relief akin to 7th CPC benefits to INAE staff, the interim relief being granted to INAE Staff was stopped w.e.f. July 01, 2020 and pay is being released as per 6th CPC scales. This was ratified by INAE Governing Council in 136th Meeting held on August 24, 2020 vide item no.12 of minutes. Interim relief for July 01, 2020 onwards, if any, will be accounted for after release of Grant from DST.

8. Investment from earmarked/endowment funds includes Rs. 3,10,000/- towards Prof Roddam Narsimha Memorial Lecture Endowment Fund created out of contribution received from INAE Bengaluru Chapter and Rs. 20,00,00,000/- out of grant received from SERB for digital gaming research initiative in from of Term deposit with SBI. Investment (others)- Term Deposit amounting to Rs.42,00,000/- with SBI taken out of New Corpus Fund generated through individual donations/voluntary contributions with specific direction, Term deposits amounting Rs.1,18,00,000/- against collections from Institutional Memberships and Term Deposits amounting Rs.1,20,00,000/- against provision for gratuity and leave encashment have been included in investment (others).

9. In view of direction received from DST for disengagement in terms of release of grant-in-aid w.e.f. 31.03.2025, to attain self-sufficiency in long run, INAE has resorted for collections from Institutional Memberships. The option under Section 11(2) of the Income Tax Act, 1961 to accumulate surplus to the tune of Rs.1,22,00,000/- out of the incomes generated form internal resources (not being grants-in-aid from DST) is being exercised by INAE for utilization of such accumulated amount during the next 5 financial years for furtherance of the objectives of INAE including support establishment and administrative expenditure. Notice to the Assessing Office in Form No. 10 shall be given accordingly.

P K M B & Co. Chartered Accountants Jasola, New Delhi

10. Utilization certificates are being received from Research Scholars on term year end basis in place of financial year end basis, in respect of the expenditure of Rs. 8,39,04,681/- on SERB-INAE Abdul Kalam Technology Innovation National Fellowship, Rs.3,88,30,209/- on SERB-INAE Digital Gaming Research Initiative and Rs.1,38,72,628/- on DST, India-Taiwan Cooperation in S&T Program.

11. During the previous financial year, the following Grant-in-aid had been received from Science and Engineering Research Board (SERB) and carry forward of these grants for expenditure during FY 2023-24 was granted towards new collaborative initiatives, unspent balances of which along with interest have been shown under Schedule-7:
    a) Grant-in-aid towards SERB-INAE Abdul Kalam TIN Fellowship – Rs.1.06 Crore/-
    b) Grant-in-aid towards SERB-INAE Digital Gaming Initiative – Rs. 21.84 Crore/-
    c) Grant-in-aid towards SERB-INAE Collaborative Activities – Rs. 0.09 Crore/-
    d) Grant-in-aid towards DST, India Taiwan Cooperation in S&T Program- Rs. 0.05 Crore/-

12. During the year 2022-23 the approval for creation of a new Corpus Fund from INAE's own resources (internal accruals) had been received from Department of Science and Technology (DST), vide letter dt March 24, 2023. Accordingly, a new bank account no. 41790835603 in the name of INAE Corpus Fund was opened on March 29, 2023 with approval of 146th INAE Governing Council on Mar 27, 2023.

    During the year a sum of Rs. 40.14 Lakhs has been received from INAE fellows as voluntary contributions with specific direction as corpus fund contribution.

13. Figures are rounded off to Rupees.

14. Previous year's figures have been re-grouped/aligned, where ever found necessary.

For **P K M B & Co.**
Chartered Accountants
Firm Reg. No.: 005311N

P K M B & Co. Chartered Accountants Nasola, New Delhi

Mayank Gaur
Partner
Membership No.: 518183

Place: New Delhi
Date: 28-06-2024

On behalf of the Council

President:

Vice-President:
(Finance & Establishment)

Deputy Executive Director:

Manager (F&A):

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