



INAE Quarterly e-Newsletter Vol. X, Issue 1, March 1, 2019

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From the Editor's Desk

Dr Purnendu Ghosh served as Chief Editor of INAE publications with great enthusiasm and distinction over the last six years. He had contributed significantly to maintain the high quality of INAE publications. I sincerely extend my thanks for his valuable contributions to the advancement of INAE publications. Under his guidance the "TNAE Letters" jointly published by Springer and INAE has made its mark in the international arena since its institution three years ago. The journal "TNAE Letters" was originally instituted to ensure the speedy publication of short communications of maximum 3-4 pages. As a continuous endeavour, it has been realised

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Furthermore, I would like to bring to your notice that INAE has entered into an agreement with M/s Springer to facilitate publishing "INAE Book Series". Under this scheme, INAE liaises with M/S Springer on behalf of the desiring Fellows and Young Associates and assists them in formalizing a separate book agreement with the publisher to ensure the speedy publication of their book. The objective in formulating the publication of "INAE Book Series" is to assist the Fellows and Young Associates who may have experienced any difficulty in identifying suitable publishers and formalizing an agreement with them. This in turn expected to enhance the visibility of the Academy in the engineering fora internationally. Under "INAE Book Series", it is planned to cover the comprehensive text books for engineering students, technical books on recent advances in all the disciplines of engineering, edited books on advanced engineering topics, and the proceedings of the important conferences of current interest. All the interested are requested to forward a brief abstract of the book with the contents that are expected to be covered to INAE.



Prof. K. Bhanu Sankara Rao
Chief Editor of Publications, INAE

Pratt & Whitney Chair Professor
School of Engineering Sciences and Technology
University of Hyderabad,
Gachibowli, Hyderabad 500 046

ACADEMY ACTIVITIES

Nominations have been invited for the following:

- **Election to Fellowship:** Last Date for receipt of Nominations- **March 31, 2019**
- **Election to Foreign Fellowship:** Last Date for receipt of Nominations- **March 31, 2019**
- **INAE Young Engineer Award:** Last Date for receipt of Nominations- **March 31, 2019**
- **INAE Young Entrepreneur Award 2019:** Last Date for receipt of Nominations- **June 30, 2019**
- **Innovative Student Projects Award:** Last Date for receipt of Nominations- **July 7, 2019**
- **Abdul Kalam Technology Innovation National Fellowship:** Last Date for receipt of Nominations for the first phase of 2019-2020 – **August 10, 2019**
- **Nominations invited for Life Time Contribution Award in Engineering 2019; Outstanding Teachers Awards for 2019; Prof Jai Krishna Memorial Award and Prof. SN Mitra Memorial Award for the year 2019:** Last date of receipt of nominations is **May 15, 2019**.

Abdul Kalam Technology Innovation National Fellowship

The first call for nominations for the year 2019-2020 has been announced for the INAE-SERB, DST Abdul Kalam Technology Innovation National Fellowship, launched in the year 2017; to recognize, encourage and support translational research by Indian Nationals working in various capacities of engineering profession, in **public funded institutions in the country**.

The Fellowship is applicable to persons engaged in the engineering profession only. The nominee should have a minimum of 5 years' service left in the parent organization. The Fellowship amount is Rs 25,000/- per month in addition to salary being drawn. A Research Grant of Rs.15.00 lakh per annum, which can be utilized for engineering research and innovation activity including hiring of manpower, consumables, national and international travel for research purposes, chemicals, equipment, etc will also be provided. A maximum of 10 Fellowships will be awarded per year. The duration of the Fellowship will be initially for three years, extendable by upto two more years depending on the performance and the Fellowship can be held for a maximum of 5 years. The guidelines and nomination proforma for the subject Fellowship can be downloaded from INAE website **www.inae.in**

Nominations are accepted for the Fellowship throughout the year. In addition, two calls for nominations are announced in each Financial Year. A soft copy of the nomination is required to be forwarded to INAE through email followed by one ink signed original hard copy to be sent to INAE Office, Gurgaon through Speed Post/Courier.

All nominees who had applied in previous Financial Years are eligible to apply again once in response to either the first call or second call for nominations announced for the Financial Year 2019 - 2020. As per guidelines, a nominee may also apply again once in each subsequent Financial Year till he/she has a residual service of five years left in his/her parent organization.

The last date for the receipt of nominations to be considered in response to the first call for nominations for the Financial Year 2019- 2020 is August 10, 2019.

Selection of Candidates for conferment of Abdul Kalam Technology Innovation National Fellowship by the Search – cum - Selection Expert Committee during its Meeting on Jan 12, 2019

The Search – cum - Selection Expert Committee for the Abdul Kalam Technology Innovation National Fellowship, during its second meeting for the Financial Year 2018-19, held on Jan 12, 2019, considered the quality of the translational research in the proposals and selected the following for conferment of the Fellowship w.e.f February 1, 2019.

- i) Dr G Padmanabhan, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), Hyderabad
- ii) Prof Sudip Misra, Indian Institute of Technology (IIT) Kharagpur
- iii) Prof Ashwini Kumar Agrawal, Indian Institute of Technology (IIT) Delhi

Inauguration of New INAE Digital Centre, Gurgaon by Prof Ashutosh Sharma, Secretary, DST

The new INAE Digital Centre was inaugurated by Prof Ashutosh Sharma, FNAE, Secretary, DST on Feb 15, 2019. This Digital Centre is located at the 9th Floor in the same building viz. SPAZE IT Park, Tower A, Gurgaon wherein the current INAE Office is housed at the 6th Floor. The INAE Digital Platform being housed in this newly inaugurated Digital Centre recently undertook the revamping of newly designed interactive INAE website which was launched during the Inaugural Session of the INAE Annual Convention Inaugural session held on December 14, 2018 at RCI, Hyderabad. Some of the new features being designed for the INAE website as an activity of the Digital Centre are Wider Slide Show of photos; Improved Site search; Quick Links; What's New - section including Recent / Forthcoming activities and INAE Activities Spotlight; Improved Sitemap (for better website navigation); Online application for INAE schemes; Downloadable INAE publications and Social media Integration.

Prof Ashutosh Sharma also addressed the INAE Office bearers during the Apex Committee Meeting held on Feb 15, 2019 prior to the inauguration. Prof Sharma in his address briefed about a few landmark initiatives of DST in promoting the growth of engineering and technology in the country. He also highlighted a few successful joint initiatives between INAE and DST and gave suggestions on topics of interest to DST, on which INAE may undertake future joint activities/programmes.



