



Indian National Academy of Engineering

ANNUAL REPORT
2013 - 14

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Foreword

It has been my constant endeavour as President, Indian National Academy of Engineering to lay the foundations of following a path of continuous improvement and reinforcing good practices and traditions. Concerted efforts have been made towards enhancing the visibility of the Academy to the Government, Industry, R&D and educational institutions and the society, at large. The only constant being change; new and innovative approaches have been deployed in conduct of the activities and functioning, thereby increasing the outreach to the scientific community and society.

The increased connectivity of INAE with policy makers and key players in industry, R&D and academia from India and abroad, being vital to realize the paradigm changes in terms of technological advancement in the country; specific programmes have been initiated in this direction. Collaborative activities have been with various departments/Agencies like Planning Commission and Scientific Advisory Committee to the Cabinet (SAC-C). Consequent to the signing of MoUs with Member academies of CAETS, INAE has initiated programs on specific areas which would be progressed further so as to achieve meaningful collaboration on the identified topics. Specific engagements for a period of five years on the selected topics have been materialized through the conduct of joint seminars/conferences and further collaborative activities with these foreign academies.

An important milestone in the history of INAE is the acquiring of its own office space at Gurgaon this year, which is functional and operational. This is a step in the pathway of achieving effective contributions, facing the challenges and creating a better eco-system and work environment. It is also planned to set up a Digital Knowledge and Research Centre at the office at Vishwakarma Bhawan, New Delhi.

INAE has also taken an initiative of organizing an annual mega event of engineers as “Engineers Conclave” starting from the year 2013 to be organized jointly with the strategic departments on rotation basis. The first “Engineers Conclave” was held jointly with DRDO during Sep 17-19, 2013 at New Delhi during which Shri Pranab Mukherjee, Hon’ble President of India was the Chief Guest during the Inaugural Function. The recommendations of the deliberations during the Conclave were sent to the concerned Ministries and Government Departments and agencies for necessary follow-up actions. This event is envisaged to be an annual flagship event of the Academy.

The Fellowship being a body of eminent engineers and scientists, the success of all programmes and activities is attributed to the synergistic and significant contributions and commitment of the Fellows. INAE is indeed a platform through which the Fellows can interact with their peers from the world and create a mechanism for achieving engineering excellence and wealth in the country. In order to increase the competitiveness of our industries, it is envisaged to create an Industry Forum. This Forum shall work towards held in realizing the dreams of increasing the involvement of captains from industry in the activities of INAE and in widening the scope and outreach of the Academy in Industry. Needless to say that this shall also provide a platform to study successful examples elsewhere in the world and implement best industrial practices in India.

Engineering education being a key area of focus of INAE, Outstanding Teachers Awards have been instituted to honour INAE Fellows who have excelled in the field of teaching in Indian Colleges, Universities, and Institutions, and have provided guidance and inspired students to take up careers in Engineering and Technology.

Two new Forums have also been instituted by INAE. The INAE Forum on Technology Foresight and Management has the mandate of addressing national challenges and INAE Forum on Engineering Interventions for Disaster Mitigation is working on identifying key areas for disaster risk mitigation and management, where INAE can play a role. These forums enable giving inputs to policy makers, institutes of higher learning & research, industries, etc and also provide a platform for collaborations with Academies of Sciences in India and Academies of Engineering abroad in the framework of CAETS.

India is on the path of economic growth with large aspirations to emerge as power house of excellence in engineering and technology. Engineers shall play an unparalleled role in making this happen. We need to be involved in this endeavour to transform and take India to new heights and glory. We, the Fellows of the Academy, with our rich experience and expertise can play a catalytic and direct role in this transformation with our commitment and convictions to help make this dream a reality in next ten years.

I wish the Fellows success in all endeavours and bliss in life.



Baldev Raj
President

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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 & 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 such fields as may be necessary for 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 salient aims and objects of the Academy are given below.

- To promote and advance the practice of engineering and technology and the related sciences and disciplines and their application to problems of national importance.
- To disseminate information on all matters pertaining to 'Engineering' by publishing proceedings, journals, memoirs and by holding meeting, lectures, seminars, symposia etc.
- To interact with professional bodies, engineering and scientific academies etc. already established or as may be established in future in India and abroad.
- To represent at all academic forums, research and development activities on 'Engineering' in India and abroad.
- To promote the National Policy on Education of the Government of India.

- To offer the Government of India, the Local Governments and others, facilities for conferring with and ascertaining the views of 'Engineers' pertaining to 'Engineering' and to confer with the said Governments and others in cooperation with fraternal professional bodies
- To encourage inventions, investigations and research and promote their applications for development of both organised and unorganised sectors of the national economy.
- To institute and establish Professorship, Fellowship, Studentship, Scholarship, Awards and other benefactions and to grant Certificates of Competency and Charter whether under any Act of Government of India or otherwise howsoever.

INAE Governing Council for the Year 2014

	President	Dr. Baldev Raj, President-Research, PSG Institutions, Coimbatore.
	Immediate Past President	Dr. PS Goel, Prof. M.G.K Menon DRDO Chair, Honorary Distinguished Professor, ISRO, Research Centre Imarat (RCI), Hyderabad
	Vice-President <i>(Academic, Professional & International Affairs)</i>	Dr. KV Raghavan, INAE Distinguished Professor, Reaction Engineering Laboratory, Indian Institute of Chemical Technology, Hyderabad
	Vice-President <i>(Fellowship, Awards & Corporate Communication)</i>	Dr. BN Suresh, Vikram Sarabhai Distinguished Professor, Bangalore
	Vice-President <i>(Finance & Establishment)</i>	Dr. Sanak Mishra, Formerly Managing Director, Rourkela Steel Plant and Director, Steel Authority of India Ltd.(SAIL); formerly Vice-President, ArcelorMittal and CEO India Project.
	Chief Editor of Publications	Dr. Purnendu Ghosh, Executive Director, Birla Institute of Scientific Research, Jaipur
	Members Engg Section-I	Prof. Sudhir K Jain, Director, Indian Institute of Technology, Gandhinagar, Ahmedabad.
	Engg Section-II	Dr. AL Rao, Formerly Chief Operating Officer, Wipro Ltd, Bangalore
	Engg Section-III	Capt NS Mohan Ram, Adviser, TVS Motor Company Ltd., Hosur.
	Engg Section-IV	Prof. MS Ananth, Formerly Director, Indian Institute of Technology Madras, Chennai.
	Engg Section-V	Prof. SC Srivastava, Department of Electrical Engineering, Indian Institute of Technology, Kanpur
	Engg Section-VI	Prof. Ranjan K Mallik, Department of Electrical Engineering, Indian Institute of Technology Delhi



Engg Section-VII

Prof. Sanjay Mittal, Department of Aerospace Engineering,
Indian Institute of Technology Kanpur



Engg Section-VIII

Dr. CG Krishnadas Nair, Honorary President, SIATI, Vice-Chancellor,
MATS University, Bangalore



Engg Section-IX

Mr. HL Bajaj, Technical Member, Appellate Tribunal for Electricity,
New Delhi



Engg Section-X

Prof. Prasun K Roy, The Tata innovation Fellow & Principal Investigator,
Indian Brain Grid, National Neuro-Imaging Facility,
National Brain Research Centre, Gurgaon



Ministry of Science & Technology

Dr. V Rao Aiyagari, Advisor, Public Health Foundation of India, New Delhi



Indian National Science Academy

Prof. Anurag Sharma, Physics Department, Indian Institute of Technology, Delhi

Asiatic Society

Prof. Dilip Kumar Basu, Former Vice-Chancellor, University of Burdwan, W.B. and Tripura University



Indian Academy of Sciences

Prof. Manindra Agrawal, Department of Computer Science & Eng g., Indian Institute of Technology,
Kanpur.



National Academy of Sciences (India)

Prof. SC Dutta Roy, Formerly Professor, Dept of Electrical Engineering, Indian Institute of Technology,
Delhi.



Institution of Electronics and Telecommunication Engineers (IETE)

Dr. Surendra Pal, Prof. Satish Dhawan Professor & Senior Adviser, Satellite Navigation (ISRO), ISRO
Satellite Centre, Bangalore



The Institution of Engineers (India)

Prof. DV Singh, Former Director of IIT Roorkee and Former Vice-Chancellor, University of Roorkee.



Confederation of Indian Industry (CII)

Mr. Anjan Das, Executive Director – Technology, Confederation of Indian Industry (CII), New Delhi

INAE Committees

Sectional Committees

INAE has ten Engineering Sections representing the various branches of engineering, each of which is represented by the Sectional Committee comprising of a Convener and eight Members. The composition of the ten Sectional Committees are given below.

Sectional Committee-I

(Civil Engineering)

Convener

Prof. CVR Murty

Members

Dr. Nagesh R Iyer

Dr. S Chowdhury

Dr. VN Sharda

Prof. PL Bongirwar

Mr. N Raghavan

Prof S Mohan

Prof. Abhijit Mukherjee

Prof. Sriman Kumar Bhattacharyya

Sectional Committee-II

(Computer Engineering and Information Technology)

Convener

Prof. Y Narahari

Members

Prof. Vijay Chandru

Prof. Manindra Agarwal

Prof. Sanghamitra Bandyopadhyay

Prof. Rajeev Sangal

Dr. S Ramesh

Prof Kamla Krithivasan

Prof. C Pandu Rangan

Prof. JR Haritsa

Sectional Committee-III

(Mechanical Engineering)

Convener

Mr. SC Chetal

Members

Prof T Sundararajan

Prof. SK Das

Prof. JH Arakeri

Prof. K Muralidhar

Prof. K Ramesh

Prof. Kshitij Gupta

Dr. Sekhar Majumdar

Dr. R Mahadevan

Sectional Committee-IV

(Chemical Engineering)

Convener

Prof. DV Khakhar

Members

Dr. R Mukhopadhyay

Mr. KV Subramaniam

Prof. Deepak Kunzru

Dr. BM Reddy

Dr. Vivek V Ranade

Prof. KS Gandhi

Mr. DP Misra

Dr. AK Bhatnagar

Sectional Committee-V

(Electrical Engineering)

Convener

Prof. B Bandyopadhyay

Members

Mr. Mukesh Bhandari,

Prof. Soumitro Banerjee

Prof. VS Borkar

Prof. K Gopakumar
Dr. Chandan Chakraborty
Dr. VR Kanetkar
Mr. Manjit Singh
Prof. Sukumar Mishra

Sectional Committee-VI

(Electronics & Communication Engineering)

Convener

Prof. Anurag Sharma

Members

Dr. PV Ananda Mohan
Dr. VK Agrawal
Dr. BB Biswas
Dr. JN Roy
Prof. Souvik Mahapatra
Dr. Rajeev Shorey
Prof. UB Desai
Prof. B Sundar Rajan

Sectional Committee – VII

(Aerospace Engineering)

Convener

Mr. Avinash Chander

Members

Prof. Ranjan Ganguli
Prof. C Venkatesan
Dr. AR Upadhya
Mr. GS Reddy
Prof. RI Sujith
Dr. V Adimurthy
Prof. NK Naik
Prof. R Nagappa

Sectional Committee – VIII

(Mining, Metallurgical and Materials Engineering)

Convener

Prof. K Bhanu Sankara Rao

Members

Dr. AK Bhaduri
Prof. BS Murty
Dr. T Balakrishna Bhat
Dr. U Ramamurty
Dr. HS Maiti
Dr. GK Dey
Dr. Debashish Bhattacharjee
Dr. BK Mishra

Sectional Committee-IX

(Energy Engineering)

Convener

Mr. HL Bajaj

Members

Mr. RN Jayaraj
Dr. RS Yadav
Mr. Anil V Parab
Dr. Ajay Mathur
Mr. R Natarajan
Dr. RK Singh
Mr. M Rajan
Mr. PK Wattal

Sectional Committee-X

(Interdisciplinary Engineering and Special Fields)

Convener

Dr. V Rao Aiyagari

Members

Prof. Prasenjit Sen
Prof. Kripa Shanker
Prof. Chandra Shakher
Dr. V Jayaraman
Prof. AK Shukla
Prof. P Munshi
Prof. M Sharan
Prof. UC Mohanty

Other Committees

Finance Committee

Chairman

Dr. Baldev Raj

Members

Dr. PS Goel
Dr. Sanak Mishra
Dr. KV Raghavan
Dr. BN Suresh
Mr. VK Agarwal
Prof. SS Chakraborty
JS&FA, DST

Steering Committee – Research Schemes/Proposals

Chairman

Dr. KV Raghavan

Members

Dr. BN Suresh
Dr. Sanak Mishra
Mr. VK Agarwal
Dr. Purnendu Ghosh
Prof. Sanjay Mittal
Prof. Sukumar Mishra
Mr. HL Bajaj
Mr. VP Sandlas
Prof. AB Bhattacharyya
Prof. K Bhanu Sankara Rao

Steering Committee – AICTE-INAE Distinguished Visiting Professorship Scheme

Chairman

Dr. KV Raghavan

Project Coordinator

Prof. Sneh Anand

Members

Prof. Prem Krishna
Dr. CR Prasad
Dr. Purnendu Ghosh
Prof. SS Murthy
Prof. Manindra Agrawal
Rep – AICTE
Rep - CII

Convener

Brig SC Marwaha
(Advisor-Academic & Research)

Selection Committee - Life Time Contribution Award in Engineering, Professor Jai Krishna Memorial Award, Professor SN Mitra Memorial Award and Outstanding Teachers Award

Chairman

Dr. Baldev Raj

Members

Dr. KV Raghavan
Dr. BN Suresh
Dr. Sanak Mishra

Selection Committee – Young Engineer and Innovative Student Projects Awards

Chairman

Dr. BN Suresh

Co-Chairman

Dr. KV Raghavan

Members

Dr. NK Tyagi
Prof. SK Thakkar
Prof. Manindra Agrawal
Prof. B Yegnanarayana

Prof. S Narayanan
 Dr. Purnendu Ghosh
 Prof. PK Dash
 Dr. M Arunachalam
 Prof. Sukumar Mishra
 Dr. Rajeev Shorey
 Prof. NGR Iyengar
 Dr. AK Gupta
 Prof. BS Murty
 Prof. Prasenjit Sen
 Prof. Kehar Singh
 Prof. Sanjay Mittal
 Dr. Kamachi Mudali
 Prof. M. Sharan

Forum on Engineering Education

Chairman

Prof. Prem Krishna

Co-Chairman

Prof. R Natarajan

Members

Dr. Nagesh R Iyer
 Prof. S Narayanan
 Prof. NGR Iyengar
 Prof. PP Chakrabarti
 Prof. AB Bhattacharyya
 Dr. Rajeev Shorey

Forum on Microelectronics

Chairman

Dr. MJ Zarabi

Members

Prof. AB Bhattacharyya
 Prof. PP Chakrabarti
 Dr. Aloknath De
 Prof. JM Vasi
 Mr. AS Kiran Kumar
 Dr. G Venkatesh

Forum on Technology Foresight & Management

Chairman

Mr. VK Agarwal

Members

Prof. Prem Vrat
 Dr. YP Anand
 Dr. CR Prasad
 Mr. AK Anand
 Mr. KP Singh
 Mr. SC Gupta
 Mr. VN Mathur
 Mr. AK Gupta

Forum on Energy

Chairman

Dr. Baldev Raj

Members

Dr. KV Raghavan
 Dr. RR Sonde
 Prof. SS Murthy
 Dr. Ajay Mathur
 Dr. Purnendu Ghosh

Forum on Engg Interventions for Disaster Mitigation

Chairman

Dr. RK Bhandari

Members

Prof. Prem Krishna
 Prof. DV Singh
 Prof. SS Chakraborty
 Prof. CVR Murty
 Prof. DK Paul
 Ms Alpa Sheth
 Mr. VK Agarwal

Academy Activities

Seminars/Workshops/Conferences –National

Engineers Conclave

INAE has taken an initiative of organizing an annual mega event of engineers' viz. "Engineers Conclave" starting from the year 2013. This "Engineers Conclave" will be organized jointly by INAE with Department of Atomic Energy (DAE), Department of Space (DOS), Defence Research & Development Organization (DRDO) and Council of Scientific and Industrial Research (CSIR) on rotation basis. The Conclave shall provide a forum to discuss important national issues with respect to development in engineering science and technology, addressing policy issues for growth, requirement of faster pace of development, human resources etc. Engineers Conclave shall have tangible delivery in suggesting possible solutions to the policy makers of the country. Each conclave will have two themes. One theme is specific to the host department and other one specific to the social problem where engineering intervention is desired. These two issues will be focused from point of view of finding solutions and to formulate specific recommendations for action by the concerned government department and industry.

Engineers Conclave 2013

The first "Engineers Conclave" was held jointly with DRDO during Sep 17-19, 2013 at New Delhi. Shri Pranab Mukherjee, Hon'ble President of India was the Chief Guest during the Inaugural Function at Vigyan Bhawan, New Delhi on Sep 17, 2013. Dr PS Goel, Past-President, INAE delivered the Welcome Address. Shri Pranab Mukherjee, Hon'ble President of India, during his Inaugural Address highlighted that engineers play an important role in society and expressed that it is heartening to note that concern has been shown in an area such as Sunderbans. The Key note address during the Inaugural Session was delivered by Dr R Chidambaram, Principal Scientific Advisor to Government of India while Shri Avinash Chander, SA to RM spoke on the Theme of Engineers Conclave 2013.



Hon. President of India, Shri Pranab Mukherjee, Chief Guest at the Inaugural Function of Engineers Conclave 2013 at Vigyan Bhawan, New Delhi on Sep 17, 2013

The two themes for Engineers Conclave-2013 were **“Production and Manufacturing in Aerospace”** and **“Engineering Interventions in the Sunderbans”**. The sessions under the Theme I : “Production and Manufacturing in Aerospace” were on (i) Need of Manufacturing, what is to be done, (ii) Strategy to Achieve the Requirement, (iii) Policies and Processes and (iv) Way Ahead for Industry. The sessions under the Theme II: “Engineering Interventions in the Sunderbans” were on (i) Issues Related to Sunderbans - analysis of problems, (ii) Scientific studies on various interventions in Sunderbans and various bodies - related effect of global warming, migration etc, (iii) Engineering Interventions that can make a difference and (iv) Enabling the change. The speakers in the two parallel sessions under each theme comprised of leading experts and scientists from R&D, Government, academia and industry. During the conclave, there were three Plenary Talks by Prof. U.R. Rao, formerly Secretary, Department of Space; Dr Sivathanu Pillai, CEO & MD BrahMos Aerospace and by Secretary, Department of Defence Production.

Dr Baldev Raj, President, INAE participated in the Valedictory Function on Sep 19, 2013 at DRDO Bhawan, New Delhi and during his address he highlighted that the Conclave shall result in actionable recommendations which shall be forwarded by INAE to the concerned Departments/Ministries for necessary follow-up actions on the two themes of the conference. A Panel Discussion on each theme was held to arrive at specific recommendations as a follow-up of this event. The recommendations on the two themes, viz., theme-1 on “Production and Manufacturing in Aerospace” and theme 2 on “Engineering Interventions in Sunderbans” of the Engineers Conclave held on Sep 17-19, 2013 at New Delhi emanating out of the deliberations have been submitted to the concerned Departments/Ministries/Agencies for implementation. The recommendations pertaining to theme-1 on “Production and Manufacturing in Aerospace” and theme 2 on “Engineering Interventions in Sunderbans” have been progressed with the concerned Ministries/Departments.



Dr R Chidambaram, Principal Scientific Advisor to Govt. of India, Hon. President of India, Shri Pranab Mukherjee and Shri Avinash Chander, Scientific Advisor to Raksha Mantri at the Inaugural Function of Engineers Conclave 2013 at Vigyan Bhawan, New Delhi on Sep 17, 2013

Engineers Conclave 2014

Second Engineers Conclave 2014 is being organized jointly with Indian Space Research Organization (ISRO) in July 2014 at Bangalore. Dr. K Radhakrishnan, Chairman, Space Commission and Secretary, Department of Space has accepted to host the Engineers Conclave 2014 (EC 2014) and also to be the Chair for EC 2014 with Dr. Baldev Raj, President, INAE as Co-Chair. There will be two themes for Engineers Conclave 2014. Theme-1 on ***“Emerging Space Applications”*** would be coordinated by ISRO and Theme-2 on ***“Technologies for Hilly Regions”***, which would be coordinated by INAE. Dr. BN Suresh, Vikram Sarabhai Distinguished Professor, ISRO Headquarters, Bangalore and Vice-President, INAE has been nominated to chair the Programme Committee with Shri AS Kiran Kumar, Director, Space Application Centre (SAC), Ahmedabad as Chairman for Theme 1 on “Emerging Space Applications” and Dr. Ashwagosh Ganju, Director, Snow and Avalanche Study Establishment, Chandigarh as Chairman for Theme-2 on “Technologies for Hilly Regions”.

The sessions under Theme 1 on ***“Emerging Space Applications”*** are on (i) Energy, (ii) Climate, (iii) Weather, (iv) Early warning and (v) Communication and Navigation. Similarly, the sessions under Theme 2 on ***“Technologies for Hilly Regions”*** are (i) Mountain Weather, (ii) Gravity flows and Associated Hazards, (iii) Earthquake Hazards in Himalayan regions and its Mitigation, (iv) Glacier, snow cover, Water Management & Energy in Hill region and (v) Communications for Hazards condition in Hill regions. Chairpersons for each session have also been identified. The event will have an Inaugural Session followed by two parallel sessions on respective themes. Each theme would have five technical sessions followed by the Panel discussion at the end of each theme.

There will be three plenary talks which will be delivered by the dignitaries and a parallel meeting with key functionaries of the Government/Secretaries to Govt. of India will be organized to discuss the actual issues on the ground, the live problems and risk areas, so that the futuristic technological breakthroughs are achieved that are useful for the society in general and hilly areas in particular. The event will be concluded with the Valedictory Session.

Seminar on “Building Process Excellence in Manufacturing”

The Seminar on “Building Process Excellence in Manufacturing” jointly organized by INAE and Indian Institute of Technology Kharagpur in association with Bengal Chamber of Commerce and Industry (BCCI) was held on Jan 17-18, 2014 at BCCI Auditorium, Kolkata. Prof PL Narasimhan, FNAE and Prof MK Tiwari, FNAE of Department of Industrial Engineering and Management, Indian Institute of Technology Kharagpur were the Organizing Secretary and Convenor of the seminar respectively. The aim of the seminar was to bring focus to manufacturing activities that need to play a greater role in the development of the country. The seminar received an overwhelming response from key persons in industry who have emphasized on summer/winter internship of the students and close interaction with academics to work on some real life problems. During the Panel Discussion the suggestions/comments made by participants were deliberated upon and vital issues were addressed.

Seminars/Workshops/Conferences –International**IGSTC Workshop on “Strategies and Concepts for Advanced Manufacturing for Big Data”**

Indo-German Science and Technology Centre (IGSTC) workshop on “Strategies and Concepts for Advanced Manufacturing” was organized under the auspices of INAE and National Academy of Science & Engineering (acatech), Germany on Jan 23-24, 2014 at India International Centre, New Delhi. The objective of the workshop was to encourage sharing of the knowledge and expertise between Indian and German experts and create a platform for joint interaction and collaborations. The workshop was conducted in five technical sessions Viz. (i) Smart Factory; (ii) Human Factors; (iii) Framework and Infrastructure Conditions; (iv) Business Environment of the Smart Factory and (v) Technologies for Advanced Manufacturing.

Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India was the Chief Guest during the Inaugural Function which was also attended by Dr. Arabinda Mitra, Adviser, DST and Mr. Philip Petit, Science Counselor, German Embassy, New Delhi. Dr. Baldev Raj, President, INAE chaired the Valedictory Session wherein road map for Indo -German joint initiatives in the area of Advanced Manufacturing was deliberated upon. The German delegation consisted of twelve participants which included participants from German Industry. There was also active participation of speakers from Indian Industry like Mahindra & Mahindra, Reliance, Bharat Forge Ltd. etc. The outcome of the workshop was to build a road map for Indo -German joint initiatives in the area of Advanced Manufacturing. This was the second joint event conducted between INAE and acatech, the first being the Indo - German Workshop on “Big Data for Engineering Applications” which was held on Mar 14-15, 2013 at Berlin, Germany. INAE delegation participated in this workshop and fruitful interactions and collaborations were established consequent to the event.



Dr R Chidambaram, Principal Scientific Advisor to Govt. of India delivering Address at the IGSTC Workshop on “Strategies and Concepts for Advanced Manufacturing” jointly organized by INAE and acatech, Germany on Jan 23-24, 2014 at New Delhi



Dr Baldev Raj, President, INAE delivering Address at the IGSTC Workshop on "Strategies and Concepts for Advanced Manufacturing" jointly organized by INAE and acatech, Germany on Jan 23-24, 2014 at New Delhi



Dr. R. Chidambaram during the Inaugural Function

Valedictory Session in progress

Indo-UK Joint Meeting on “Virtual Manufacturing”

First Indo-UK Joint Seminar on “Functional and Energy Materials, Manufacturing and Structures (FAEMMS-2013)” was held on March 25-26, 2013 at University of Hyderabad which was organized jointly by INAE and Royal Academy of Engineering (RAEng), UK. Prof. K. Bhanu Sankara Rao from INAE and Prof. Ravi De Silva from RAEng, UK were the Coordinators of the seminar. The themes of this seminar were - Shape Memory Alloys and Structures, Magnetic Materials, Sensor Development, Fuel Cells and Energy Materials & Bio Materials and Bio-Engineering.



Dr. Baldev Raj, Prof. K. Bhanu Sankara Rao, Prof. Ravi De Silva and other dignitaries on the dais

The second joint workshop between INAE and RAEng, UK on “Distributed Manufacturing -Opportunities for Growth (Perspectives from the UK and India)” is being held on June 16-18, 2014 at London, UK. Specific efforts are being made to build academic-research-industry collaborations on topics of mutual interest and enable exchange of young leaders of the two countries on the topic of advanced manufacturing, which is of high importance to India and UK.

Dr. V Bhujanga Rao, Distinguished Scientist and Director General (NS&M), DRDO, Visakhapatnam, India and Prof. Mike Gregory, University of Cambridge, UK are the coordinators from INAE and RAEng, UK respectively. The broad topics to be covered during the joint meeting are UK and India Perspectives on Distributed Manufacturing – the Present and Future Prospects; Distributed Manufacturing in Aeronautical and Automotive Sectors; Intelligent Manufacturing Design; Implications of Distributed Manufacturing for Industrial Innovation – R&D to Service and Identification of Future Strategies and Opportunities for Long Term collaboration between UK and India. It is also planned to bring out a ‘Way Forward’ for the two Academies which would be based on the recommendations emanating from the presentations by speakers, deliberations and the panel discussion held during the workshop.

INAE-NATF collaboration on ‘Technology and Health Care’

A joint Workshop with National Academy of Technology, France (NATF) on “Technology and Health Care” is being planned during October 15-16, 2014 at Évry-Génopôle, France. Dr. Rajeev Shorey, Advisor, Department of Information Technology, Govt. of India, New Delhi has been nominated as the coordinator of this event from INAE side and Prof. Prof. Bruno Revellin-Falcoz will be the coordinator from NATF. The topics to be covered during this event will be (i) New medical devices for analysis and diagnostics, (ii) based on genome sequencing data, such as bio-chips, (iii) Genome data-processing software, (iv) Genome-related modelling software, (v) Engineering aspects of Healthcare, (vi) Medical Devices and (vii) Management of Healthcare. Experts from Industry, Academia and R&D are being identified to participate in the event. During the two day workshop, three technical visits to different laboratories at the Génopole are being planned. The presentations will be followed by discussions related to the deliberations and laboratory visits and future areas of collaboration and conclusions emanating from the event.

Research Studies

Studies on issues of national interest are undertaken by the Academy through specially constituted study groups. The objective is to bring out a comprehensive/exhaustive document covering review of national and international technological and commercial aspects, analysis of options, future trends and policy/recommendations for the future roadmap. The guidelines for the research study proposals have been modified. During the current year, the following research studies have been instituted. Project Monitoring Committee (PMC) for these Research Studies have been constituted to review the progress of the study.

INAE Research Studies

Research Study on “Non-Ionizing Electromagnetic Radiation Effects on Biological Systems and Protection Methods”

The Research Study on “Non-Ionizing Electromagnetic Radiation Effects on Biological Systems and Protection Methods” has been instituted this year with Mr VP Sandlas as Principal Engineering Investigator. Electromagnetic radiation (EMR) from wireless systems and related pollution levels are now reaching alarming proportions. Till recently, continuous exposure to radio waves was localized to areas near broadcasting stations, radars, radio communication terminals etc and thus the related radiations were not adversely affecting inhabited areas and general public. However, the situation has changed significantly during the last few years with the proliferation of cell phones, related base station towers and other EMR sources which are detrimental to health. The objective of the study is to bring out a report on the current status, internationally accepted and approved restrictions on generation of EM radiations, decisions taken by Govt. of India to curb EM radiations, recommended safety levels and protection methods. The Project Monitoring Committee (PMC) to monitor the research study has also been constituted with Dr BN Suresh as Chairman, Prof. RK Mallik and Dr Surendra Pal as members and Mr VP Sandlas as Member-Secretary. The Project Monitoring Committee (PMC) will examine the objectives and deliverable outputs; check whether prescribed milestones have been achieved or not as per schedule given in the proposal.

Research Study on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes”

The research study on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes” has been instituted with Dr KV Raghavan as the Principal Engineering Investigator. Dr Lakshmi Kantam, Director, Indian Institute of Chemical Technology, Hyderabad is the Project Coordinator, Dr GVM Sharma is the Principal Project Advisor and there are eleven other members of the study team including Dr BM Reddy, FNAE and Dr Sai Prasad of IICT. Earlier INAE undertook a study sponsored by PSA on “Impact of R&D on Indian Chemical Industry” during 2009-2011. Dr KV Raghavan was also the Principal Engineering Investigator of the study. The study had examined internationalization of intellectual property generation in India, post WTO growth trends of Indian research papers and patents and declining Indian contribution of patented products and processes in the Indian chemical sector. A brief study was made on the emerging technological trends in two sub-disciplines of organic chemistry viz aromatics and heterocyclics. The study brought out several interesting aspects of technological trends in India and their variance with the technological developments in USA. The inspiration to undertake more detailed studies on industrially relevant chemical processes (catalytic and non-catalytic) and their engineering aspects in the present study was derived from the above sample study.

The research study on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes” has five major objectives viz. Collection of bibliometric data from searchable (online and offline) national and international databases on patents and research publications in specific sub-areas of organic chemistry and chemical engineering fields; scientometric analysis of collected data sets involving data integration, assessment of its inter relationships and evaluation of data fitness and identification of major technology milestones; evaluation of patented technology generation and fitting trends in India, USA, Europe, Japan and China during 2000 -2012 in specific product and process domains; assessment of Indian situation with respect to the patented technology scenarios in USA, Europe, China and Japan and development of a comprehensive monitoring system based on the methodologies to be developed to sensitize Indian researchers and chemical industry leaders on the pace and direction of technology growth in critical areas. It is envisaged that the study shall lead to development of a comprehensive monitoring system for chemical technology growth and direction of utility in critical areas. The Project Monitoring Committee (PMC) to monitor the research study has also been constituted with Dr. Utkarsh Palnitkar as Chairman, Dr. BD Kulkarni and Mr. DP Misra as members and Dr. KV Raghavan as Member-Secretary.

Research Study on “Design of an Undergraduate degree programme for Capacity Building in Modern Civil Infrastructure”

The Research Study on “Assessment of Civil Engineering Inputs for Infrastructural Development” was completed by INAE in 2011. The objective of the study was to assess the civil engineering manpower deficit that may be contributing to the infrastructure underperformance and identify the cause for the same. The second mandate was to suggest a road map for taking appropriate counter measures for the massive growth of the infrastructure. As a follow up on the above research study, a Research Study on ‘Design of an Undergraduate Degree programme for Capacity Building in Developing Modern Civil Infrastructure’ has been commissioned by INAE with Prof. SS Chakraborty as Principal Engineering Investigator (PEI), Prof. Prem Krishna, IIT Roorkee as Member and Dr. Pradipta Banerjee, Director, IIT Roorkee as Consultant for this Research Study.

The objective of this study is to quantify the requirements of the efforts, and keeping in mind that the proposed academic programme is tuned towards development of modern infrastructure, the demand scenario for infrastructure engineers will be worked out. Industry inputs will be actively sought during the conduct of this exercise. This estimation would consider, inter alia, the cross-disciplinary competencies that would become sine qua non for infrastructure engineers. Further, in the development of the academic programme, the requirements of a complete skill set, including communication skills, contract and legal matters, risk analysis and management, disaster response, management tools, will be determined and training efforts in this regard will be woven in.