Prof Ashutosh Sharma, Secretary DST Inaugurating the New INAE Digital Centre



L to R: Dr Sanak Mishra, President, INAE; Prof Ashutosh Sharma Lighting the Lamp and Brig Rajan Minocha, Executive Director, INAE

INAE Annual Convention 2018

The INAE Annual Convention was held on December 13-15, 2018 at Research Centre Imarat (RCI), Hyderabad. The Convention commenced with the INAE Governing Council Meeting on Dec 13, 2018 followed by the Award Lectures by two winners of Life Time Contribution Award in Engineering 2018- Dr RK Bhandari and Prof Juzer Vasi and the INAE Fellows Dinner.

The Inaugural Session of the Main Programme of the Annual Convention was held on Dec 14, 2018 which commenced with the Welcome Address by Mr. BHVS Narayana Murthy, Director, RCI, Hyderabad. The highlights of the event were the Address by Guest of Honour - Mr. BVR Mohan Reddy, Founder & Executive Chairman, Cyient Ltd., Hyderabad and Address by Chief Guest – Prof. BL Deekshatulu, Formerly Director, National Remote Sensing Agency, Hyderabad. This was followed by the Special Induction Ceremony of INAE Fellows from Industry. The Launch of newly designed interactive INAE website, developed under the aegis of the newly instituted INAE Digital Platform was conducted by Mr. K Ananth Krishnan, Executive Vice-President and Chief Technology Officer, TCS, Chennai as the next feature of the Inaugural session. The release of the Monograph on “Malpa Landslide Disasters” prepared by the INAE Forum on Engineering Interventions for Disaster Mitigation under the Chairmanship of Dr RK Bhandari was the then featured in the Inaugural Session.



Release of the Monograph on “Malpa Landslide Disasters”

Two Plenary Talks were held during the event, the first was delivered by the spokesperson, Dabbawala on behalf of Mr. Ulhas Muke, President of Mumbai tiffin box supplier, Dabbawala and the second on “Ballistic Missile Defence” by Mr Raja Babu, Program Director, RCI, Hyderabad.

An Industry Session was held on Dec 15, 2018 wherein the lectures were delivered by the INAE Innovator Entrepreneur Awardees. Mr Nitesh Kumar Jangir delivered a lecture on “Saving Lives at Critical Stage Indigenous Technologies”; Prof Tarun Gupta made a presentation on “Lab to Market: Aerosol Measurement Devices” and Mr Tushar Vyas delivered a lecture on “Nasofilters: a Nano Solution to Global Problems of Air Pollution”.

The 30th Annual General Meeting of Fellows was held on Dec 15, 2018. During the Induction Ceremony, the newly elected Fellows and Young Associates were formally admitted into the Academy by the President, INAE. Technical Sessions were held on Dec 14, 2018 in which newly elected Fellows (whose Fellowship is effective from Nov 1, 2018) and INAE Young Engineer Awardees 2018 made presentations relating to their own significant engineering contributions.

The Grand Award Ceremony was held on the evening of December 14, 2018. Dr RK Bhandari and Prof Juzer Vasi were conferred the Life Time Contribution Award in Engineering 2018. Dr TK Alex and Shri B Prasada Rao were conferred the Prof Jai Krishna Memorial Award and Prof SN Mitra Memorial Award

2018 respectively. Mr. Nitesh Kumar Jangir, Director, Coeo Labs, Bangalore and joint awardees Prof. Tarun Gupta, IIT Kanpur and Mr. Tushar Vyas, CTO, Nanoclean Global Private Limited, New Delhi were conferred the INAE Innovator Entrepreneur Awards 2018. A special commendation was also given to Dr Mayank Shrivastava, Indian Institute of Science, Bangalore. Ten Young Engineer Awards were conferred to brilliant engineers below 35 year of age. The Innovative Student Project Awardees comprised of Six awards at Doctoral level ; two at Master's Level and eight at Bachelors Level who were presented for innovation in their project/thesis work.



Dr RK Bhandari being conferred with the Life Time Contribution Award in Engineering 2018



Prof Juzer Vasi being conferred with the Life Time Contribution Award in Engineering 2018



Dr TK Alex being conferred the Prof Jai Krishna Memorial Award 2018



Mr B Prasada Rao being conferred the Prof SN Mitra Memorial Award 2018

In addition, a Cultural Programme prior to the Dinner was organized on December 14, 2018. All INAE Fellows and Young Associates had been invited to participate in the Annual Convention 2018.

IEEE-INAE Workshop on Electromagnetics, held on Dec 6-8, 2018 at Trivandrum

A 'Symposium on Electromagnetics and Engineering Education' was organized by the Madras Chapter of the IEEE Antennas and Propagation Society (AP-S) at IIT Madras on January 3, 2014. This symposium was attended, among others, by Tapan K. Sarkar, the then President of the AP-S. At this symposium, a hope had been expressed by the organizing chairs Prof Krishnasamy T. Selvan (SSN College of Engineering) and Dr Harishankar Ramachandran (IIT Madras) that that the event would become a regular feature. Consistent with this hope, the 'IEEE-INAE Symposium on Electromagnetic Education and Research' was organized by the AP-S Madras Chapter at SSN College of Engineering in December 2016.

As a sequel to this programme, the 'IEEE-INAE Workshop on Electromagnetics' was held in Trivandrum, Kerala, during December 6-8, 2018. This event was organized jointly by the Kerala and Madras Chapters of IEEE AP-S. The Workshop had Dr B.N. Suresh, INAE President and Chancellor, IIST and Dr V.K. Dadhwal, Director, IIST as Honorary Chairs; Prof Krishnasamy T. Selvan, SSN CE and Dr C.K. Anandan, CUSAT, as General Chairs; and Dr Chinmoy Saha and Dr Basudeb Ghosh of IIST as Organizing Chairs. The Workshop featured 2 keynote talks – one by Dr Tapan K. Sarkar, Syracuse University, USA, on "Generation of non-minimum phase response from amplitude only data" and another by Dr V.K. Dadhwal, IIST, on "Applications of space borne microwave remote sensing." Besides these, there were 7 invited talks and about 50 contributed papers. The programme received very good feedback from all participants and stakeholders.