The Research Study will focus on structuring the academic programme that will be of interest to all stakeholders, viz the planners, industry, academia and most significantly the civil society whose interest is multifold: the utility infrastructure and also in providing employment, particularly considering the fact we are lagging in reaping our demographic dividend. The Project Monitoring Committee (PMC) to monitor the research study has also been constituted with Dr. Nagesh R Iyer as Chairman, Prof. MC Tandon and Prof. SK Bhattacharyya as members and Prof. SS Chakraborty as Member-Secretary. The Project Monitoring Committee (PMC) will examine the objectives and deliverable outputs; check whether prescribed milestones have been achieved or not as per schedule given in the proposal.

Research Studies supported by Principal Scientific Advisor (PSA) to Govt. of India**Research Study on “Development of Scientific Recycling of ‘End of Life’ Automobiles with special focus on rubber, plastics and residues in India – The role of Research and Development”**

Recycling of engineered goods at end of life constitutes a major element in India’s effort at developing a sustainable economy, contributing to our initiatives towards reduction of Greenhouse Gases and reduction of Global warming. Among engineering goods, automobiles which have reached end of useful life, offer maximum potential for energy savings and Greenhouse Gas reduction. In addition Automobile Recycling helps to conserve depleting resources and employment generation. Automobile production is increasing at an exponential rate in India. Consequently the numbers of vehicles to be scrapped also will increase rapidly. Scrapping is currently carried out in the informal sector in poorly equipped units, leading to unhygienic practices and low yields. Over 70% by weight of an automobile consists of metals like Steel, Aluminum, Copper, Lead etc. which are relatively easily recovered. With appropriate technologies, rubber and plastics also can be recycled. The major challenge is the disposal of about twenty percent Auto shredder Residue (ASR) left after recycling, which is traditionally dumped in plastic covered landfills. Land is a scarce resource in India where land utilization is among the highest in the world. World over, research is being undertaken to recover useful materials such as metals from the residue, use part of the residue as fuel and to minimize the extent of residues which will need landfills. Within the next five years, large volumes of used cars, motorcycles, trucks, auto rickshaws and other automobiles will need to be scrapped.

Principal Scientific Advisor (PSA) to Govt. of India had tasked INAE to conduct a Research Study on developing systems for recycling rubber and plastics. More importantly, it is required to carry out research and development on recovery of useful materials from auto shredded residue and minimize the extent of residues going into refills. For this purpose, a Research Study on “Development of scientific recycling of ‘End of Life’ Automobiles with special focus on rubber, plastics and residues in India- The role of Research and Development” has been commissioned similar to the earlier research studies conducted by INAE under the auspices of PSA on “Impact of R&D on Indian Chemical Industry- Current Status and Future Strategies” and “Impact of R&D on Indian Mining Industry”. The study has been sanctioned by PSA with Capt. NS. Mohan Ram, VSM, Indian Navy (Retd), FNAE & Consultant, TVS Motor Company Limited as Chairman and Dr. Basudam Adhikari, IIT Kharagpur; Mr. S.Sugumar, Central Institute of Plastics Engineering and Technology (CIPET), Chennai and Dr. LM Gantayet, Bhabha Atomic Research Centre, Mumbai as Members for this Study.

The Study will be conducted in three phases in which phase 1 will focus on collection of data on Recycling of ELV’s- automobile production, population, ELV generation, extent of material recoveries, and ASR generation over the next twenty years. This task will be carried out by analysis of past production data and postulating lives of different classes of vehicles. Phase 2 will focus on development of laboratory scale processes for material recovery from dismantling nonmetallic elements like rubber, plastics, ceramics etc. and proposals for deploying the methods to industrial scale. Phase 3 will be concerned with identification of processes for recovery of useful materials and energy from ASR and minimizing the final residues which require landfills. The unique feature of this project is that INAE is proactively looking for a solution for a major problem which has not yet arisen in India but will confront us in the not too distant future. It is planned to access work being done elsewhere in treating ASR and develop processes and technologies to suit Indian conditions. In that respect, this project is a rare one of its kind.

Research Schemes

With the objective to encourage invention, investigation, research and promote high caliber of engineering-scientists, INAE has instituted four schemes, viz., INAE Chair Professorship; INAE Distinguished Professors/Technologists; Mentoring of Engineering Teachers by INAE Fellows and Mentoring of Engineering Students by INAE Fellows.

INAE Chair Professorship

The following nominees were selected as INAE Chair Professors during this year.

- Prof Subhash C Mishra, Department of Mechanical Engineering, Indian Institute of Technology Guwahati
- Prof Suman Chakraborty, Department of Mechanical Engineering, Indian Institute of Technology Kharagpur

Mentoring of Engineering Teachers by INAE Fellows

A total of 10 engineering teachers nominated for mentoring by 8 INAE Fellows were selected under scheme on “Mentoring of Engineering Teachers by INAE Fellows” this year, as per details given below.

S No	Name of Mentor	Name of Engg Teacher	Institution of Teacher
1	Prof. S. K Koul	Yerram Ravinder	Pune Institute of Computer Technology, Pune
2	Prof. S. K Koul	Vikas Kumar Rai	Sachdeva Inst. of Technology, Mathura
3	Dr. Sivaji Chakravorti	Sandip Kumar Ojha	Haldia Institute of Technology, Haldia
4	Dr. T Jayakumar	Dr Atul Ramesh Ballal	Visvesvaraya National Institute of Technology, Nagpur
5	Prof. B.S Murty	Dr. Debdas Roy	NIFFT, Ranchi
6	Prof. B.S Murty	Varayogi Rangadhara Chary	NIT, Warangal
7	Dr. Subrata Charaborty	Dr. (Ms) Debarati Dutta	Visvesvaraya National Institute of Technology, Nagpur
8	Dr. G. Madhusudhan Reddy	M. Vijayalakshmi	MGIT, Hyderabad
9	Prof. K.Bhanu Sankara Rao	Ajoy Kumar Pandey	NIT, Warangal
10	Dr. Kamachi Mudali	K. Kalaivani	ASAN Memorial College of Engg and Tech, Chengalpattu

Mentoring of Engineering Students by INAE Fellows

Out of a total of eighty nominations received for mentoring of engineering students, the following 62 nominations were selected under the scheme “Mentoring of Engineering Students by INAE Fellows” this

year, as per details given below.

S No	Name of Mentor	Name of Engineering Student	Institution of Student
1	Mr. N. Saibaba	Mr Sunil Ugadi	RGUKT, IIIT Hyderabad
2	Mr. N. Saibaba	Tutika Ravi Tej Anand	NIT Warangal
3	Prof. Ganpati Panda	Priyanka Priyadarsini Swain	NIT Rourkela
4	Prof. Ganpati Panda	Rathna Deexith	NIT Rourkela
5	Prof. Shibani K Koul	Bhawna Rawat	Shiv Nadar University, Gautam Budhnagar U.P
6	Prof Shibani K Koul	Prahalad Kumar	IIT, Roorkee
7	Prof. K. Bhanu Sankara Rao	S. Lavanya	IIIT, RGUKT, R K Valley
8	Prof. K. Bhanu Sankara Rao	S.Hemanth Kumar	IIIT, RGUKT (A.P)
9	Shri M. Narayana Rao	Ch. Dinesh Reddy	IIIT, RGUKT, Basara
10	Shri M. Narayana Rao	B. Prasanth	IIIT, RGUKT, Basara
11	Dr. Arun Kumar Bhaduri	G.M. Nandan Kumar	SCSVMV University, Enathur, Kanchipuram
12	Dr. Arun Kumar Bhaduri	Rajiv Khandelwal	NIT, Jamshedpur
13	Prof. Nagesh R Iyer	S.K. Kirthika	Sastra University, Thirumalaisamudram
14	Prof. Debashish Ghose	Sonali Andani	Vellore Institute of Technology, Vellore
15	Prof. Vikram Jayaram	B Bharath Ganesh Kumar	Sri Chandrasekharendra Viswa Maha Vidhyalaya, Enathur, Kancheepuram
16	Prof. Vikram Jayaram	Saurav Suman	NIT, Jamshedpur
17	Prof. D. V Singh	Keshav Subramanian	SCSVMV University, Kanchipuram
18	Dr. S.V Joshi	S.Hari Babu	IIIT, RGUKT (A.P)
19	Dr. S.V Joshi	V. R. Roja	IIIT, RGUKT (A.P)
20	Dr. J. Krishnan	S. Vijayshankar	SCSVMV University, Kanchipuram
21	Dr. J. Krishnan	Abhishek Kumar	IIT, Kharagpur

22	Prof Suman Chakraborty	Sampad Laha	Jadavpur University, Kolkata
23	Prof Suman Chakraborty	Suman Samanta	Jadavpur University Kolkata
24	Prof. B. S Murty	Sandhya Susarla	IIT, BHU, Varansi
25	Prof. B. S Murty	Achintya Kumar Patra	NIT, Jamshedpur
26	Prof. Pradip Dutta	R. Aadithya Viswanath	Shiv Nadar University, Gautam Budhnagar U.P
27	Prof. B. Yegnanarayana	Nalam Visweswara Venkata Rama Krishna Vinay	RGUKT, NUZVID (A.P)
28	Prof. B. Yegnanarayana	Madepalli Venkatarmana	RGUKT, NUZVID (A.P)
29	Prof. Dipanwita Roy Chowdhury	Rajrup Ghosh	Bengal Engg. And Science University, Shibpur, Howarh
30	Prof. U Rama Murty	M. Lakshmi Sravani	Mahatma Gandhi Institute of Technology, Gadipet, Hyderabad
31	Prof. U Rama Murty	V. Gayatri Devi	Mahatma Gandhi Institute of Technology, Gadipet, Hyderabad
32	Prof Prem Krishna	Mr Sharad Srivastava	NIT Jamshedpur
33	Dr. R. Natarajan	K. Poorna Santosh	PSG College of Technology, Coimbatore
34	Prof Sukumar Mishra	Ms Poornima Ramachandran	VIT University, Chennai Campus
35	Prof Sukumar Mishra	Shubangi Bhadoria	Maulana Azad National Institute of Technology, Bhopal
36	Dr. Samir V Kamat	Pamidi Venkateswarlu	IIIT, RGUKT (A.P)
37	Dr. Ram Kumar Singh	Harish M Reddy	S.C.S.V.M.V University, Enathur, Kanchipuram, Tamil Nadu
38	Prof Indranil Manna	Soham Chattopadhyay	NIT Durgapur
39	Dr. Sivaji Chakravorti	Sumit Sultania	NIT Jamshedpur
40	Dr. DP Kothari	Ms Anusha Pillay	Vellore Institute of Technology, Vellore
41	Prof. V Ramgopal Rao	Siddharth Ghai	UIET, Panjab University
42	Dr. A.N Rajagopalan	R Madhavi Jyothsna	Meenakshi Sunderarajan Engg. College, Chennai

43	Dr. Shashank Chaturvedi	Ayush Suhane	IIT BHU, Varansi
44	Prof Ajoy Kumar Ghose	Arpan Halder	IIT Kharagpur
45	Dr SV Kulkarni	Priyanshi Shrivastava	VIT University, Chennai campus
46	Mr S Bimalkhedkar	Ms Shruti Pasrija	NIT Jamshedpur
47	Prof P. K Dash	Apoorva Satpathy	Amity University, Noida, U.P
48	Prof P. K Dash	Avinash Kumar	NIT Meghalaya
49	Prof KT Jacob	Arneet Rajput	MANIT Bhopal
50	Prof. K. Anantha Padmanabhan	Priya Kumari	NIT Jamshedpur
51	Dr. Amol A Gokhale	Illa Mani Pujitha	RGUKT, APIIT, NUZVD
52	Prof. Subhash Chander	Shashank Prakash	IIT, Kharagpur
53	Prof HM Suryawanshi	Mr Akshay Dwadesh Shreni	NIT Jamshedpur
54	Dr S Srikanth	Mr Abhishek Kumar Thakur	NIT Jamshedpur
55	Dr. G Madhusudan Reddy	Chinnam Sivateja	MGIT, Gandipet, Hyderabad
56	Prof. ES Dwarakadasa	Ved Prakash Rai	NIT Jamshedpur
57	Dr. Soumitra Tarafder	Abhijeet Nayak	IIT, BHU, Varanasi
58	Dr. U Kamachi Mudali	G. R Lavanya	Govt. College of Engineering, Salem
59	Prof. K Ramesh	Rajiv Lochan Baruah	NIT, Silchar, Assam
60	Prof. K Ramesh	Nikhil Tripathi	MANIT, Bhopal, M.P
61	Dr. S. J Chopra	Naveen Kumar	IIT Kharagpur
62	Prof. M. C Tandon	Akshay Kumar	College of Engineering, Roorkee

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 INAE forums have been constituted –*Forum on Engineering Education, Forum on Energy, Forum on Microelectronics, Forum on Technology Foresight and Management* and *Forum on Engineering Interventions for Disaster Mitigation*. These forums enable giving inputs to policy makers, institutes of higher learning & research, industries, etc and also provide a platform for collaborations with Academies of Sciences in India and Academies of Engineering abroad in the framework of the International Council of Academies of Engineering and Technological Sciences (CAETS).

INAE Forum on Energy

Keeping in view the importance of energy issue, an INAE Forum on Energy was constituted with Dr Baldev Raj, as Chairman and Dr KV Raghavan, Dr RR Sonde, Dr Ajay Mathur, Dr Purnendu Ghosh and Prof SS Murthy as Members. This Forum has the mandate to address all issues related to energy. One of the pertinent tasks being undertaken by the Forum is to give inputs to the CAETS Working Group Report on Low Carbon Energy Technologies and the other task is to prepare a status report on energy in India with actionable recommendations towards achieving energy sustainability in the country.

A meeting of the INAE Forum on Energy was held on Aug 2-3, 2013 at Coimbatore wherein inputs received from the members for inclusion in the report were discussed. The members were requested to offer suggestions for improvement of the format of the report and the topics to be covered. It was decided that the report should cover the scenario for the next 10 years to make it significant and should highlight the aspects of making a paradigm change in improving the lives of the people. The focus should be not only on providing energy but also on distribution of energy. The thrust areas for R&D in the field of renewable energy need to be specified in the report and it should raise a question on the engineering and technology challenges to be overcome for achieving energy security and should suggest engineering solutions for the same. The report is under finalization.

INAE Forum on Engineering Education

INAE Forum on Engineering Education has taken the initiative of launching two joint schemes with All India Council for Technical Education (AICTE) viz. AICTE-INAE Teachers Research Fellowship Scheme and AICTE-INAE Travel Grant Schemes. The AICTE-INAE Teachers Research Fellowship Scheme has been launched in order to promote a research culture amongst the faculty in the engineering colleges. Under this scheme, engineering teachers are sponsored to pursue research in Council of Scientific and Industrial Research (CSIR)/ Defence Research and Development Organization (DRDO)/ Department of Space (DoS)/ Department of Atomic Energy (DAE) laboratories leading to the award of a Ph.D degree in the chosen field of study. The AICTE-INAE Travel Grant Scheme for Engineering Students has been launched with the objective to provide partial travel assistance and registration fees to Bachelors and Masters Level engineering students for presenting a research paper in an international scientific event (conference/seminar/symposium/workshop/exhibition etc) in order to encourage engineering students to engage in research.

INAE Forum on Microelectronics

INAE Forum on Microelectronics comprising of Dr MJ Zarabi, as Chairman and Prof AB Bhattacharyya; Dr Aloknath De; Prof PP Chakrabarti; Prof JM Vasi; Dr G Venkatesh and Mr AS Kiran Kumar as

Members has the mandate to address all issues related to Microelectronics and to appropriately network with other agencies concerned with this area. The members of the Forum have deliberated on issues related to India's capabilities-strengths and areas of improvement in the sphere of silicon design. They have also explored global and domestic opportunities to find a way of intensifying the design activities in India.

This Forum organized MOS-AK/GSA India2012-International Workshop on Device Modeling of Microsystems during Mar 16-18, 2012. The objective of the workshop was to classify the most important directions for the future development of the microelectronic device models, not limiting the discussion to compact models, but including physical, analytical and numerical models, to clearly identify areas that need further research and possible contact points between the different modeling domains. The workshop was also envisaged to serve as a platform for launch of MOS-AK/GSA India as a forum that will help galvanize the microelectronics modeling community in the country. A meeting of the INAE Forum on Microelectronics was held on Oct 25, 2013 at New Delhi with the objective of discussing the follow up activities as a result of the workshop. As a result of the workshop an Indian national compact modelling network was created. For this purpose, several meetings have been held to progress the initiative.