Group Photo of Participants in the Workshop



Prof KT Selvan receiving a Memento

INAE on Facebook and Twitter

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

- (a) Facebook -link <https://www.facebook.com/pages/Indian-National-Academy-of-Engineering/714509531987607?ref=hl>
- (b) Twitter handle link <https://twitter.com/inaehq1>

All INAE Fellows are requested to visit and follow the above to increase the visibility of INAE in Social media.

Important Meetings held during December 2018, January 2019 and February 2019

- INAE Governing Council meeting held on Dec 13, 2018 at RCI, Hyderabad
- Meeting of Forum on Engineering Education held on Dec 14, 2018 at RCI, Hyderabad
- Meeting of Forum on Energy held on Dec 14, 2018 at RCI, Hyderabad
- Meeting of Forum on Engineering Interventions for Disaster Mitigation held on Dec 14, 2018 at RCI, Hyderabad
- AICTE -INAE Travel Grant Scheme Committee and INAE Travel Grant Scheme Committee Meetings held on Dec 14, 2018 at RCI, Hyderabad.
- Annual General Meeting (AGM) and Special General Meeting (SGM) of Fellows held on Dec 15, 2018 at RCI, Hyderabad
- Meeting of INAE Forum on Civil Infrastructure held on Dec 17, 2018 at New Delhi
- Meeting of INAE Forum on Technology, Foresight and Management held on Dec 27, 2018 at INAE Office, Gurgaon
- INAE-DST Consultative Committee Meeting held on Jan 11, 2019 in the Office of Secretary, DST, New Delhi
- Meeting of Search – cum - Selection Expert Committee of Abdul Kalam Technology Innovation National Fellowship held on Jan 12, 2019 at INAE Office, Gurgaon
- Frugal Innovation Nurturing Programme meeting on Jan 16, 2019 at Bangalore
- AICTE -INAE Programme Committee Meeting held on Feb 8, 2019 at INAE Office, Gurgaon
- INAE Corpus Fund Committee Meeting on Feb 14, 2019 at New Delhi

Academia Industry Interaction

AICTE-INAE Distinguished Visiting Professorship Scheme

Industry-academia interactions have become essential as with the world over technological changes in recent times these can impart relevant knowledge to the students in the engineering institutions, that is sustainable in the changing conditions. While industries could gain by using the Academia's knowledge base to improve the industry's cost, quality and global competitive dimensions; thereby reducing dependence on foreign know-how and expenditure on internal R&D, academicians benefit by seeing their knowledge and expertise being fruitfully utilized practically and also by strengthening of curricula of educational programs being offered at engineering colleges/institutions. INAE together with All India Council for Technical Education (AICTE) launched "AICTE-INAE Distinguished Visiting Professorship Scheme" in 1999. Under this scheme, Industry experts are encouraged to give a few lectures in engineering institutions. This scheme has become popular among industry experts as well as engineering colleges.

Brief details pertaining to recent visits of industry experts under this scheme are given below.

Dr Jayanta Kumar Saha Deputy General Manager (Applications) Institute for Steel Development & Growth	Indian Institute of Engineering Sciences and Technology, Shibpur July 25-27, 2018	Delivered lectures on "Latest Developments in Welding Techniques on Structural Steels and Overview of Non-destructive Testing"; "Fire Resistance Steel Relevance w.r.t. Passive Fire Protection and Industry 4.0 Significance in Steel
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	Jan 28-30,2019	<p>Industries" and "Basic Understanding of Different Types of Protection of Metals from Corrosion". As per the feedback from the engineering institute the interactive sessions helped the students to correlate the applications with theoretical knowledge on the subject. The DVP is also helping students in skill development.</p> <p>Delivered lectures on "Applied Knowledge in Metallurgical Engineering", "Latest Development of Automotive Grades of Steels and their protection techniques" and " Overview of different types of Coatings (Organic, Metal & Hybrid) Techniques applied for Steel Structures as Corrosion Protection". As per the feedback given by the engineering college, the lectures were interactive highlighting the importance of domain knowledge in Materials Science and Engineering.</p>
Dr Suvankar Ganguly Principal Scientist, R&D Division, TATA Steel Ltd.	<p>Department of Mechanical Engineering, Jadavpur University</p> <p>August 24, 2018</p> <p>December 20, 2018</p>	<p>Delivered lectures on " Heat Transfer and Phase Transformation of Hot Rolled Steel in Industrial Run-out: Mathematical Modelling and Lab Experiments". As per the feedback from Engineering College, the scheme allows the students and faculty members to get exposure to industrial relevant projects and their correlation with fundamental topics.</p> <p>Delivered lecture on "Numerical Implementation of a Heat Transfer Model in Industrial Run Out Table During Rolling: Discussion for Specific Cases". According to the feedback from the engineering college, the topic was relevant to research being carried out in the department and directly beneficial for PhD students, PG and UG students working in the area.</p>
Mr. Nawal Kishore Gupta Former Deputy Director LPSC/ISRO	<p>Madhav Institute of Technology & Science, Gwalior</p> <p>October 25-28,2018</p>	<p>Delivered lectures on "Introduction to the World Space Program Scenario - An Overview", "Introduction to ISRO; Planetary Sciences and Astronomy", " Calculations of Planet Orbits and Escape Velocity". He also helped in project work and in forming an aerospace club MITS. According to the feedback received from engineering college, the scheme is beneficial as the students learnt about the technology of "Aerospace Propulsion" directly from the Industry Expert based on his experience in the field.</p>