INAE Forum on Technology Foresight and Management

INAE constituted a "Technology Foresight and Management Forum" in Aug 2012, with Shri VK Agarwal as Chairman and Prof Prem Vrat, Dr YP Anand, Dr CR Prasad, Mr AK Anand, Mr KP Singh, Mr SC Gupta, Mr VN Mathur and Mr AK Gupta as Members with the mandate of preparing a roadmap for addressing National Challenges. The domain of national challenges being very wide and transient, this Forum addresses some of the major issues such as Food Production and Utilization and Conservation of Water; Energy Generation and Utilities; Manufacturing Technologies; Mass Transit Systems and Building and Construction Technologies. This Forum endeavours to evolve solutions keeping in view the issues of sustainable development, poverty reduction, and climate change in focus and suggests appropriate technologies accordingly. Further, suitable Engineering Management techniques are employed to find cost effective and optimal solutions.

The Forum decided 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. For formulation of the Recommendations / Solutions the Forum could also invite Specialists as required and / or conduct Workshops as found desirable. It is a well known fact that "Technology Foresight" is regarded as the most upstream element of the technology development process. It provides inputs to the formulation of technology policies and strategies that guide the development of the technological infrastructure. In addition, technology foresight provides support to innovation, leading to enhanced competitiveness and inclusive growth. Technology foresight helps the engineers, scientists, industrialists, government officials and other strategists in the society; to identify the areas of strategic research and the emerging technologies likely to yield the greatest economic and social benefits.

The Forum will bring out three challenges/areas in the first Report being compiled on the pertinent issues related to "Waste Management"; "Water – Meeting the Future Challenges" and "Transport – Making it Greener". The report provides a perspective and an action plan for implementation. It is envisaged that the suggestions/ recommendations of the Forum highlighted in the report shall be of value to the Nation and all policy-makers, engineers, technocrats and administrators in addressing the national challenges. The

report will be based on the suggestions regarding Minimization of waste generation (prevention / reduction), optimal waste recovery (reuse/recycling) and the effective waste treatment and disposal which are the need of the hour. Suitable waste-to-energy (WTE) approaches are also being explored. It will also cover access to water and sanitation at an affordable price and the vision for transportation to improve the share of environmental-friendly transportation mode.

INAE Forum on Engineering Interventions in Disaster Mitigation

The Forum on Engineering Interventions for Disaster Mitigation has been constituted recently with Dr RK Bhandari as Chairman and Prof Prem Krishna, Prof DV Singh, Prof SS Chakraborty, Mr VK Agarwal, Prof CVR Murty, Prof DK Paul and Ms Alpa Sheth as members. This Forum will identify key areas for disaster risk mitigation and management, where INAE can play a role through its multidisciplinary expertise and take appropriate actions to pursue them with concerned agencies for achieving tangible results and impact. A Brainstorming Session is being planned to decide the outcome of the further activities to be taken up by the Forum. A Round Table Meeting on “Mitigation of Landslide Disasters –Vision, Scientific Look at the Vexing Issues and the Way Forward” is also being planned with the objective of articulating vision and debating on the vexing issues related to landslide mitigation. It is envisaged to bring out a White Paper on some of the critical issues related to landslide disaster mitigation at the cutting-edge of science, engineering and technology and show the way forward through actionable recommendations emanating from the deliberations of the Round Table.

Engineering Excellence Awards

Life Time Contribution Award in Engineering 2013

This award is given to an eminent Indian citizen who has made most distinguished contributions in the field of Engineering / Engineering Research / Technology, which have brought prestige to the nation and regarded as landmarks of technological development of the country.

Prof. KL Chopra, Former Director, IIT Kharagpur and Formerly IREDA Chair Professor, Centre for Energy Studies and Thin film Laboratory, Physics Department, IIT, New Delhi; and Col SP Wahi, Chairman, SP Wahi Management and Technology Consultants Pvt. Ltd., Gurgaon and Formerly Chairman, Oil & Natural Gas Commission, New Delhi were conferred Life Time Contribution Awards in Engineering 2013.

Prof. Jai Krishna and Prof. SN Mitra Memorial Award 2013

These awards are given to an eminent engineer, engineer-scientist or a technologist for one or more of the following:

- (a) Academic and scholarly achievements in any discipline of technology
- (b) Outstanding research in engineering and technology and application thereof.
- (c) Outstanding contributions in the management of education and research in engineering
- (d) Outstanding achievements and contributions in the Indian industry, engineering services or engineering projects

Prof Jai Krishna Memorial Award is given from among the disciplines of Engineering Section I (Civil Engineering), Engineering Section III (Mechanical Engineering), Engineering Section IV (Chemical Engineering), Engineering Section VII (Aerospace Engineering) and Engineering Section VIII (Mining, Metallurgical and Materials Engineering) and **Prof S N Mitra Memorial Award** is given from among the disciplines of Engineering Section II (Computer Engineering and Information Technology), Engineering Section V (Electrical Engineering), Engineering Section VI (Electronics & Communication Engineering), Engineering Section IX (Energy Engineering) and Engineering Section X (Interdisciplinary Engineering and Special Fields).

Prof. ML Munjal, Honorary Professor & INSA Senior Scientist, Department of Mechanical Engineering, Indian Institute of Science, Bangalore and Prof. N Balakrishnan, Associate Director and Professor, Supercomputer Education & Research Centre and Department of Aerospace Engineering, Indian Institute of Science, Bangalore were conferred Prof. Jai Krishna and Prof SN Mitra Memorial Awards 2013 respectively.

INAE Outstanding Teachers Award 2013

INAE Outstanding Engineering Teachers Award has been instituted in the year 2013 to honour INAE Fellows who have excelled in the field of teaching in Indian Colleges, Universities, and Institutions, and have provided guidance and inspired students to take up careers in Engineering and Technology. All

disciplines of Engineering and Technology will come under the purview of this award. There are a maximum of two such awards per year. One award covers the disciplines of Civil Engineering, Mechanical Engineering, Chemical Engineering, Aerospace Engineering and Mining, Metallurgical and Materials Engineering. The other award will cover Computer Engineering and Information Technology, Electrical Engineering, Electronics and Communication Engineering, Energy and Interdisciplinary Engineering. The nominees should have been recognized for their outstanding abilities in teaching already by peers, institutes, and students. Such abilities can be measured on a weighted scale in terms of consistent high scores in teacher evaluation by students (where existent), which rates the expert professional knowledge and understanding of the subject by the teacher, quality of teaching, and ability to motivate and inspire the students. The outstanding teacher should be of unquestionable honesty, integrity, and moral character. The quality of teaching and research can also be measured in terms of best teacher awards obtained by the nominees in their own Institutes.

Prof. Souvik Bhattacharyya, Deputy Director, Indian Institute of Technology Kharagpur and Prof JC Misra, Department of Mathematics, Institute of Technical Education and Research (ITER), SOA University, Bhubaneswar were conferred INAE Outstanding Teachers Award in the year 2013.

INAE Young Engineer Awards 2013

The Academy instituted INAE Young Engineer Awards in 1996, to recognize excellence in design and technology transfer, innovative development and engineering research. The scheme has attracted nominations of bright young talent in the country and has become a prestigious national award since then. So far, 178 young engineers have been conferred this Award and their early recognition has encouraged the best upcoming talent to make innovative engineering and technological contributions for our national development. The nominations for this award for the year 2013 were sought from INAE Fellowship, Engineering institutions, R&D Labs. Out of 97 nominations, 26 were shortlisted by the Sectional Committees. The shortlisted candidates gave presentation of their work before the Selection Committee on Sep 25, 2013 at New Delhi.

The following eleven candidates were selected for conferment of Young Engineer Award 2013.

- 1 Dr. Ishan Sharma, Associate Professor, Department of Mechanical Engineering, IIT Kanpur, Kanpur
- 2 Dr. Pankaj Wahi, Associate Professor, Nonlinear Mechanics Laboratory, Mechanical Engineering Department, IIT Kanpur, Kanpur
- 3 Dr. Karthik Ramanathan, Member of Technical Staff, Simulation Centre of Competence, Applied Materials India Pvt. Ltd, Bangalore
- 4 Dr. Premalata Jena, Assistant Professor, Department of Electrical Engineering, IIT Roorkee, Roorkee
- 5 Dr. Jagabondhu Hazra, Research Staff Member, IBM Research - India, Bangalore
- 6 Dr. Kota Murali, Chief Technologist, IBM India, Bangalore
- 7 Dr. Rahul Vaze, Reader, School of Technology and Computer Science, Tata Institute of Fundamental Research, Mumbai.
- 8 Dr. MJNV Prasad, Assistant Professor, Department Metallurgical Engineering & Materials Science, IIT Bombay, Mumbai

- 9 Mr. GV Prasad Reddy, Scientific Officer -D, Fatigue Studies Section, Mechanical Metallurgy Division, Indira Gandhi Centre for Atomic Research, Kalpakkam
- 10 Dr. Ashis Kumar Sen, Assistant Professor, Department of Mechanical Engineering, IIT Madras, Chennai.
- 11 Dr. Phaneendra Kumar Yalavarthy, Assistant Professor, Supercomputer Education and Research Centre (SERC), Indian Institute of Science, Bangalore

Innovative Student Projects Awardees 2013

The Academy has instituted Innovative Students Projects Award since 1998 to identify innovative and creative projects undertaken by the students at three levels B.E./ B. Tech, M.E/M.Tech and PhD in engineering colleges. This Award recognizes innovative and creative projects and theses of students and research scholars in engineering institutions, since an early recognition of merit and talent can often mark the beginning of a brilliant career.

A total 69 nominations received i.e 15 at Doctoral level; 16 at Master's level and 38 at Bachelor level were examined by the Selection Committee on July 25, 2013. Out of these, 39 nominations; 10 nominations at Doctoral level; 8 at Master's level and 21 at Bachelor level were shortlisted for presentations of their work before the Selection Committee on Sep 26, 2013 at New Delhi.

Five candidates at Doctoral level, five at Master's level and ten at Bachelor level were selected by the Selection Committee for conferment of Innovative Student Projects Awards 2013 as given below.

Doctoral Level

- 1 Dr Chandan Karfa, Indian Institute of Technology Kharagpur
(Formal Verification of Behavioural Transformations During Embedded System Design)
- 2 Dr Sandeep Anand, Indian Institute of Technology Bombay, Mumbai
(Interface Circuits and Controllers for Effective Utilization of Solar Photovoltaics)
- 3 Dr Manmohan Dass Goel, Indian Institute of Technology Delhi
(Blast Response of Structures and its Mitigation Using Advanced Lightweight Materials)
- 4 Dr. A Shahin, Indian Institute of Technology, Kanpur
(Phase Behaviour and Soft Glassy Rheology of Aqueous Laponite Suspensions)
- 5 Dr Pijus Kundu, Indian Institute of Technology Kharagpur
(Performance Enhancement of Microthruster Using Nano-Engineered MEMS structure for Long Term Space Mission)

Master's Level

- 1 Christy Jojoy, Department of Computer Science, University of Kerala, Thiruvanthapuram
(SAR Image De-Speckling Using Importance sampling Unscented Kalman and Non Local Means Filters)
- 2 Hrilina Ghosh, Bengal Engineering and Science University, Shibpur
(Silicon Oxide Nanoporous Structures for Sensitive Toxin Detection)
- 3 Mr Srinadh Mattaparthi, Indian Institute of Technology Hyderabad
(Biomimicked Polymeric Surfaces Exhibiting Superhydrophobic and Antireflective Properties)

- 4 Rahul, School of Engineering Sciences and Technology, University of Hyderabad
(Development of Novel Nano Composites Using Unique approaches and Their Mechanical & Tribological Characteristics)
- 5 Mr Vijay Bhooshan Kumar, School of Engineering Sciences and Technology, University of Hyderabad
(Core Shell Nanostructure of PCL, PCL@SiO₂, ZnO-SiO₂ and their Physical Properties and Biomedical Applications)

Bachelor Level

- 1 Parag Agrawal and Rishi Barua Indian Institute of Technology, Guwahati
(Learning Weakness of Players from Cricket Text Commentary)
- 2 Anirudh Vasudevan, Ashwin Kumar M and Chandrasekar MG Sri Venkateswara College of Engineering, Sriperumbudur
(Power Harvesting Tile Using Piezo Disk Element Matrix)
- 3 Kaustubh Umathe, Ajay Jamodkar, Ameya Chandrayan and Anil Kumar Visvesvaraya National Institute of Technology, Nagpur
(Unified Multi-Input DC-DC Converter for Hybrid Distributed Generating Systems)
- 4 Sivagurunatha Pandian M, Shivaraman I, Shreenath M and Sundaraganesh GEaswari Engineering College, Chennai
(Wireless Communication and Security Embedded Safety Helmet)
- 5 Varun Vishnudas Verlekar, Ankit Prakash Naik, Avinash Gupta and Gaurav Sunil Revalkar, Goa College of Engineering, Govt. of Goa
(Design and Analysis of Multi-axis 3D Machining Unit)
- 6 Yallappa D, College of Agricultural Engineering, Raichur
(Design, Development and Performance Evaluation of Pedal Operated Flour Mill)
- 7 Rohit Thakwani, National Institute of Technology Silchar
(Solar Powered Wheelchair)
- 8 Satish Kumar S and Rohan Kanna C, SRM University, Kancheepuram Distt (TN)
(Automated Vehicle Speed Management Assisted with GPS)
- 9 Akhil S Anand and Yesaswi Narendra Chilamkurti, Indian Institute of Technology, Patna
(Design and construction of Flapping Wing MAV)
- 10 Mr Prashant Sharma and Mr Manoj Kumar Ellur, International Institute for Aerospace Engineering & Management, Jain Univ., Bangalore
(Analysis of Flight Test Data from Helicopter Development Programme)

Joint Schemes with AICTE

AICTE-INAE Distinguished Visiting Professorship Scheme

Industry-Academia interaction has long term benefits for both parties. The role of academia and industry has always been indispensable to each other. If industry is responsible for producing, academia provides the necessary back up in terms of the engineers, technocrats and professionals who run the industry. Academia prepares the society for the future and close interaction between academia and industry paves the way for the progress of the nation. Using the academia's knowledge base to improve the industry's cost, quality and competitive dimensions, reducing dependence on foreign know-how and expenditure on internal R&D and updating and upgrading the knowledge base of the industry's professionals are some of the outcomes of academia -industry interaction.

The Indian National Academy of Engineering (INAE) launched a Distinguished Visiting Professorship (DVP) scheme jointly with AICTE in 1999. The Scheme envisages promotion of industry-institute interaction by facilitating the dissemination of knowledge through the expertise of experienced and knowledgeable persons from industry to integrate their rich industrial experience with technical education. As per the objectives of the scheme; the Distinguished Visiting Professor is required to deliver lectures on the state-of-art of Industry, industrial ambience and R&D needs of the industry to the students and faculty of technical institutions; guide student projects/ theses of interest to industry; help curriculum development, keeping in view, the changing industrial needs; develop cooperative undergraduate and postgraduate programmes with industry having potential benefits to faculty, students and Industry and take up any other activities for the mutual benefit of engineering institutions and industry.

The scheme has no doubt been a great success and has been running effectively during the last fourteen years. Thirteen Industry Experts were selected during the year 2000; eighteen each in 2001 and 2002; fourteen in 2003; ten in 2004; thirteen in 2005; fifteen during the year 2006, fifteen during 2007; eleven during 2008; eighteen during the year 2009; nine during the year 2010; seven during the year 2011; twelve during the year 2012 and 16 during the year 2013 by a high level Steering Committee of INAE Fellows and representatives from AICTE and CII. The Industry experts selected under the subject Scheme include experts from Industry as well as DRDO/DAE/DOS Labs. During their visits, the visiting professors besides delivering lectures on the state-of-art industrial practices and sharing their industrial experience with the faculty/ students of the affiliated engineering institutions are also assisting in updating the curriculum. There is no doubt that both the industry and engineering institutions are the beneficiaries of academia-industry interaction. The outcomes of this interaction are industry support to basic research; industry participation in technology development involving exploratory work and academic intervention in solving specific industry problems.

The Steering Committee during its meeting on May 15, 2013 discussed the 23 nominations received for the year 2013 and selected the following 16 industry experts. In all these cases the industry experts have already identified the matching engineering college/institution.