	<p>Department of Metallurgical Engineering, JNTUH, Hyderabad.</p> <p>December 18, 2018</p>	<p>Analysis and Measurement Residual Stress" and "Hardness Measurement and its Application". according to the feedback from college, the scheme provides an excellent opportunity to academicians and experts from research to interact with a purpose.</p> <p>Delivered lecture on " X-ray Diffraction and its Applications: Part I Production and Properties of X-ray" As per the feedback from engineering college the scheme helps academicians to work on problems with practical and industrial relevance. Students also get an opportunity to interact with an Industrial Expert.</p>
<p>Dr. Lalit Kumar Chairman CEPTAM, DRDO, New Delhi; Director (Retd), MTRDC, DRDO, Bangalore</p>	<p>Siddaganga Institute of Technology, Tumkur</p> <p>November 15-17, 2018</p>	<p>Delivered lectures on " Advanced Topics on Microwave Devices and Applications - Part I (Vacuum Tubes, Limitations, Klystron amplifier)", "Advanced TOPICS on Microwave Devices and Applications -Part II (Multicavity Klystron Amplifier, Reflex Klystron TWT)" and "Advanced Topics on Microwave Devices and Applications - Part III (Magnetrons)". According to the feedback from the Faculty Coordinator, the scheme is useful for the Institutes in utilizing the rich experience of distinguished professor for courses, project guidance and research monitoring.</p>
<p>Dr. SK Gupta Project Coordinator (Saline Water), CSSRI</p>	<p>Karnal Institute of Technology and Management</p> <p>November 12-14, 2018</p> <p>ICAR-National Dairy Research Institute, Karnal November 19, 20 & 22, 2018</p>	<p>Delivered lectures in "Crop Water Requirement and Irrigation Scheduling for Irrigation System Design", "Infiltration Indices and their Application in Hydrology" and " Dimensional Analysis and Hydraulic Similitude Studies". He also guided projects on design irrigation structures. According to the feedback received from the engineering institute, the interactions of Distinguished Professor with students have been very beneficial for the students.</p> <p>Delivered lectures on "Gear Pumps and their Applications", " Rotodynamic pumps and their applications" and " Reciprocating Pumps and their Applications". According to the feedback from the engineering college, the interactions with DVP was very helpful from faculty members and students.</p>
<p>Dr. SL Mannan Former Outstanding Scientist and Director Metallurgy and Materials Group, Indira Gandhi Centre for Atomic Research, Kalpakkam</p>	<p>PSG College of Technology, Coimbatore</p> <p>December 4-5, 2018</p>	<p>Delivered lectures on "Creep Deformation and Fracture Lecture-I" and "Creep Deformation and Fracture - Lecture II". According to the feedback from the engineering college both faculty members and the students were benefitted and would like to have more of such interactions with the distinguished industry expert.</p>

<p>Dr Chaitanyamoy Ganguly Former Distinguished Scientist, DAE</p>	<p>Dr MN Dastur School of Materials Science and Engineering, Indian Institute of Engineering Science and Technology, Shibpur</p> <p>December 14, 17&18, 2018</p>	<p>Delivered lectures on "Nuclear, A Carbon -Free Option, for Sustainable Energy Security and Environmental Protection", " Nuclear Fuels and Fuel Cycle Programme in India - Prospects and Challenges of Uranium & Thorium Fuel Cycle" and "Non -Power Applications of Nuclear Energy - Radiation & Radioisotopes in Food, Agriculture, Medicine & Healthcare & Sterilization of Sewage Sludge". According to the feedback received from the engineering college the lectures by the DVP has laid the foundation for taking up energy, environment and food security as a research and academic programmes of the Institute.</p>
<p>Dr Ananta Lal Das Ex Director, Society for Applied Microwave Electronics Engineering and Research (SAMEER)</p>	<p>National Institute of Technical Teachers Training and Research, Chandigarh</p> <p>December 19-21,2018</p>	<p>Delivered lecture on "RFID and Applications", "Antennas for RFID Applications" and "An Overview of Electromagnetic Interference & Electromagnetic Compatibility". According to the feedback received from the college, the scheme is important as the students get exposed to new areas of research.</p>
<p>Dr SK Gupta Project Coordinator (Saline Water), CSSRI</p>	<p>ICAR-National Dairy Research Institute, Karnal</p> <p>Jan 7-9,2019</p>	<p>Delivered lectures on "Discharge Measurement: Open Channels", "Discharge Measurement: Pipe Flow" and "Instrumentation for Surface Level Measurements". According to the feedback from the engineering college the lectures have been beneficial for the students.</p>
<p>Prof MR Madhav Professor Emeritus and Visiting Professor, IIT Hyderabad and JNTUH</p>	<p>Gayatri Vidya Parishad College of Engineering, Visakhapatnam</p> <p>Jan 9-10, 2019</p>	<p>Delivered lectures on " Supporting Foundations" and "Pavements with Geosynthetics". According to the feedback from the engineering college, Prof Madhav helped in introduction of a course relevant to the existing curriculum and his visits have been beneficial for both UG and PG students.</p>
<p>Prof. KG Narayankhedkar Former Professor (Mech Engg) and Dean (Planning), IIT Bombay; Director, VJIT, Mumbai</p>	<p>Atharva College of Engineering, Malad, Mumbai</p> <p>Jan 16-18, 2019</p>	<p>Delivered lectures on "Challenges in First Engineering- some thoughts", " How to Write a Technical Paper?" and "Teaching-Learning Process". According to the feedback from the engineering college the sessions conducted by DVP were effective, informative, thought provoking and motivational for students and faculty members.</p>
<p>Prof. V. Radhakrishnan Professor, Department of Mechanical Engineering, IIT Madras & Emeritus Professor of Indian Institute of Space Science and Technology</p>	<p>College of Engineering, Pune</p> <p>Jan 28-30, 2019</p>	<p>Delivered lectures on "Conceptual Changes in Manufacturing", "Challenges in Surface Metrology" and "Technology Options for Future Manufacturing". Interacted with Faculty members and PhD students regarding projects. According to the feedback from the engineering college, the interactions have helped the department of Production Engineering & Industrial Management to strengthen the</p>

		research activities.
Prof. Bankim Chandra Majumdar Formerly Professor, Department of Mechanical Engineering, IIT Kharagpur	Adhiyamaan College of Engineering, Tamil Nadu Jan 23-25,2019 National Institute of Science and Technology, Berhampur, Odisha Jan 31, 2019, Feb 1-2, 2019	Delivered lectures on " Basics of Hydrodynamic Lubrication", "Idealized Bearings-Part I Slider Bearings" and "Idealized Bearings - Part II Journal Bearings". According to the feedback received from the engineering college, the interactions have been beneficial for PG students specially for developing model and other research-oriented activities. He also has advised few students on their thesis work. Delivered lectures on "Parallel Forces in Plane, Problem Solving"; "Support System General Cases of Parallel Forces in a Plane, Centre of Parallel Forces and Centre of Gravity, Problem Solving" and "Centre of Gravity of Lines (Curves) and Areas, Problem Solving". As per the feedback received from the engineering college, the DVP is an authority on Tribology and the current visit was very useful for setting up conventional in-house lathes. The sessions were very interactive and the second year and third year students received valuable guidance for minor projects.

International/National Conferences/Seminars being organized by IITs/other Institutions

To view a list of International/ National Conferences/Seminars being held in the month of March 2019, April 2019 and May 2019 click here.

Honours and Awards

1.	Dr RK Bhandari, FNAE, Formerly Director, Central Building Research Institute, Roorkee & Programme Director, UN-HABITAT, Nairobi and Formerly Chairman, Centre for Disaster Mitigation and Management, VIT, Vellore was conferred the Life Time Achievement Award 2017 by the Indian Building Congress at its 23rd Annual Convention held in Patna on Dec 28, 2018.
2.	Dr U Kamachi Mudali, FNAE, Distinguished Scientist & Chairman & Chief Executive Heavy Water Board (HWB), Department of Atomic Energy, Mumbai is being honoured with the "Distinguished Alumnus Award" by IIT Bombay for 2018 and the award will be conferred on March 08, 2019
3	Dr M. Arunachalam, FNAE, Professor, Electrical and Electronics Engineering, Raja Rajeswari College of Engineering, Bengaluru and Formerly General Manager at EDN, BHEL, Bengaluru was conferred the 'Outstanding Service Award 2018' for his Outstanding Contributions to the Indian Power Sector, by the IEEE Power and Energy Society, Bangalore Chapter during the AGM of IEEE PES, Bangalore Chapter held on January 27, 2019 at Bangalore.
4.	Prof RP Mohanty, FNAE, Chief Consultant, SOA Deemed to be University, Bhubaneswar and formerly Senior Advisor, ICFAI Group, Hyderabad; Formerly Vice-President, The Associated Cement Companies Ltd., Mumbai, Formerly Chair Professor, Dean and Advisor, ITM Group of Institutions, Navi Mumbai and formerly Vice-Chancellor, Siksha 'O' Anusandhan University, Bhubaneswar has been awarded as the Distinguished Educator for his noteworthy contributions in the field of Management Education by the Operational Research Society of India. The award

is instituted in honour of Prof. P. C. Mahalanobis, the Founder President of the society. Prof. Mohanty was felicitated on the day of 19th December, 2018 at IIT Bombay during the celebration of the 51st Annual Convention.

News of Fellows

1	The lectures delivered at IIT Delhi by Prof SS Murthy, FNAE, Adjunct Professor, NIAS, Bengaluru and IIT Ropar and Formerly Professor, Elec. Engg. IIT Delhi, Vice Chancellor, Central University of Karnataka, Director, NIT. Surathkal, Director, Electrical Research & Dev. Association, Baroda, Distinguished Professor, CPRI, Bengaluru are available on YOUTUBE. The topics covered in the lectures are Introduction to Electric Machines; Electric Machines; Electromechanical Energy Conversion; Synchronous Machines; Induction Machines; DC Machines; Electric Drives and Modeling of Electric Machines.
2	Prof SV Kulkarni, FNAE, INAE Chair Professor, Department of Electrical Engineering Indian Institute of Technology Bombay, Mumbai has been elevated to the grade of IEEE fellow w.e.f Jan 1, 2019 for his contributions to transformer engineering education.
3	Dr RK Bhandari, FNAE, Formerly Director, Central Building Research Institute, Roorkee & Programme Director, UN-HABITAT, Nairobi and Formerly Chairman, Centre for Disaster Mitigation and Management, VIT, Vellore has been invited to be Distinguished Visiting Professor at IIT Roorkee in recognition of his pioneering academic and research contributions in the area of Disaster Mitigation & Management.

International/National Conferences in March 2019, April 2019 and May 2019

International Conference on Advances in Mechanical Engineering and Nanotechnology (ICAMEN 2019) on March 8-9, 2019 at Jaipur,
<https://conferencealerts.com/show-event?id=206290>

2019 2nd IEEE International Conference on Signal Processing and Communication on March 29-30, 2018 at Coimbatore
<https://conferencealerts.com/show-event?id=211898>

International Conference on Advanced Computing Trends & Cyber Security (ICIRCSIT'2019) supported by CSI, MeitY & DRDO on March 30, 2019 at New Delhi,
<https://conferencealerts.com/show-event?id=210487>

International Conference on Electronics Comm, Robotics Data Mining Information Sciences & Electrical Eng. (ERDIE-2019) on March 30, 2019 at New Delhi
<https://conferencealerts.com/show-event?id=210223>

International Conference on Civil Eng. Built Environment Architecture & Environmental Sciences for Sust. Develop (CBAE-19) on March 30, 2019 at New Delhi
<https://conferencealerts.com/show-event?id=210224>

International Conference on "Mechanical Material, Industrial Automotive Aerospace and Nano-Technology" (MIANT-2019) on April 27, 2019 at New Delhi,
<https://conferencealerts.com/show-event?id=210921>

International Conference on Artificial Intelligence and Data Engineering on May 23-24, 2019 at Nitte, Karkala, Karnataka
<https://conferencealerts.com/show-event?id=209990>

National Seminar on "Advanced Materials & Materials Technologies for Prototypes and Systems" (AMMTPS-2019 hosted by Defence Materials and Stores Research & Development Establishment (DMSRDE) in Kanpur during April 3rd-April 6th 2019 as a part of commencement of Decennial Celebrations of TR Anantharaman Education and Research Foundation, Hyderabad. The Systems to be covered include: Missile Systems, Aerospace Systems, Naval Platforms, and Materials Systems.
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Civil Engineering

1. New 3D-Printed Cement Paste Gets Stronger When It Cracks -- Just Like Structures in Nature

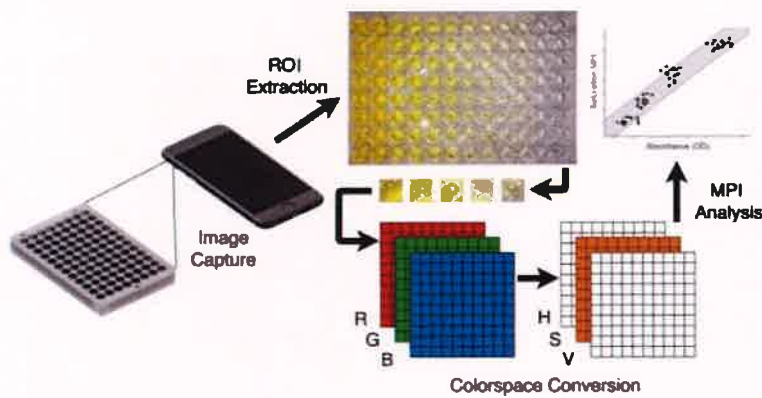


The first-ever bioinspired 3D-printed cement paste element shows promise for making infrastructure more resilient to mechanical loads, like those that occur during natural disasters.