- 1 Prof Barada Kanta Mishra, FNAE
Director, CSIR-Institute of Minerals & Materials Technology (IMMT), Bhubaneswar

- 2 Mr DP Misra, FNAE
Director, Indian Chemical Council, Mumbai
- 3 Dr Ramamurthy Badrinath
Computer Systems Architect, Hewlett Packard (HP), Bangalore
- 4 Dr Venkataramana Runkana
Principal Scientist, Tata Research Development and Design Centre, Pune
- 5 Dr Ranjan Sen
Chief Scientist, CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur
- 6 Dr S Suresh
Consultant, Bharat Heavy Electricals Ltd (BHEL), Tiruchirapalli (TN)
- 7 Dr Namburi Eswara Prasad
Scientist 'G' and Regional Director, Regional Centre for Military Airworthiness (Materials), DRDO, Hyderabad
- 8 Dr Poonam Ahluwalia
Technical Specialist, M/s MWH India Pvt Ltd, New Delhi
- 9 Dr P.C. Jain
Scientist F and Head Structures, Defence Research and Development Laboratory, Hyderabad
- 10 Dr R Selvaraj
Head Civil Engineering Division, Central Electrochemical Research Institute (CECRI), Karaikudi (T.N.)
- 11 Dr G Raja Singh Thangadurai
Dy. Programme Director, Defence Research Development Laboratory, Hyderabad
- 12 Dr PS Ramkumar
Director, Applied Cognition Systems Pvt Ltd, Bangalore
- 13 Dr SK Singal
Professor & Chief Scientist, Indian Institute of Petroleum, Dehradun
- 14 Dr Shashi Bhushan Singh
Director, Institute of Technology Management, DRDO, Mussoorie
- 15 Mr S Madivaanan,
Formerly Additional Director, Combat Vehicles Research & Development Establishment (CVRDE), Chennai
- 16 Dr V Ramachandra
Vice-President (Technical Services) UltraTech Cement Ltd, Bangalore

Some of the representative feedbacks received recently from engineering colleges/institutions associated with this scheme are given below.

- “The students get first hand information about developments in industry. In general, such schemes further strengthen industry/institution interaction and motivates staff and students in paper presentation and research activities” - Registrar, SASTRA University, Shanmugha Arts, Science, Technology & Research Academy, Thanjavur

- *“The availability of an expert from the industry, with high calibre has been of immense help to the post-graduate students in the Department. His lectures have been well received by the students and he has been available for them for discussions on their seminar and dissertations. “INAE-AICTE should continue with such good initiatives so that students in Technical Institutions will benefit hearing from experts in the field” -HOD, Civil Engineering, National Institute of Technology, Karnataka, Surathkal*
- *“The AICTE-INAE Distinguished Professorship system is good and encouraging. New projects in advanced engineering and sciences are planned that will be helpful to students in doing applied projects in new frontiers”- Assistant Professor, Department. of Mechanical Engineering, Indian Institute of Technology, Guwahati*
- *The lectures delivered by the industry expert were extremely beneficial for the students. The students are definitely benefitted by the industrial inputs which will help in making them competent in real life situations”. Head, Department of Mechanical Engineering, National Institute of Technology, Agartala.*

INAE-AICTE Distinguished Industry Professor Scheme

“INAE-AICTE Distinguished Industry Professor” Scheme was instituted in the year 2007, in which Faculty from engineering institutions spend some time in industry to contribute to the Industry, as well as, gain exposure to the industrial environment/requirements. This can initiate the development of longer-term relationships between the institution and the industry, by way of joint projects, joint student practical training programmes, research and consultancy contracts, and placement of students. The faculty can enhance and update the basic theoretical knowledge of the engineers in industry by interacting with them and solving industrial problems. For engineering faculty, this would provide the opportunity to learn about the State-of-the-Art technologies and get exposure to current industrial and commercial practice. This would also help in making the teaching more relevant to the industrial realm and add to the realism of the courses taught in engineering institutions. Dr Sukumar Mishra, Professor, Department of Electrical Engineering, IIT Delhi and Dr Dipak Mazumdar, Ministry of Steel Chair Professor, Department of Materials Science and Engineering, IIT Kanpur were selected under this scheme during the year 2013.

AICTE-INAE Teachers Research Fellowship scheme

A joint scheme – “AICTE- INAE Teachers Research Fellowship Scheme” for Engineering Teachers has been launched to pursue Doctoral Research in Central Laboratories in order to promote a research culture amongst the faculty in AICTE approved engineering institutions. Under this scheme, engineering teachers in AICTE approved engineering colleges/institutions are sponsored to pursue research in Council of Scientific and Industrial Research (CSIR)/ Defence Research and Development Organization (DRDO)/ Department of Space (DoS)/ Department of Atomic Energy (DAE) laboratories leading to the award of a Ph.D degree in the chosen field of study. The Ph.D degree will be awarded by the concerned organizations of CSIR, DRDO, DoS and DAE.

A Steering Committee of the experts from AICTE, INAE, CII, CSIR, DRDO, DOS and DAE has been constituted. The guidelines for operation and implementation of the AICTE-INAE TRF Scheme were prepared by a Committee formed for the purpose. The disciplines of engineering in which Ph.D programmes can be offered and maximum number of candidates which can be accommodated in their laboratories during the each academic session of the proposed scheme were intimated by CSIR/DRDO/DOS/DAE. The applications received from the eligible engineering teachers to pursue the Ph.D programme were scrutinized by the Steering Committee and two batches of selected candidates have reported to the concerned laboratories as per the details given below:

S. No.	Name	College / Institute	Specialization	Lab & Location
1	Arnab Kundu	Birbhum Institute of Engineering and Technology, Birbhum	Mobile Communication & Network Technology	CSIR-CMERI Durgapur
2	Debasri Chakraborty	Birbhum Institute of Engineering and Technology, Birbhum	Geographic Information System	CSIR-CMERI Durgapur
3	Mukund Arun Patil	GH Rasoni Institute of Engineering and Management, Jalgaon, Maharashtra	Mechanical Enggining	CSIR-CMERI Durgapur
4	BS Somesh	Reva Institute of Technology and Management, Bangalore	Simulation and Modeling in Signal Processing Domain	CSIR-CMERI Durgapur
5	M Shireesha	Anurag Group of Institution, Ranga Reddy Distt., (AP)	Chemical Engineering	CSIR-IICT Hyderabad
6	Jangiti Siva Prasanth	Anurag Group of Institution, Ranga Reddy Distt., (AP)	Information Security	CSIR-IICT, Hyderabad
7	Mr. Amit Naik	Shri GS Institute of Technology & Science	Electronics and Communication	DRDO-DIAT, Pune
8	Shreevyas HM	Government Engineering College, Karwar	Communication Enggineering	DRDO-CAIR, Pune
9	Beneyaz Ara Begum	Silicon Institute of Technology, Bhubaneswar	Distributed Data Sharing Services (loosely coupled domain)	CSIR-IICT, Hyderabad
10	Swagat Kumar Samantaray	National Institute of Science & Technology, Berhampur, Odisha	Low Power Microcontroller & Robotics	CSIR-CSIO, Chandigarh
11	Sangeeta Bagha	Silicon Institute of Technology, Bhubaneswar	Biomedical Instrumentation	CSIR- IMMT, Bhubaneswar

AICTE-INAE Travel Grant Scheme for Engineering Students

AICTE-INAE Travel Grant Scheme for Engineering Students has been launched recently to provide financial support for engineering students to present papers abroad. The objective of the scheme is to provide partial travel assistance and registration fees to Bachelors and Masters Level engineering students for presenting a research paper in an international scientific event (conference/ seminar/ symposium/ workshop etc) in order to encourage engineering students to engage in research. Third/Fourth year B.E./ B.Tech; First/Second year M.E./M.Tech; or Fourth/Fifth year Integrated M.Tech Level engineering students from AICTE approved Engineering institutions are eligible under the scheme. The applicant should have an invitation for presenting a research paper which has been accepted in a conference/ seminar/symposium/workshop abroad. The Selection Committee comprising of Advisor, AICTE; Head, Higher Education, CII and experts from each of the ten engineering sections of INAE has been constituted. The scheme is running quite satisfactorily. Since the commencement of the scheme from July 2013, 4-5 engineering students have been selected each month, by the Selection Committee on the subject scheme.

National Competition on “Innovation on Manufacturing Practices - 2014” (IMP-2014)

INAE in association with IIT Kanpur organized a National Competition on “Innovation on Manufacturing Practices - 2014” (IMP-2014) which was held at IIT Kanpur on March 5, 2014. The objective of the competition was to spark the awareness amongst the young, dynamic and energetic students of different engineering fields at U.G. and P.G. levels, about the importance of manufacturing in general, and innovative manufacturing practices in particular. There were three prizes of Rs 1 lakh, Rs 50,000 and Rs 25,000 respectively. Nominations for the competition were invited from the Directors and Heads of Departments of over 1500 engineering institutions including IITs, NITs, Govt. Engineering Colleges and Private Engineering Colleges. Two Committees were constituted for evaluation of entries at P.G. and U.G. level. The shortlisted candidates were invited for final demonstration of their prototypes on March 05, 2014. A committee comprising of eight members under the chairmanship of Dr. Sanak Mishra, Vice-President INAE was also constituted by Prof Indranil Manna, FNAE, Director, and IIT Kanpur to examine and evaluate all entries shortlisted for demonstration. After detailed deliberations the prizes were awarded are given below.

S. No.	Title	Institute	Group Members	Prizes
1.	Pedal Driven Multi-tool Carpenter Bench	Indian Institute of Technology Kanpur	1. Nikhil Kurele 2. Pranav Vyas 3. Ravi Ranjan	1 st Prize
2.	Lathe Chuck key locking Device for safety purpose	Bannari Amman Institute of Technology, Chennai	1. A. K. Soundararajan 2. A. Arunkumar	2 nd Prize
3	Design and Development of Castor seed extraction machine	G.H. Raisonni College of Engineering, Nagpur	1. N. Galande 2. S. Choudhari 3. S. Malapure	3 rd Prize
4	Multi-point Die Casting	VIT University, Chennai	1. Suvansh Kasliwal 2. Aashish Kishore 3. Sanjeet Desai	3 rd Prize

Due to a tie, two 3rd prizes were awarded. Dr. Sanak Mishra, Vice President, INAE distributed the Prizes, Certificates and Mementos to the winning teams. A “Certificate of Appreciation” was also distributed to each member of all teams who participated in IMP-2014.

Events Organized by Local Chapters

INAE Kolkata Local Chapter

INAE Kolkata Local Chapter along with the Centre for Soft Computing Research, Indian Statistical Institute, Kolkata jointly organized an Engineers’ Day Lecture entitled “The Importance of Understanding Nonlinearity in Engineering Science” delivered by Prof. Soumitro Banerjee, Indian Institute of Science Education & Research, Kolkata at Indian Statistical Institute, Kolkata on Sep 16, 2013. In addition, a special session in the 5th International Conference on Pattern Recognition and Machine Intelligence (PReMI-2013) was also organized by this Chapter on December 14, 2013 wherein a lecture entitled “Body-wide Automatic Anatomy Recognition in Medical Imagery via Fuzzy Models” was delivered by Dr. Jayaram K Udupa, Medical Image Processing Group, Dept of Radiology, University of Pennsylvania, USA.

Collaborative Activity with Planning Commission

Report on Wind Energy Systems in India Present Status and Recommendations for Growth for Planning Commission, Govt. of India

The Planning Commission had tasked INAE and Indian Institute of Metals (IIM) to identify a strategy for the development of Wind Energy Systems which would address specifically India's Wind Energy Potential including sensitivity for low speed wind, need of tall towers as well off - shore harvesting of wind energy. For this purpose, it was desired to bring out a report which was required to be prepared jointly by INAE and Indian Institute of Metals (IIM), on priority for presenting to the Planning Commission.

The emphasis of the report was laid on end to end strategy which reflects system/systems specifically tuned for Indian conditions and areas like system configuration, design of blades & components, material technologies, tall structures, corrosion mitigation, etc. It was also desired that this study should be comprehensive reflecting all S&T aspects to realize full potential of wind energy resources in the country. Further, the need was expressed to also examine the economics of such issues, marketing strategies as well as policy directions. Various eminent Experts from R&D, Industry and Academia were grouped together to form a task force to conduct this study. Dr. Baldev Raj, President, INAE and Dr. Sanak Mishra, Vice-President, INAE & Chairman, Generic Studies Committee of IIM were the Co-Chairs of this Study. Mr. Ismail Ali Khan, Planning Commission, Dr. AR Upadhyaya, Aeronautical Development Agency (ADE) DRDO, Bangalore, Dr. S Gomathinayagam, Centre for Wind Energy Technology (C-WET), Chennai, Mr. Mahesh Vipradas, Suzlon Energy Ltd., Dr. Sanjay Chandra, Tata Steel Limited, Dr. Santosh Kumar, Steel Authority of India (SAIL), Dr. SV Kamat, Defence Metallurgical Research Laboratory (DMRL) DRDO, Dr. Kamachi Mudali, Indira Gandhi Centre for Atomic Research (IGCAR) and Prof. Sukumar Mishra, IIT Delhi were the Members of the Task Force.

A Report has been prepared to make a total assessment of the status of Wind Energy Science and Technology in India, the gaps in technology, design and materials and manufacturing competence for Wind Energy Systems. An equally important challenge is storage of energy and its evacuation through Grids. In addition, economics of wind energy systems vis- a vis global competence were addressed in the report. The Report focussed on developing a Wind Energy Mission with a time-frame of ten years (Two Five Year Plan periods). An effort has been made to define milestones and tasks. The enhancement of design and manufacturing capability received emphasis as a thrust area in the Report. The strategies to have industry linked long-term R&D for the next 15-20 years to emerge as global leader in wind mills and systems have also been addressed in the report. Although much of the development so far in India is on land-based (On-Shore) Wind Energy Systems, the Report gave adequate weightage to the potential for Off-Shore Wind Energy Systems and the efforts that need to be made to establish the Off-Shore Wind Energy generation as an important element of total energy generation in India, through various means and technologies.

The draft report has been sent to Planning Commission and it is proposed to make a presentation of the Draft Report by the members of the study team to the Members of the Planning Commission. This would facilitate the study team in obtaining wide views for review and completeness of the report. The final report would be submitted after the presentation and incorporating suggestions, if any.

International Affairs

CAETS Symposium and Annual Meeting

Dr. Baldev Raj, President, INAE attended the CAETS Board of Directors meeting held on June 26, 2013 and briefed regarding the proposed Convocation on “Pathways to Sustainability: Energy, Mobility and Health Care Technologies”, to be hosted by INAE during October 12-15, 2013 at New Delhi. An important recommendation of the Board of Directors during this meeting regarding selection of Dr. Baldev Raj, President, INAE, to be President-Elect of CAETS during the year 2014, was approved later in the CAETS Council meeting held on the same day.

INAE is a member of the CAETS Working Group for a study on “Deployment of Low Emissions Technologies for Electric Power Generation in Response to Climate Change” constituted during the year 2009. This Working Group comprises of the Australian Academy of Technological Sciences and Engineering (ATSE); INAE; acatech, Germany; Canadian Academy of Engineering; South African Academy of Engineering; National Academy of Engineering Korea; National Academy of Engineering, USA, Swiss Academy of Engineering Sciences (SATW) and the Royal Academy of Engineering, UK. The first report of the Working Group on “Deployment of Low Emissions Technologies for Electric Power Generation in Response to Climate Change” was published during November 2010. Based on suggestions and positive response from the members, this Working Group was tasked to undertake the Second Phase of the Study on “Opportunities for Low Carbon Energy Technologies for Electricity Generation to 2050”. The report is focused on identifying promising initiatives to accelerate the commercial deployment of low carbon energy (LCE) technologies for electricity generation and to highlight the engineering and financial risks to be overcome to facilitate the deployment of such technologies. This Report was brought out in the year 2013.

A meeting of the CAETS Energy Committee was held on June 26, 2013 at Budapest during the sidelines of the CAETS Symposium and Annual Meeting; which was attended by representatives from Australia, India Germany, South Africa, USA, Canada, Korea and China. The objective of the meeting was to discuss the aspects of dissemination of the above mentioned report; scope and expectations of the CAETS Energy Committee; topic of the next project to be undertaken and the appointment of the Chair and Secretariat of the Committee. The proposals received for the next topic were discussed and the next project to be undertaken by the CAETS Energy Committee was identified as “Transition to a Lower Carbon Economy”. During this meeting INAE was assigned the responsibility of the Chair and Secretariat of the CAETS Energy Committee and Dr Baldev Raj, President, INAE was elected Chairman of this Committee. The third report of the CAETS Energy Committee on “Transitioning to a Low Carbon Economy: Engineering Opportunities in Building and Transportation Sector” is under preparation. A meeting of the CAETS Energy Committee was held on Nov 28-30, 2013 hosted by South African Academy of Engineering, wherein the framework and structure of the report was finalized and the member academies were assigned topics to be covered by them for inclusion in the report. The draft report compiled by INAE with inputs from the members of the CAETS Energy Committee will be discussed on June 2, 2014 during the CAETS Annual Meeting and Convocation at Beijing, China. Dr Baldev Raj shall Chair this meeting. This report is envisaged to catalyze collaborative activities in the area of “Transitioning to a Low Carbon Economy” which is vital in today’s environment.