What if the inherent weaknesses of a material actually made houses and buildings stronger during wildfires and earthquakes? Purdue University researchers have 3D-printed cement paste, a key ingredient of the concrete and mortar used to build various elements of infrastructure, that gets tougher under pressure like the shells of arthropods such as lobsters and beetles. The technique could eventually contribute to more resilient structures during natural disasters. The idea would be to use designs inspired by arthropod shells to control how damage spreads between the printed layers of a material, like trying to break a bunch of uncooked spaghetti noodles as opposed to a single noodle. "The exoskeletons of arthropods have crack propagation and toughening mechanisms that we can reproduce in 3D-printed cement paste," said Pablo Zavattieri, Purdue professor of civil engineering. 3D-printed cement-based materials -- such as cement paste, mortar and concrete -- would give engineers more control over design and performance, but technicalities have stood in the way of scaling them up. Purdue engineers are the first to use 3D printing to create bioinspired structures using cement paste. "3D printing has removed the need for creating a mold for each type of design, so that we can achieve these unique properties of cement-based materials that were not possible before," said Jeffrey Youngblood, Purdue professor of materials engineering. The team is also using micro-CT scans to better understand the behavior of hardened 3D-printed cement-based materials and take advantage of their weak characteristics, such as pore regions found at the "interfaces" between the printed layers, which promote cracking. "3D printing cement-based materials provides control over their structure, which can lead to the creation of more damage and flaw-tolerant structural elements like beams or columns," said a Purdue Ph.D. candidate of civil engineering. The team was initially inspired by the mantis shrimp, which conquers its prey with a "dactyl club" appendage that grows tougher on impact through twisting cracks that dissipate energy and prevent the club from falling apart. Some of the bioinspired cement paste elements designed and fabricated by the team using 3D printing techniques include the "honeycomb," "compliant" and "Bouligand" designs, called "architectures." Each of these architectures allowed for new behaviors in a 3D-printed element once hardened. The Bouligand architecture, for example, takes advantage of weak interfaces to make a material more crack-resistant, whereas the compliant architecture makes cement-based elements act like a spring, even though they are made of brittle material. The team plans to explore other ways that cement-based elements could be designed for building more resilient structures.

Source <https://www.sciencedaily.com/releases/2018/10/181003162712.htm>

2. Selfies to Self-Diagnosis: Algorithm 'Amps Up' Smartphones to Diagnose Disease



Images of a diagnostic assay are captured using a smartphone camera. Regions of interest are extracted and are converted to HSV (hue, saturation, value) space. After the conversion process, the standard pixel intensity analysis is applied to the saturation channel and the values are used to determine absorbance and concentration of the sample automatically.

Accessible, connected, and computationally powerful, smartphones aren't just for "selfies" anymore. They have emerged as powerful evaluation tools capable of diagnosing medical conditions in point-of-care settings. Smartphones also are a viable solution for health care in the developing world because they allow untrained users to collect and transmit data to medical professionals. Although smartphone camera technology today offers a wide range of medical applications such as microscopy and cytometric analysis, in practice, cell phone image tests have limitations that severely restrict their utility. Addressing these limitations requires external smartphone hardware to obtain quantitative results -- imposing a design tradeoff between accessibility and accuracy. Researchers from Florida Atlantic University's College of Engineering and Computer Science have developed a novel cell phone imaging algorithm that enables analysis of assays typically evaluated via spectroscopy, a highly sophisticated and powerful device used in scientific research. Through the analysis of more than 10,000 images, the researchers have been able to demonstrate that the saturation method they developed consistently outperformed existing algorithms under a wide range of operating field conditions. Their findings are a step forward in developing point-of-care diagnostics by reducing the need for required equipment, improving the limit of detection, and increasing the precision of quantitative results. "Smartphone cameras are optimized for image appearance rather than for quantitative image-based measurements, and they can't be bypassed or reversed easily. Furthermore, most lab-based biological and biochemical assays still lack a robust and repeatable cell phone analogue," said Waseem Asghar, an assistant professor in FAU's Department of Computer and Electrical Engineering and Computer Science. "We have been able to develop a cell phone-based image preprocessing method that produces a mean pixel intensity with smaller variances, lower limits-of-detection, and a higher dynamic range than existing methods." For the study, researchers performed image capture using three smartphones: The Android Moto G with a 5 megapixel (MP) camera; the iPhone 6 with a 12 MP camera, and the Samsung Galaxy Edge 7 with a 12 MP camera. They tested for image capture at various conditions, measured algorithm performance, tested sensitivity to camera distance, tilt and motion, and examined histogram properties and concentration response. They also examined limit-of-detection as well as properties of saturation, ambient lighting levels and relationship with red-green-blue (RGB) color space. Cell phone images are natively stored as arrays of RGB pixel intensities, commonly referred to as color channels. Using several thousand images, the researchers compared saturation analysis with existing RGB methods and found that it both analytically and empirically improved performance in the presence of additive and multiplicative ambient light noise. They also showed that saturation analysis can be interpreted as an optimized version of existing RGB ratio tests. They verified that the ideal image capture conditions include constant white light, a clean white background, minimal distance to the sample and zero angular displacement of the camera. The researchers also applied the test to an ELISA (enzyme-linked immunosorbent assay), a plate-based assay technique designed for detecting and quantifying substances such as peptides, proteins, antibodies and hormones. They discovered that for HIV, saturation analysis enabled an equipment-free evaluation and a limit-of-detection was significantly lower than what is currently available with RGB methods. The FAU-developed methodology represents an improvement in repeatability, practicality, and image capture noise rejection. In addition, saturation analysis is not affected by many of the major limiting factors for image-based tests, such as ambient lighting variations, shading, and variable light levels. The researchers anticipate that the favorable properties of saturation analysis will encounter and enable cell phone image-based point-of-care tests with less equipment overhead and lower limits-of-detection. The research has important implications for diagnostic medicine and the delivery of health care. The team members are driven to continue to develop cutting-edge technology that has the ability to remotely detect and diagnose diseases rapidly, accurately and inexpensively.

3. The First Walking Robot that Moves Without GPS



Antbot, the first walking robot that moves without GPS.

Desert ants are extraordinary solitary navigators. Researchers were inspired by these ants as they designed AntBot, the first walking robot that can explore its environment randomly and go home automatically, without GPS or mapping. This work opens up new strategies for navigation in autonomous vehicles and robotics. Human eyes are insensitive to polarized light and ultraviolet radiation, but that is not the case for ants, who use it to locate themselves in space. Cataglyphis desert ants in particular can cover several hundreds of meters in direct sunlight in the desert to find food, then return in a straight line to the nest, without getting lost. They cannot use pheromones: they come out when the temperature would burn the slightest drop. Their extraordinary navigation talent relies on two pieces of information: the heading measured using a sort of "celestial compass" to orient themselves using the sky's polarized light, and the distance covered, measured by simply counting steps and incorporating the rate of movement relative to the sun measured optically by their eyes. Distance and heading are the two fundamental pieces of information that, once combined, allow them to return smoothly to the nest. AntBot, the brand-new robot designed by CNRS and Aix-Marseille University (AMU) researchers at ISM, copies the desert ants' exceptional navigation capacities. It is equipped with an optical compass used to determine its heading by means of polarized light, and by an optical movement sensor directed to the sun to measure the distance covered. Armed with this information, AntBot has been shown to be able, like the desert ants, to explore its environment and to return on its own to its base, with precision of up to 1 cm after having covered a total distance of 14 meters. Weighing only 2.3 kg, this robot has six feet for increased mobility, allowing it to move in complex environments, precisely where deploying wheeled robots and drones can be complicated (disaster areas, rugged terrain, exploration of extraterrestrial soils, etc.). The optical compass developed by the scientists is sensitive to the sky's polarized ultraviolet radiation. Using this "celestial compass," AntBot measures its heading with 0.4° precision by clear or cloudy weather. The navigation precision achieved with minimalist sensors proves that bio-inspired robotics has immense capacity for innovation. Here we have a trio of advances. A novel robot has been developed, new, innovative and unconventional optical sensors have been designed, and AntBot brings new understanding on how desert ants navigate, by testing several models that biologists have imagined to mimic this animal. Before exploring potential applications in aerial robotics or in the automobile industry, for example, progress must be made, for instance in how to operate this robot at night or over longer distances.

Source <https://www.sciencedaily.com/releases/2019/02/190213142705.htm>

4. A Better Way to Make Acrylics

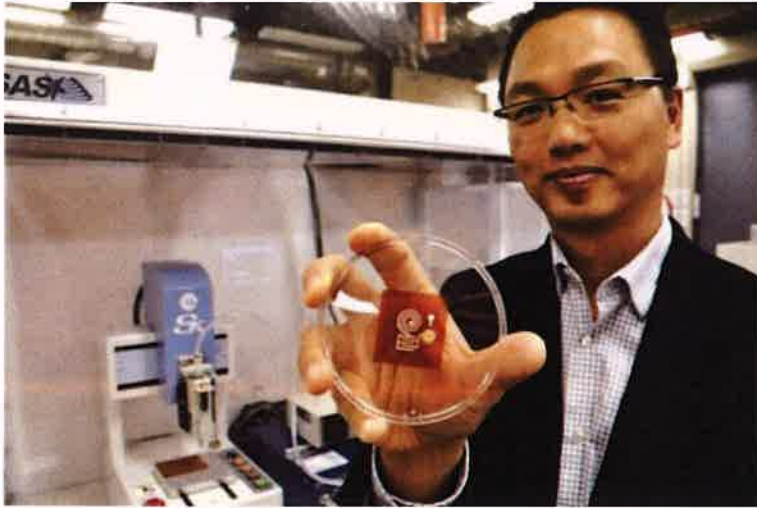
Acrylics are an incredibly diverse and useful family of chemicals used in all kinds of products, from diapers to nail polish. Now, a team of researchers from UConn and ExxonMobil describe a new process for making them. The new method would increase energy efficiency and reduce toxic byproducts. The global market for acrylic acid is enormous. The world used close to 5 million metric tonnes of it in 2013, according to industry group PetroChemicals Europe. And no wonder, for acrylics and the closely related acrylates are the building blocks for many kinds of plastics, glues, textiles, dyes, paints, and papers. Strung together in long chains, they can make all kinds of useful materials. Acrylate mixed with sodium hydroxide, for example, makes a super absorbent material used in diapers. Add extra methyl groups (carbon plus three hydrogens), and acrylate makes plexiglass. The current industrial processes for making acrylics require high temperatures close to 450 F, and produce unwanted and sometimes harmful byproducts, such as ethylene, carbon dioxide, and hydrogen cyanide. UConn chemist Steve Suib, director of the University's Institute for Materials Science, and colleagues at UConn and ExxonMobil have designed a new way of making acrylics at mild temperatures. Their technique can be finely tuned to avoid producing unwanted chemicals. The researchers have been probing new technologies that can lower energy intensity, skip steps, improve energy efficiency, and reduce CO₂ footprint in the production process of acrylics as highlighted by Mr Partha Nandi, a chemist at ExxonMobil. The research has led to discovery of a new route to produce a class of acrylate derivatives in potentially fewer steps and with less energy. The technique uses a porous catalyst made of manganese and oxygen. Catalysts are materials used to speed up reactions. Often, they provide a surface for the molecules to sit on while they react with each other, helping them to meet up in the right configurations to do the deed. In this case, the pores fill that role. The pores are 20 to 500 Angstroms wide, big enough for fairly large molecules to fit inside. The manganese atoms in the material can trade their electrons with nearby oxygens, which makes it easier for the right chemical reactions to happen. Depending on the starting ingredients, the catalyst can facilitate all different kinds of acrylics and acrylates, with very little waste, Suib says. "We hope this can be scaled up," he says. "We want to maximize yield, minimize temperature, and make an even more active catalyst," that will help the reaction go faster. The group also found adding a little bit of lithium helped speed things up, too. They are currently studying the exact role of lithium, and experimenting with ways of improving the manganese and oxygen catalyst.