During the CAETS Symposium entitled “Innovative Approaches to Engineering Education” held on June 27, 2013, Engineering Education strategies of several countries around the globe, in particular, from, Australia, China, Germany, India, South Africa and the U.S. were discussed. The presentations focused on several pioneering education, organizational and research approaches. It was recognized that the Engineering Community has an essential role in promoting central issues of engineering education such as quality of education, accreditation of engineering qualifications, regional agreements, establishing substantial equivalence, curriculum (including interdisciplinary system-based subjects) and innovation.

Prof. Indranil Manna from INAE gave a presentation on “Innovative Approaches in Engineering Education – An Indian Perspective” He brought out that Indian Engineering education is distinctly different in its scope, philosophy and execution than that for subjects related to science, commerce or humanities. Engineering education must build on relevant scientific theories and principles to address the issues of ‘need’ of the society; e.g. high strength material, greater thermal/electrical conductivity, affordable health care, sustainable energy resources, remedial measures for carbon footprint, efficient devices/machines, etc. He also mentioned that Engineering education is seldom successful in conventional pedagogic style – lecture, monologue, text books, notes, examination, and degree. The best innovative minds are often attracted to engineering tempted by challenges that can make them rich, famous, even immortal.

The Programme for the Symposium was balanced with presentations, discussions and Q&A Sessions.

Consequent to the deliberations during the Symposium, the following recommendations were made.

- (a) Engineering education for the new century must prepare engineers to deal with initiatives in technological development as well as contribute to the conditions of social welfare of humankind.
- (b) Many, if not all, of society’s grand challenges-sustainability, energy, security—require engineering solutions on a global scale.
- (c) Engineering education must provide a bridge between science and technology, while recognizing that engineering is a unique activity unto itself. The need for integrative thinking should be an important part of training future engineers.
- (d) Engineering education must reflect the interaction of engineers in industry and academia; universities must forge cooperative alliances with industry and national laboratories to promote the value of an engineering education.
- (e) Engineering education must be based on up-to-date research and innovation in educational practices. Innovations such as problem-based learning, experiential learning and on-line learning should be key parts of the curriculum and entrepreneurial thinking should be part of the culture of engineering schools.
- (f) Universities should provide the resources, time and rewards to faculty for engaging in innovative engineering education practices.
- (g) Life-Long Learning for engineers must be encouraged and should address disciplines which bridge the elements of science and technology, account for the globalization of engineering and are sensitive to national interests and values as well.
- (h) Accreditation should be based on the outcomes realized by graduates. It is recognized that an engineering qualification, with its broad fundamental base, must be the starting point of a career path in one of many areas of engineering specialization through structured development and lifelong learning.

CAETS Council meeting was held on June 28, 2013. Besides the administrative actions and issues, brief presentations were made by CAETS Committees on International Organisations (CIO) and CAETS Noise Control Technology Committee (NCTC).

Dr. Baldev Raj gave a brief presentation regarding the CAETS Annual meetings and Convocation, to be hosted by INAE during October 12-15, 2015 at Hotel Ashok, New Delhi. The theme of this Convocation would be “Pathways to Sustainability: Energy, Mobility and Health Care Technologies”. The suggested focus areas under each of the sub themes, i.e., Energy, Mobility and Healthcare Technologies were projected and views/suggestions on these were invited. He also requested Member Academies of CAETS to nominate a suitable expert for each of these sub-themes to make presentations during the Convocation. In order to encourage maximum participation from various Member-Academies of CAETS, he highlighted certain salient aspects of Indian Cultural Heritage, followed by a short video film (of about five minutes duration) on “Incredible India”.

An important topic for discussion during the CAETS Council meeting was “Nuclear Power : Present National Plans and Attitudes”, for which members from Australian Academy of Technological Sciences and Engineering (ATSE), Canadian Academy of Engineering (CAE), Chinese Academy of Engineering (CAE), German Academy of Science and Engineering (acatech), Indian National Academy of Engineering (INAE), The Engineering Academy of Japan (EAJ), The National Academy of Engineering of Korea (NAEK), South African Academy of Engineering (SAAE), The Royal Academy of Engineering (RAEng), UK, National Academy of Engineering (NAE), USA and the National Academy of Engineering of Uruguay (ANIU) gave brief presentations. Dr. Baldev Raj during his presentation on “Nuclear Power: Present National Plans and Approaches” brought out that India has enviable comprehensive expertise in Pressurized Heavy Water Reactors, and is one among the leaders in Sodium Cooled Fast Reactors and a pioneer in thorium technologies. Emphasis of Indian nuclear programme for society and energy based on close fuel cycle, puts India, in a strong position with respect to comprehensive mastery of science based technologies for food, healthcare and energy with a large base of industrial capabilities and competence of small, medium and large industries. India has a challenge of achieving scalability to realize fast pace of growth in energy contribution. After Fukushima, additional challenges are public acceptance of large increase in nuclear energy, at different locations, with varied socio-economic, political scenarios and aspirations. The advantage of nuclear programme in India is that safety organizational structures are robust with good track record. Political and public support needs to be harnessed for good of the country to realize large scale green energy for growing India. Regulatory body should become independent visibly and in functioning; not only in functions.

Another topic of discussion during the Council was “National Efforts to Promote Science, Technology, Engineering and Math (STEM) in K-12, for which brief presentations were made by Members from Australian Academy of Technological Sciences and Engineering (ATSE), Danish Academy of Technical Sciences (ATV), Indian National Academy of Engineering (INAE), The Royal Academy of Engineering (RAEng), UK and the National Academy of Engineering (NAE), USA. Prof. Indiranil Manna from INAE made a brief presentation on “School Level Science Education System and Status in India”. He mentioned that Education is now free for children between 6 to 14 years of age with provisions for free midday meal, budget allocation for education during FY 2013-14 is INR 65,865 crore (~ \$ 650 billion) of which nearly half is for Sarva Shiksha Abhiyan (SSA) or ‘education for all’ scheme. The Government is committed to raise the plan outlay on education to 6.5% of GDP and 20% of total budget. With regard to initiatives on Science Technology Engineering and Mathematics (STEM) in India, the proactive measures initiated in the recent past are: Innovation in Science Pursuit for Inspired Research (INSPIRE) program sponsored

and managed by the Department of Science & Technology for attracting young talent to the excitements of a creative pursuit of science as a career option and building the required critical human resource pool for strengthening and expanding the Science & Technology system and R&D base in the country. INSPIRE Scheme includes three components: (a) Scheme for Early Attraction of Talents for Science (SEATS), (b) Scholarship for Higher Education (SHE) and (c) Assured Opportunity for Research Careers (AORC).

The next CAETS Convocation on “Engineering and the Future of Mankind” will be hosted by Chinese Academy of Engineering (CAE) during June 2-5, 2014 in Beijing, China.

INAE delegation had separate discussion meetings with delegates of selected CAETS Member Academies, viz., The Royal Academy of Engineering (RAEng), UK; Canadian Academy of Engineering (CAE); Australian Academy of Technological Sciences and Engineering (ATSE), Australia; National Academy of Science and Engineering (acatech), Germany; Chinese Academy of Engineering (CAE); and Swiss Academy of Engineering Sciences (SATW) on the sidelines of the CAETS Annual Meetings and Symposium to discuss collaborative activities of mutual interest.

Collaborative Activities with CAETS Member Academies

Having signed MoUs with a number of CAETS Member Academies, INAE has initiated programs on specific areas which would be progressed further so as to achieve meaningful collaboration on the identified topics. INAE has initiated joint collaborative programs with Canadian Academy of Engineering on “Clean Coal Technologies”; with Australian Academy of Technological Sciences and Engineering (ATSE) on “Solar Energy” with Royal Academy of Engineering, UK on “Virtual Manufacturing” and with National Academy of Technology, France on “Affordable Healthcare Technologies”.

INAE-ATSE Joint Project on Solar Energy

INAE-ATSE Joint Project proposal on “One MW Solar Biomass Hybrid Distributed Power Cum Poly Generation” with Dr. RR Sonde as Coordinator assisted by Prof Indranil Manna, Director IIT Kanpur and Dr. Sudipta De of Jadavpur University, Kolkata is under progress. Dr Bruce Godfrey, Chair ATSE Energy Forum and Dr Vaughan Beck are the coordinators from the Australian side. The objective of the project is to ensure power supply to remote far flung areas in India which are not connected with the national grid.

India -Canada Joint Conference on Clean Coal Technologies

Consequent to the signing of an MoU between INAE and Canadian Academy of Engineering, Clean Coal technologies was identified as an area of common interest for the two countries. Canada and India are endowed with diverse mix of energy sources with coal as one of the most dominating feedstocks. Both countries have recognized the importance of green energy options for achieving higher level of environmental sustainability. Canada is recognized as a leader in the field of “Clean Coal Technologies” in the world. In this regard, the INAE-CAE Joint Conference on “Clean Coal Technologies” was held on Dec 4, 2012 at New Delhi. Eminent experts from India and Canada participated in this event. An abstract booklet and post –conference proceedings were brought out. The following areas have been identified for joint INAE –CAE initiatives: Indian Coal Industry Foresight Development on Clean Coal Technology; Capability Enhancement of young Indian researchers and post graduate engineering students on clean coal R&D; Advanced Analytical Techniques for Indian coal characterization with application orientation; Water footprint analysis of prospective clean coal technologies for implementation in India; Potential biocoal conversion processes for joint Indo-Canadian research and engineering studies and Enhancing the technology assessment capabilities of Indian technologists on advanced clean coal technology options.

As a follow-up activity of the conference, a stakeholders workshop is being planned in 2014-2015 at Canada wherein experts from India and Canada shall work together on clean coal initiatives. The participation from industry and policy makers from both countries is envisaged at this stakeholders workshop. The outcome of the workshop is to create a joint Working Group INAE/CAE/ stakeholders to monitor the progress of the activity. Eminent experts and young engineers from India shall form part of the Indian delegation to participate in the event.

CAETS 2015

CAETS Convocation on *“Pathways to Sustainability: Energy, Mobility and Healthcare Engineering”*

INAE is a member Academy of the International Council of Academies of Engineering and Technological Sciences (CAETS). CAETS Symposium and Annual Meeting is hosted by one of the CAETS member-Academies each year by rotation which is attended by all member Academies of CAETS. INAE has been requested by CAETS to host the event in 2015. In order to plan all other activities for the conduct of CAETS event 2015, it was decided to constitute a CAETS Core Organizing committee comprised of Dr. KV Raghavan, Dr. Sanak Mishra, Dr. BN Suresh, Dr. U Kamachi Mudali, Dr. Rajeev Shorey and Prof. RK Shevgaonkar. The CAETS event is being held from Oct 12-15, 2015. The events would comprise of CAETS Board of Directors meeting, CAETS Executive Committee meeting etc. followed by two days Convocation. The theme of the convocation is **Pathways to Sustainability: Energy, Mobility and Health Care Engineering**. The venue of these events will be Hotel Ashok, New Delhi. The reps from 17 member academies of CAETS would form part of CAETS Organizing Committee. The topics identified under each sub-theme are as follows:

(a) Energy Engineering:

- Potential LCE and efficient energy end use options for large scale deployment
- Hybrid Renewable-Non Renewable Energy (successful cases)
- Nuclear energy through Gen IV and Fusion Reactors
- Smart Microgrids

(b) Mobility Engineering:

- Multi-modal connectivity Trends and Futures : Urban and Rural
 - Integrated systems
 - Sustainable mobility core models
- Mobility Case Studies

(c) Health Care Engineering:

- Health care devices and delivery systems: Trends and Futures
- Developing Stronger Health care science-technology interface

An Inaugural Session is being planned wherein the President of India/Senior dignitary would be invited. This will be followed by three plenary lectures by eminent international/national experts pertaining to each sub-theme. It is envisaged that three parallel sessions would be organized during two days wherein

invited talks by experts/ young engineers would be made. An exhibition to showcase technological advancements of the country and a Poster Presentation Session by Young Engineers below the age of 45 years is being organized. There shall be two prizes for poster presentations in each sub-theme. A panel discussion and valedictory session to sum up the proceedings of the Convocation will be held which would be followed by the technical visit(s).

The Council meeting will be held after the Convocation. This would be attended by the delegates from various member academies of CAETS. The topic for discussion during this Council Meeting will be “Light Based Technologies” and “Academy Operations”. The year 2015 has been proclaimed as the international year of light by the Executive Board of UNESCO in its 190th Session held in October 2012. Light based technologies have played a major contribution to the growth of several engineering fields. CAETS will become the world’s first body of engineering academies to support this initiative. It will also be appropriate for CAETS to support the above theme during one of its discussion topics during council meeting in 2015. In addition, there is a need for the Member Academies to benefit mutually from each other’s experience about the functioning and operation of the Academies which shall form the basis for the second topic of discussion on “Academy Operations”.

The Fellowship

Newly Elected Fellows

The following were elected as Fellows of the Academy w.e.f. Jan 1, 2014.

Engineering Section-I

- 1 Dr. S Arunachalam, Chief Scientist & Advisor (Management) and Head Wind Engg. Lab, CSIR – Structural Engineering Research Centre, Chennai . – Elected for his contributions to the areas of Civil Engineering and Wind Engineering.

Engineering Section-II

- 1 Dr. Raghu Krishnapuram, Associate Director, IBM Research Lab-India, Bangalore. –Elected for his contributions to the areas of Machine Learning and Text Analytics.
- 2 Prof. Ujjwal Maulik, Department of Computer Science and Engineering, Jadavpur University, Kolkata. – Elected for his contributions to the areas of Evolutionary Computing & Data Mining and Computational Biology.
- 3 Dr. Sunita Sarawagi, Associate Professor, Department of Computer Science and Engineering, Indian Institute of Technology, Bombay, Mumbai.– Elected for her contributions to the areas of Machine Learning and Databases.
- 4 Dr. Soumen Chakrabarti, Associate Professor, Department of Computer Science and Engineering, Indian Institute of Technology, Bombay, Mumbai. – Elected for his contributions to the areas of Web Search & Mining and Information Retrieval.

Engineering Section-III

- 1 Prof. VK Jain, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur. – Elected for his contributions to the areas of Micromanufacturing and Advanced Machining Processes.
- 2 Prof. Rudra Pratap, Department of Mechanical Engineering and Chairperson, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore. – Elected for his contributions to the areas of Micro & Nano Electro-Mechanical Systems and Nonlinear Dynamics.
- 3 Mr. A Ravisankar, Associate Director, Reprocessing Projects & Operations Group, Indira Gandhi Centre for Atomic Research, Kalpakkam, Tamil Nadu. – Elected for his contributions to the area of Fast Reactor Fuel Reprocessing Technology.

Engineering Section-IV

- 1 Dr. Ajit V Sapre, Group President – R&T, Reliance Industries Limited, Navi Mumbai. – Elected for his contributions to the areas of Reaction Engineering & Catalysis.
- 2 Dr. NV Choudary, General Manager (Process Technologies), Hindustan Petroleum Corporation Ltd, Bangalore. – Elected for his contributions to the areas of Adsorptive Separations and Catalysis.
- 3 Prof. Giridhar Madras, Department of Chemical Engineering, Indian Institute of Science, Bangalore. – Elected for his contributions to the areas of Catalysis and Polymers.

Engineering Section-V

1. Prof. Narayana Prasad Padhy, Department of Electrical Engineering, Indian Institute of Technology Roorkee. – Elected for his contributions to the area of Power System Economics.

Engineering Section-VI

1. Dr. Venkata N Padmanabhan, Principal Researcher & Research Manager, Microsoft Research India, Bangalore. – Elected for his contributions to the areas of Computer Networking and Mobile Systems.
2. Prof. P Vijay Kumar, Electrical Communication Engineering Department, Indian Institute of Science, Bangalore. – Elected for his contributions to the areas of Algebraic Coding Theory and Wireless Communication.

Engineering Section-VII

1. Dr. Debasis Chakraborty, Scientist 'G' & Technology Director, Directorate of Computational Dynamics, Defence Research and Development Laboratory, Hyderabad. – Elected for his contributions to the areas of Computational Fluid Dynamics and Turbulent Reacting Flows.

Engineering Section-VIII

1. Dr. T Venugopalan, Advisor to Managing Director, Tata Steel, Jamshedpur. – Elected for his contributions to the area of Cold and Hot Rolling Process and Steel Making.
2. Dr. G Madhusudhan Reddy, Scientist 'G', Head, Metal Joining Group, Defence Metallurgical Research Laboratory (DMRL), Hyderabad. – Elected for his contributions to the area of Welding Metallurgy.

Engineering Section-IX

1. Mr. SK Mehta, Advisor, SPECSIM Engineering Pvt. Ltd, Mumbai. – Elected for his contributions to the area of Safety Assessment of Nuclear Power Plant and Design and Development of Reactor Components.
2. Dr. J Narayana Das, Outstanding Scientist & Chief Controller R&D, Defence Research and Development Organisation, New Delhi. – Elected for his contributions to the areas of Defence Materials Technology and Fuel Cell Technology.
3. Mr. N Saibaba, Distinguished Scientist & Chief Executive, Nuclear Fuel Complex (NFC), Department of Atomic Energy, Hyderabad. – Elected for his contributions to the area of Nuclear Fuel Fabrication for Pressurized Heavy Water Reactors.
4. Dr. Prabhat Kumar, Chairman and Managing Director, BHAVINI, Kalpakkam, Tamil Nadu. – Elected for his contributions to the areas of Construction and Design of Nuclear Reactors.
5. Mr. Pradeep Chaturvedi, Vice-President, World Environment Foundation, New Delhi. – Elected for his contributions to the areas of Energy and Sustainable Development.

Engineering Section-X

1. Prof. T Pradeep, Department of Chemistry, Indian Institute of Technology, Madras, Chennai. – Elected for his contributions to the areas of Molecular & Nanoscale Materials and Water Purification.

Foreign Fellows

1. Prof. Yukio Tamura, Professor, Wind Engineering Research Centre, Tokyo Polytechnic University, Japan. – Elected for his contributions to the areas of Wind Engineering and Vibration Control.
2. Dr. Prabhakar Raghavan, Vice-President, Strategic Technologies, Google INC, USA. – Elected for his contributions to the field of Computer Science.

- 3 Prof. Ares J Rosakis, Chair, Division of Engineering and Applied Science, Theodore von Karman Professor of Aeronautics and Mechanical Engineering, California Institute of Technology, USA. – Elected for his contributions to the fields of Mechanical Engineering and Aerospace Engineering.
- 4 Prof. SK Bhargava, Deputy Pro Vice-Chancellor (International) and Director – Center of Advanced Materials and Industrial Chemistry, College of Science, Engineering and Health, RMIT University, Melbourne, Australia. – Elected for his contributions to the areas of Advanced Materials and Industrial Chemistry.
- 5 Prof. Subhash Mahajan, Distinguished Professor and Special Advisor to the Chancellor, University of California-Davis, USA. – Elected for his contributions to the area of Functional Materials

Honours and Awards

Republic Day Award

The following INAE Fellows have been conferred with the prestigious award of Padma Vibhushan, Padma Bhushan and Padma Shri on the occasion of the Republic Day on Jan 26, 2014.

Padma Vibhushan

- Dr. RA Mashelkar

Padma Bhushan

- Dr. T Ramasami
- Dr. K Radhakrishnan
- Late Dr. A Ramakrishna

Padma Shri

- Dr. RB Grover
- Dr. G Sundararajan
- Shri Sekhar Basu

Other Awards

The details of other awards received by INAE Fellows during the year are given below.

1. Dr. Baldev Raj, President, INAE and President-Research, PSG Institutions, Coimbatore was conferred with Life Time Achievement Award of National Association of Corrosion Engineers, India Gate Way Section, New Delhi (2013) and Prof. Brahm Prakash Memorial Medal by Indian National Science Academy (2013).
2. Prof. R Nagappa, Visiting Professor, National Institute of Advanced Studies (NIAS), Bangalore was conferred with DRDO Academy Excellence Award for the year 2012, which was given by the Raksha Mantri during the Award ceremony held on May 29, 2013 at DRDO Headquarters.
3. Prof. ML Munjal, Honorary Professor and INAE Distinguished Professor, Department of Mechanical Engineering, Indian Institute of Science, Bangalore was honoured by Government of Madhya Pradesh with the “Pt. Jawaharlal Nehru National Award in Engineering and Technology for the year 2010” in recognition of his outstanding contributions in the field of Noise Pollution Control. The award was given by the Honorable Minister for Science and Technology, Govt. of M.P. on May 18, 2013.
4. Prof. S Ranganathan, INAE Distinguished Professor, Centre for Advance Study, Department of Metallurgy, Indian Institute of Science, Bangalore was conferred with Lifetime Achievement Award by The Electron Microscope of India on July 3, 2013.

5. Col SP Wahi, Chairman, SP Wahi Management and Technology Consultants Pvt. Ltd., Gurgaon was conferred with the Lifetime Achievement Award by Bureaucracy Today in recognition of building institutions and exemplary work performance on June 19, 2013. He was also conferred with “2014 Global Excellence Award in Petroleum Sector” by Energy and Environment Foundation for his vision, leadership, outstanding contribution and for demonstrating excellence in the Petroleum Sector.
6. Prof. J Nanda, INSA Honorary Scientist, Department of Electrical Engineering, Indian Institute of Technology, Delhi was conferred with the "Biju Patnaik Award for Scientific Excellence in the field of Engineering and Technology" for the Year 2011 by Odisha Bigyan Academy (OBA) at a special function organised at Suchana Bhavan, Bhubaneswar on 19th July 2013.
7. Prof. Indranil Manna, Director, Indian Institute of Technology Kanpur was conferred with TWAS Prize in Engineering Sciences for 2013 which was presented during the next TWAS 25th General Meeting.
8. Mr. VP Sandlas, Formerly Distinguished Scientist and Chief Controller R&D, DRDO; Director, DEAL, Dehradun; Mission Director, SLV-3, ISRO; Group Director, Electronics, VSSC; Director General, Amity Institute of Space Science & Technology and Amity Institute of Aerospace Engineering has received ‘Eminent Aerospace Engineer’ Award from the Institution of Engineers (India).
9. Dr. CR Prasad, Chairman & Managing Director, Everest Power Private Limited, Gurgaon has been selected for the “Life Time Achievement Oil & Gas Leadership & Excellence Award” by Chemtech Foundation, Mumbai.
10. Prof. Shibani K Koul, Centre for Applied Research in Electronics, Indian Institute of Technology, New Delhi has received the “IEEE MTT-S Distinguished Microwave Award-2014”.
11. Prof. RS Sirohi, Professor of Eminence, Dept of Physics, Tezpur University, Tezpur and formerly Director, IIT Delhi has been conferred with the Distinguished Alumni Award for the year 2013 by IIT Delhi and the Chandra S Vikram Award for Optical Metrology by SPIE in recognition of his significant contributions to optical techniques and instrumentation for speckle metrology, particle-field holography, interferometry, and optical logic.

News of Fellows

1. Dr. Baldev Raj, President, INAE and President-Research, PSG Institutions, Coimbatore was selected to be the President- Elect of International Council of Academies of Engineering and Technological Sciences (CAETS) and has also been elected Chairman of CAETS Energy Committee.
2. Prof. S Ranganathan, INAE Distinguished Professor, Centre for Advance Study, Department of Metallurgy, Indian Institute of Science, Bangalore was invited to join the Advisory Board for the 1st Asian Symposium on Materials Education to be held on December 11-12, 2014.
3. Prof. CVR Murty, Department of Civil Engineering, Indian Institute of Technology Madras, Chennai has taken over as Director, Indian Institute of Technology, Jodhpur w.e.f Sep 11, 2013 for a period of five years.
4. Dr. Sanak Mishra, Formerly Managing Director, Rourkela Steel Plant and Member Board of Directors, Steel Authority of India Ltd., New Delhi; and Formerly Chief Executive Officer, India Greenfield Projects, ArcelorMittal, New Delhi has been appointed as Program Ambassador of the "German Chancellor Fellowship for the Leaders of Tomorrow".

5. Dr. Purnendu Ghosh, Executive Director, Birla Institute of Scientific Research, Jaipur and Chief Editor of Publications, INAE has authored a book “THE RISING SUN”, a collection of stories published by Partridge (a Penguin company). Further details about the book can be viewed on [purnendughosh](#)
6. Dr. MJ Zarabi, Formerly Chairman-cum-Managing Director, Semiconductor Complex Ltd., SAS Nagar (Punjab) and formerly Executive Director Technology, Samtel Color Ltd., Ghaziabad, headed the Empowered Committee responsible for the feasibility study for the setting up of a fab for semiconductor manufacturing facilities in India; which has led to two fabs getting the final approval last year.
7. Prof. Satya N Atluri, UCI Distinguished Professor, Department of Mechanical & Aerospace Engineering, USA was elected as Member of the Academy of Athens.
8. Mr. PS Deodhar, Chairman, Aplab Limited, Thane has authored a Book on “Viewing China from India” published by Mc Graw Hills.
9. Professor Bimalendu B. Bhattacharya, formerly Director, Indian School of Mines, Dhanbad, has taken over as Chairman of Research Council (RC) of CSIR-National Geophysical Research Institute (CSIR-NGRI), Hyderabad with effect from August 1, 2013. The tenure is up to July 31, 2016.
10. Mr. Avinash Chander, Distinguished Scientist & CC R&D (MSS), DRDO has taken over as Scientific Advisor to Raksha Mantri (SA to RM), Secretary, Defence Research & Development and Director General, Defence Research & Development Organization (DRDO)
11. Prof. RK Mallik, Department of Electrical Engineering, Indian Institute of Technology, New Delhi was elected as Fellow of The World Academy of Sciences.
12. Prof. Anurag Kumar, Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore was elected as Fellow of The World Academy of Sciences.
13. Prof. Bhim Singh, Department of Electrical Engineering, Indian Institute of Technology, New Delhi was elected as Fellow of The World Academy of Sciences.
14. Prof. Shalabh Bhatnagar, Department of Computer Science and Automation, Indian Institute of Science, Bangalore has received the Fellowship of Institution of Electronics and Telecommunication Engineers (IETE).
15. Prof Satya N Atluri, UCI Distinguished Professor, Department of Mechanical & Aerospace Engineering, USA has been elected as Member of the Academy of Athens.

Fellows Deceased in Last one Year

The Council learned with deep regret regarding the demise of the following Fellows during the period April 1, 2013 to March 31, 2014.

1. Dr. A Ramakrishna Past President, Indian National Academy of Engineering during 2003-2004. He had served as President and Deputy Managing Director, Larsen & Toubro Ltd, Chennai and was also Director, International Infrastructure Consultants Pvt Ltd, Chennai
2. Prof. NL Arora, formerly Professor & Head, National Wind Tunnel Facility, Indian Institute of Technology Kanpur
3. Prof CRL Murthy, formerly Professor, Department of Aerospace Engineering, Indian Institute of Science, Bangalore.

Inauguration of INAE Office at Gurgaon

The activities of the Academy having expanded in the recent past and due to paucity of space at the premises of INAE office at Vishwakarma Bhawan, another office space was purchased by INAE at Gurgaon, this year. INAE office at Gurgaon was ready for functioning during the first week of January 2014 and was formally inaugurated on January 22, 2014. An inauguration function was held which was attended by members of the Governing Council. Dr Baldev Raj, President, INAE and Dr PS Goel, Past President, INAE participated in the ribbon and cake cutting ceremonies at the inauguration function. To mark the occasion, a special Governing Council Meeting was held in the new office premises on the same day. Both INAE offices are now functional and operational.

*Dr. Baldev Raj, President, INAE and
Dr. PS Goel, Immediate Past-President,
INAE inaugurating INAE office
at Gurgaon*



Cake cutting ceremony



INAE Meeting in Progress

INAE Annual Convention

The Annual Convention of the Indian National Academy of Engineering was held on Dec 13-14, 2013 at SOA University, Bhubaneswar. The major scientific and engineering highlights of the Convention were the following technical presentations:

Presentations by newly elected Fellows

- ❖ Mr. Sudhir Vasudeva : Technological March in Exploration & Production ONGC Leads the Way
- ❖ Prof. Debatosh Guha : New Thoughts and Innovations for Wider Applications of Microstrip and Dielectric Resonator Antennas
- ❖ Prof. AJ Pal : Materials Engineering for Organic Electronics
- ❖ Prof. C Balaji : Experimental Investigations on Thermal Performance of Phase Change Material Based Composite Heat Sinks
- ❖ Mr. MM Madan : “Hydro Power in India” – Towards Sustainable Development
- ❖ Mr. PS Veeraraghavan : Autonomous Access to Space ISRO’s Achievements and Challenges Ahead
- ❖ Prof. Shalabh Bhatnagar : Smoothed Functional Algorithms For Optimization
- ❖ Mr. K Sreekumar : Development of a Ship Borne High Precision RF Tracking System
- ❖ Prof. Yukio Tamura : Wind Engineering for Safer and Sustainable Society
- ❖ Prof Suresh K Bhargava : Nano Engineered surfaces for Mercury Sensing in Air
- ❖ Prof. MC Deo : Modern Data-Driven Methods to Solve Problems in Coastal Engineering
- ❖ Prof. K. G. Ayappa : Adsorbed Natural Gas as a Transportation Fuel: Multiscaling From Molecules to Onboard Delivery Systems
- ❖ Prof. Sukhdev Roy : Ultrafast All-Optical Computing with Organic Molecules and Silicon Microresonators
- ❖ Prof. Vinod Sharma : Mathematical Models and Algorithms for Energy Harvesting Wireless Networks
- ❖ Prof. Pallab Dasgupta : Formal Verification for Safe Engineering Design
- ❖ Dr. Shashank Chaturvedi : Computer Simulations for High Energy Density Applications
- ❖ Prof. Joseph Mathew : Prediction of Turbulent Flows for Next Generation Devices
- ❖ Dr. K.S.M.S. Raghavarao : Food and Bio-Process Engineering - Research Contributions
- ❖ Prof. PA Lakshminaryanan : Rate of Heat Release in a modern DI Diesel Engine
- ❖ Prof. AK Pradhan : Innovative Network Protection for a Reliable Power System
- ❖ Dr. Samir V. Kamat : Mechanical Characterization of MEMS Materials and Structures
- ❖ Prof. S Narasimhan : Extracting Process Knowledge from Data

Presentations by Young Engineer Awardees 2013

- ❖ Dr. Ishan Sharma : Dynamics, stability and segregation of granular materials
- ❖ Dr. Jagabondhu Hazra : Real Time Blackout Prediction Using High Performance Computing
- ❖ Dr. Pankaj Wahi : Reduced order modeling for Engineering Systems
- ❖ Dr. Karthik Ramanathan : Macro-scale and Kinetic Modeling of Automotive Exhaust Aftertreatment Devices
- ❖ Dr. Phaneendra Kumar Yalavarthy : Development of Next Generation Medical Imaging Technologies
- ❖ Dr. Kota Murali : Challenges in Nanodevice Technology
- ❖ Dr. Ashis Kumar Sen : Microfluidics- Theory and Applications
- ❖ Dr. Premlata Jena : Development of protection schemes for different power networks and stressed system conditions
- ❖ Dr. MJNV Prasad : Microstructural Stability and Superplasticity in Electrodeposited Nanocrystalline Nickel
- ❖ Mr. GV Prasad Reddy : Indigenous Development of Nuclear Structural Materials, Characterisation of Mechanical Behavior and Modeling
- ❖ Dr. Rahul Vaze : Fundamental Limits of Wireless Communication

The 25th Annual General Meeting of Fellows was held in the afternoon on Dec 13, 2013. During the Induction Ceremony, thirty Fellows/Foreign Fellows were formally admitted into the Academy. The Grand Award Ceremony was held on the same day. The INAE Young Engineer Awards and the Innovative Students Projects Awards were conferred during the Award Ceremony.

Dr. Premlata Jena receiving INAE Young Engineer Award from President, INAE





Dr Manmohan Das Goel receiving Innovative Student Projects Award from President, INAE

Prof. Souvik Bhattacharyya, Deputy Director, Indian Institute of Technology Kharagpur and Prof JC Misra, Department of Mathematics, Institute of Technical Education and Research (ITER), SOA University, Bhubaneswar were conferred the INAE Outstanding Teachers Award 2013. Prof Souvik Bhattacharyya was awarded in recognition of his outstanding contributions to technical education, pedagogy and innovative methods of enhancing learning and inculcating research culture among students. Prof JC Misra was conferred the award in recognition of his significant contributions as a dedicated teacher, brilliant researcher and his role in popularizing science and technology among students.

Prof. Souvik Bhattacharyya receiving Outstanding Teachers Award from Dr Baldev Raj, President, INAE



Prof. JC Misra receiving Outstanding Teachers Award from Dr Baldev Raj, President, INAE



Prof. ML Munjal, Honorary Professor & INSA Senior Scientist, Department of Mechanical Engineering, Indian Institute of Science, Bangalore was conferred the Prof. Jai Krishna Memorial Award 2013 in recognition of his outstanding and pioneering research contributions in the area of Acoustics, Noise and Vibration Control. Prof. N Balakrishnan, Associate Director and Professor, Supercomputer Education & Research Centre and Department of Aerospace Engineering, Indian Institute of Science, Bangalore was conferred the Prof. SN Mitra Memorial Award 2013 in recognition of his significant contributions in national programmes for Technology Development in Indian Languages, Information Security and capability building in Supercomputing.



Prof. ML Munjal receiving Prof. Jai Krishna Memorial Award 2013 from Dr Baldev Raj, President, INAE

Prof. N Balakrishnan receiving Prof. SN Mitra Memorial Award 2013 from Dr Baldev Raj, President, INAE



Prof. KL Chopra, Former Director, IIT Kharagpur and Formerly IREDA Chair Professor, Centre for Energy Studies and Thin film Laboratory, Physics Department, IIT, New Delhi; and Col SP Wahi, Chairman, SP Wahi Management and Technology Consultants Pvt. Ltd., Gurgaon and Formerly Chairman, Oil & Natural Gas Commission, New Delhi were conferred Life Time Contribution Awards in Engineering 2013. Prof. KL Chopra was conferred the award in recognition of his outstanding contributions as an eminent educator, institution builder and for his pioneering research in "Thin Films" in India whereas Col SP Wahi was awarded in recognition of his outstanding contributions to propagation of engineering profession, providing transformational leadership and institution building, leading to the development of the nation. Life Time Contribution Award lectures were delivered by Prof. KL Chopra and Col SP Wahi. Outstanding Teachers Award lectures were delivered earlier in the day by Prof. Souvik Bhattacharyya and Prof. JC Misra. Prof Jai Krishna and Prof. SN Mitra Memorial lectures were delivered by Prof. ML Munjal and Prof. N Balakrishnan respectively.



Prof. KL Chopra receiving the Life Time Contribution Award 2013 from Dr Baldev Raj, President, INAE

Col SP Wahi receiving the Life Time Contribution Award 2013 from Dr Baldev Raj, President, INAE



Establishment of Digital Knowledge Research Centre

The INAE Digital Knowledge Research Centre is being set up at INAE Office, Vishwakarma Bhawan, New Delhi. The infrastructure and facilities being created at INAE Digital Knowledge Research Centre are planned in such a manner that all Fellows of INAE can have online access facility to e-journals/e-books/Bibliographic Databases etc from their respective locations. The following facilities are proposed to be set up at this Centre viz a repository of digital and hard copies of Indian/ foreign publications pertaining to the issues of national importance viz. Energy, Water and Environment Management, Healthcare Technologies, Mobility & Transportation, Manufacturing and Information Technology; Database for important engineering information; a repository of engineering books, monographs and on-line access to e-journals of high cost and academic value; Provider of documentation services to INAE Fellows; Harnessing information technology applications in information management and providing formal linkages of communication among the engineering community in the form of research journals in different areas of engineering and technology. For this purpose, a dedicated server with adequate storage capacity along with associated accessories will be required. In addition, a domain controller and application interface for the software aspects will be required. Two experts to ensure reliable functioning of the system would be needed viz. one network administrator and other knowledge resource administrator.

Publications of the Academy

INAE e-Newsletter

With effect from September 2009, INAE monthly electronic newsletter has been started replacing the erstwhile printed copies of quarterly newsletter. This monthly electronic newsletter contains engineering and technology updates and aspects of frontiers of engineering as well as the news regarding INAE activities. Inputs regarding technology updates are being taken from various sources such as journals/newsletters from DRDO, DAE, DOS, CSIR, S&T Report, Embassy of India in Japan and also from websites pertaining to technology review/updates. This also includes important innovative ideas, which can be absorbed for development of innovative engineering products. A new feature of the e-newsletter is the articles submitted by INAE Fellows, pertaining to the highlights of their childhood, education, mentorship, challenges and innovations, which shall inspire the citizens of India to take and deliver challenges in engineering and technology. The monthly INAE e-Newsletter is being sent to the fellowship through email and is also uploaded on the INAE website www.inae.in.

Annals of INAE

The Annals of the INAE containing the text of the lectures delivered by Life Time Contribution Awardees; Professor Jai Krishna and Prof. SN Mitra Memorial Awardees, newly elected Fellows of the Academy and INAE Young Engineer Awardees during the year has been printed and distributed to the Fellowship of the Academy.

INAE Vision Document 2037

Preparation of the INAE VISION 2037 is a logical follow up of a coffee table book entitled “Glimpses of Indian Engineering Achievements”, which was released at the inaugural function of the INAE Silver Jubilee celebrations on 20 April, 2012. This reflected the impressive progress made by Indian Engineering, particularly since Independence. While the nation is poised to achieve a higher growth profile in the coming years, there are numerous concerns for the Indian engineering community, particularly with respect to environmental sustainability, long-term security issues, education, energy, housing, water resources, food, industrial production and public utility infrastructure. INAE would naturally be expected to play a major role in achieving the various Engineering goals of the Country. INAE Vision 2037 tries to envision the state of Indian Engineering during the coming years to enable the Academy to chalk out priorities for its activities. Systematic and actionable programs are required to be realized during the next 25 years for the implementation of the VISION statement of INAE. Anchors and guide posts developed by the Academy will bring clarity to strategic and operational aspects of the Vision; an important part of this effort will be to carve the engineering policies and needed inputs to achieve progress in the anticipated directions.

In the Indian context, R&D in Space, Atomic Energy and Defence are important for strategic reasons. Likewise, production of all forms of Energy, management of Water resources and Environment, and growth of Manufacturing and Chemical industry, are essential for economic growth. But, with India almost quadrupling its population since independence in 1947, the second rebuilding of the nation is mandatory and one issue that takes centre stage is Infrastructure Development. This includes adequate provision of roads, railways, ports, power & irrigation structures and housing & industrial buildings. But, there is a significant shortage of competent engineering manpower in India to undertake the rebuilding of the

nation. A major thrust is required in capacity building of engineers and engineering artisans to create the needed quality and quantity of human resources at a robust pace to meet the pressing demand and engineering education and training are required at different levels, and in various disciplines. Alongside, engineers need to engage in the socio-political canvas to sensitize them on the importance of engineering for all-round growth of the country. It is expected that for the next 25 years, INAE shall undertake missions to address engineering matters of importance to India, including engineering education, public utility infrastructure, clean energy, effective water resource management, a well networked public transportation system and engineering products of global relevance.

Current Trends in Engineering Practice Volume III

The first volume of “Current Trends in Engineering Practice” - a compilation of papers based on the lectures delivered by industry experts in engineering colleges under the AICTE-INAE Distinguished Visiting Professorship scheme was brought out in the year 2006 and the second volume was brought out in 2010. The third volume of this series – “Current Trends in Engineering Practice Volume III” was brought out in August 2013. This deals with recent developments and practices adopted in various projects in different disciplines and specializations and was forwarded to the industry experts and engineering colleges/institutions participating in the AICTE-INAE Distinguished Visiting Professorship Scheme.

New Initiatives during the Year

INAE has undertaken a number of new initiatives in terms of commencing new programmes and conduct of unique events during this year, which have enhanced the outreach and visibility of the Academy both in India and abroad. A brief summary of these novel initiatives is highlighted below

Engineers Conclave

INAE has taken an initiative of organizing an annual mega event for engineers viz. “Engineers Conclave” starting from the year 2013. This “Engineers Conclave” will be organized jointly by INAE with Department of Atomic Energy (DAE), Department of Space (DOS), Defence Research & Development Organization (DRDO) and Council of Scientific and Industrial Research (CSIR) on rotation basis. Each conclave will have two themes, one specific to the host department and other one specific to the social problem where engineering intervention is desired. The first “Engineers Conclave” was held jointly with DRDO during Sep 17-19, 2013 at New Delhi. Shri Pranab Mukherjee, Hon’ble President of India was the Chief Guest during the Inaugural Function at Vigyan Bhawan, New Delhi on Sep 17, 2013.

Collaborative Activities with CAETS Member Academies

Having signed MoUs with a number of CAETS Member Academies, INAE has initiated programs on specific areas which would be progressed further so as to achieve meaningful collaboration on the identified topics. INAE this year has initiated new joint collaborative programs with Royal Academy of Engineering, UK on “Virtual Manufacturing” with National Academy of Science & Engineering (acatech), Germany on “Advanced Manufacturing” and with National Academy of Technology, France on “Affordable Healthcare Technologies”. These collaborations have resulted in conduct of various seminars/conferences/workshops on topics of mutual interest. In this regard, the Indo-UK Joint Seminar on “Functional and Energy Materials, Manufacturing and Structures” was jointly organized with the Royal Academy of Engineering (RAEng), UK at Hyderabad on March 25-26, 2013 and Indo-German Science and Technology Centre (IGSTC) workshop on “Strategies and Concepts for Advanced Manufacturing” was organized with National Academy of Science & Engineering (acatech), Germany on Jan 23-24, 2014 at New Delhi. A joint Workshop with National Academy of Technology, France (NATF) on “Technology and Health Care” is being planned during October 15-16, 2014 at Évry-Génopôle, France. The RAEng–INAE joint workshop on “Distributed manufacturing – opportunities for growth (Perspectives from the UK and India)” is being planned on June 16-18, 2014 at London. INAE delegation led by Dr Baldev Raj, President, INAE shall participate in this event.

INAE Outstanding Teachers Award

INAE instituted the Outstanding Engineering Teachers Award in the year 2013 to honour INAE Fellows who have excelled in the field of teaching in Indian Colleges, Universities, and Institutions, and have provided guidance and inspired students to take up careers in Engineering and Technology. There are a maximum of two such awards per year. One award covers the disciplines of Civil Engineering, Mechanical Engineering, Chemical Engineering, Aerospace Engineering and Mining, Metallurgical and Materials Engineering. The other award will cover Computer Engineering and Information Technology, Electrical Engineering, Electronics and Communication Engineering, Energy and Interdisciplinary Engineering.

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 INAE forums have been constituted. Two new Forums have been constituted this year, viz. “Technology Foresight and Management Forum” with the mandate of preparing a roadmap for addressing National Challenges and “Forum on Engineering Interventions for Disaster Mitigation” with the mandate of identifying key areas for disaster risk mitigation and management, where INAE can play a role through its multidisciplinary expertise and take appropriate actions to pursue them with concerned agencies for achieving tangible results and impact.

Research studies

Studies on issues of national interest are undertaken by the Academy through specially constituted study groups. The objective is to bring out a comprehensive/exhaustive document covering review of national and international technological and commercial aspects, analysis of options, future trends and policy/recommendations for the future roadmap. During the current year, four new research studies have been instituted on “Non-Ionizing Electromagnetic Radiation Effects on Biological Systems and Protection Methods”; “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes”; “Design of an Undergraduate Degree programme for Capacity Building in Developing Modern Civil Infrastructure” and “Development of scientific recycling of ‘End of Life’ Automobiles with special focus on rubber, plastics and residues in India- The role of Research and Development”.

Statement of Accounts 2013-14



Indian National Academy of Engineering

MEHRA MALHOTRA & CO
CHARTERED ACCOUNTANTS

THE MEMBERS
INDIAN NATIONAL ACADEMY OF ENGINEERING
NEW DELHI – 110 016

Phone : 25733778
16A/7 W.E.A.
KAROL BAGH
NEW DELHI – 110 005

AUDITORS REPORT

We report that we have audited the Balance Sheet of **INDIAN NATIONAL ACADEMY OF ENGINEERING** as at March 31, 2014 and also the Income and Expenditure Account for the year ended on that day annexed thereto. These financial statements are the responsibility of the Academy's Management. Our responsibility is to express an opinion on these financial statements based on our Audit.

We conducted our Audit in accordance with auditing standards generally accepted in India. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An Audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An Audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation. We believe that our Audit provides a reasonable basis for our opinion.

Subject to the above :

- i) We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit.
- ii) In our opinion, proper books of account as required by the law have been kept by the Academy so far as appears from our examination of those books.
- iii) The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account.
- iv) In our opinion, the Balance Sheet and Income and expenditure Account dealt with by this report comply with the accounting standards.
- v) In our opinion and to the best of our information and according to the explanations given to us, the said accounts, read with accounting policies and Notes to Accounts thereon, give a true and fair view in conformity with the accounting principles generally accepted in India :
 - a) In the case of Balance Sheet, of the state of affairs of the Academy as at March 31, 2014; and
 - b) In the case of Income and Expenditure Account, of the surplus of Income over Expenditure of the Academy for the year ended on March 31, 2014.

Place : New Delhi
Dated : August 21, 2014

For MEHRA MALHOTRA & CO
CHARTERED ACCOUNTANTS

-Sd-
(ARUN KUMAR MEHRA)
PARTNER
(Membership No. 80827)
(Reg. No. : 001052 N)

BALANCE SHEET AS AT 31ST MARCH, 2014

(Amt in Rs)

	As at 31.3.2014	As at 31.3.2013
<u>CORPUS/CAPITAL FUND AND LIABILITIES</u>		
GENERAL FUND	8,56,96,381	2,88,95,963
EARMARKED FUNDS	1,30,80,317	4,75,83,531
CURRENT LIABILITIES AND PROVISIONS	1,37,97,856	1,59,79,797
TOTAL	11,25,74,554	9,24,59,291
<u>ASSETS</u>		
FIXED ASSETS	4,72,12,326	5,66,743
INVESTMENTS	5,95,95,959	8,46,03,034
CURRENT ASSETS, LOANS & ADVANCES	57,66,269	72,89,514
TOTAL	11,25,74,554	9,24,59,291
SIGNIFICANT ACCOUNTING POLICIES AND NOTES ON ACCOUNTS		

As per our report of even date

On behalf of the Council:

For MEHRA MALHOTRA & CO
CHARTERED ACCOUNTANTS

Sd/-
(Dr Baldev Raj)
President

Sd/-
(Dr Sanak Mishra)
Vice-President
(Finance & Establishment)

Sd/-
(ARUN KUMAR MEHRA)
Partner
(Membership No. 80827)
(Reg. No. : 001052N)

Sd/-
Brigadier Rajan Minocha
Executive Director

Sd/-
(Bhuwan Adhlakha)
Manager (F & A)

Place : New Delhi

Dated : August 21, 2014

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2014

(Amt in Rs)

	Current Year 2013-14	Previous Year 2012-13
<u>INCOME</u>		
Grants and Sponsorships	4,63,14,149	4,11,67,296
Delegate Registration Fees etc.	9,48,451	2,15,854
TOTAL	4,72,62,600	4,13,83,150
<u>EXPENDITURE</u>		
(1) Engineering Activities		
i) Seminars / Conferences / Symposiums / Workshops	56,72,602	85,58,291
ii) INAE Chair , Distinguished Professors & Mentoring Schemes	69,79,432	73,62,487
iii) Research Studies/ Projects	34,95,653	3,56,404
iv) INAE Awards	37,10,411	32,45,421
v) Academia-Industry Interaction	16,75,229	18,30,846
vi) INAE Forums	3,61,967	1,22,740
vii) Academy Meetings	24,99,619	15,66,064
viii) Annual Convention	10,40,219	12,66,064
ix) International Affairs	17,32,076	31,18,626
x) INAE Publications	11,83,697	11,13,738
xi) Financial Assistance for Engineering Activities	10,22,500	3,50,000
(2) Establishment expenses	1,28,59,955	1,20,76,064
(3) Depreciation	49,88,747	1,16,305
(4) Disposal of Assets	8,817	3,915
(5) Transfer to General Fund	31,676	2,96,185
TOTAL	4,72,62,600	4,13,83,150
SIGNIFICANT ACCOUNTING POLICIES AND NOTES ON ACCOUNTS		

As per our report of even date

For MEHRA MALHOTRA & CO
CHARTERED ACCOUNTANTS

Sd/-
(ARUN KUMAR MEHRA)
Partner
(Membership No. 80827)
(Reg. No. : 001052N)

Place : New Delhi
Dated : August 21, 2014

On behalf of the Council:

Sd/-
(Dr Baldev Raj)
President

Sd/-
(Dr Sanak Mishra)
Vice-President
(Finance & Establishment)

Sd/-
Brigadier Rajan Minocha
Executive Director

Sd/-
(Bhuwan Adhlakha)
Manager (F & A)

Gurgaon Office

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Indian National Academy of Engineering