Source <https://www.sciencedaily.com/releases/2019/02/190208161433.htm>

5. Engineers Develop Room Temperature, Two-Dimensional Platform for Quantum Technology

Quantum computers promise to be a revolutionary technology because their elementary building blocks, qubits, can hold more information than the binary, 0-or-1 bits of classical computers. But to harness this capability, hardware must be developed that can access, measure and manipulate individual quantum states. Researchers at the University of Pennsylvania's School of Engineering and Applied Science have now demonstrated a new hardware platform based on isolated electron spins in a two-dimensional material. The electrons are trapped by defects in sheets of hexagonal boron nitride, a one-atom-thick semiconductor material, and the researchers were able to optically detect the system's quantum states. The study was led by Lee Bassett, assistant professor in the Department of Electrical and Systems Engineering. There are number of potential architectures for building quantum technology. One promising system involves electron spins in diamonds: these spins are also trapped at defects in diamond's regular crystalline pattern where carbon atoms are missing or replaced by other elements. The defects act like isolated atoms or molecules, and they interact with light in a way that enables their spin to be measured and used as a qubit. These systems are attractive for quantum technology because they can operate at room temperatures, unlike other prototypes based on ultra-cold superconductors or ions trapped in vacuum, but working with bulk diamond presents its own challenges. "One disadvantage of using spins in 3D materials is that we can't control exactly where they are relative to the surface" a researcher says. "Having that level of atomic scale control is one reason to work in 2D. Maybe you want to place one spin here and one spin there and have them talk to each other. Or if you want to have a spin in a layer of one material and plop a 2D magnet layer on top and have them interact. When the spins are confined to a single atomic plane, you enable a host of new functionalities." With nanotechnological advances producing an expanding library of 2D materials to choose from, Bassett and his colleagues sought the one that would be most like a flat analog of bulk diamond. "You might think the analog would be graphene, which is just a honeycomb lattice of carbon atoms, but here we care more about the electronic properties of the crystal than what type of atoms it's made of," says an assistant professor of Physics at Lafayette University. "Graphene behaves like a metal, whereas diamond is a wide-bandgap semiconductor and thus acts like an insulator. Hexagonal boron nitride, on the other hand, has the same honeycomb structure as graphene, but, like diamond, it is also a wide-bandgap semiconductor and is already widely used as a dielectric layer in 2D electronics." With hexagonal boron nitride, or h-BN, widely available and well characterized, the researchers focused on one of its less well-understood aspects: defects in its honeycomb lattice that can emit light. That the average piece of h-BN contains defects that emit light had previously been known. Bassett's group is the first to show that, for some of those defects, the intensity of the emitted light changes in response to a magnetic field. "We shine light of one color on the material and we get photons of another color back," Bassett says. "The magnet controls the spin and the spin controls the number of photons that the defects in the h-BN emit. That's a signal that you can potentially use as a qubit." Beyond computation, having the building block of a quantum machine's qubits on a 2D surface enables other potential applications that depend on proximity. "Quantum systems are super sensitive to their environments, which is why they're so hard to isolate and control," Bassett says. "But the flip side is that you can use that sensitivity to make new types of sensors. In principle, these little spins can be miniature nuclear magnetic resonance detectors, like the kind used in MRIs, but with the ability to operate on a single molecule. Nuclear magnetic resonance is currently used to learn about molecular structure, but it requires millions or billions of the target molecule to be assembled into a crystal. In contrast, 2D quantum sensors could measure the structure and internal dynamics of individual molecules, for example to study chemical reactions and protein folding. While the researchers conducted an extensive survey of h-BN defects to discover ones that have special spin-dependent optical properties, the exact nature of those defects is still unknown. Next steps for the team include understanding what makes some, but not all, defects responsive to magnetic fields, and then recreating those useful defects. "This study is bringing together two major areas of scientific research," Bassett says. "On one hand, there's been a tremendous amount of work in expanding the library of 2D materials and understanding the physics that they exhibit and the devices they can make. On the other hand, there's the development of these different quantum architectures. And this is one of the first to bring them together to say 'here's a potentially room-temperature quantum architecture in a 2D material.'"

6. Sustainable Electronics Manufacturing Breakthrough



SFU Mechatronic Systems Engineering professor Woo Soo Kim is collaborating with Swiss researchers to develop an eco-friendly 3D printable solution for producing wireless Internet-of-Things sensors. The research team is using a wood-derived cellulose material to replace the plastics and polymeric materials currently used in electronics.

Simon Fraser University and Swiss researchers are developing an eco-friendly, 3D printable solution for producing wireless Internet-of-Things (IoT) sensors that can be used and disposed of without contaminating the environment. SFU professor Woo Soo Kim is leading the research team's discovery involving the use of a wood-derived cellulose material to replace the plastics and polymeric materials currently used in electronics. Additionally, 3D printing can give flexibility to add or embed functions onto 3D shapes or textiles, creating greater functionality. "Our eco-friendly 3D printed cellulose sensors can wirelessly transmit data during their life, and then can be disposed without concern of environmental contamination," says Kim, a professor in the School of Mechatronic Systems Engineering at SFU's Surrey campus. The research is being carried out at PowerTech Labs in Surrey, which houses several state-of-the-art 3D printers used by researchers. "This development will help to advance green electronics. For example, the waste from printed circuit boards is a hazardous source of contamination to the environment. If we are able to change the plastics in PCB to cellulose composite materials, recycling of metal components on the board could be collected in a much easier way." Kim's research program spans two international collaborative projects, including the latest focusing on the eco-friendly cellulose material-based chemical sensors with collaborators from the Swiss Federal Laboratories for Materials Science. He is also collaborating with a team of South Korean researchers from the Daegu Gyeongbuk Institute of Science and Technology's (DGIST)'s department of Robotics Engineering, and PROTEM Co Inc, a technology-based company, for the development of printable conductive ink materials. In this second project, researchers have developed a new breakthrough in the embossing process technology, one that can freely imprint fine circuit patterns on flexible polymer substrate, a necessary component of electronic products. Embossing technology is applied for the mass imprinting of precise patterns at a low unit cost. However, Kim says it can only imprint circuit patterns that are imprinted beforehand on the pattern stamp, and the entire, costly stamp must be changed to put in different patterns. The team succeeded in developing a precise location control system that can imprint patterns directly, resulting in a new process technology. This will have widespread implications for use in semiconductor processes, wearable devices and the display industry.

Source <https://www.sciencedaily.com/releases/2019/02/190213172304.htm>

7. India Successfully Launches Latest Communication Satellite GSAT-31



India's latest communication satellite GSAT-31 was successfully launched by European launch services provider- Arianespace's rocket from French Guiana in the early hours of Wednesday, February 6, 2019. Blasting off from Ariane Launch Complex at Kourou, a French territory located in northeastern coast of South America at 2.31 am (IST), the Ariane-5 vehicle injected GSAT-31 into the orbit in a flawless flight lasting about 42 minutes. "It gives me great pleasure on the successful launch of GSAT-31 spacecraft on board Ariane-5," Indian Space Research Organisation's (ISRO) Satish Dhawan Space Centre (SDSC), Director S Pandian said at Kourou soon after the launch. The GSAT-31 is a "high power" communication satellite with Ku-band, and it is going to serve and replace some of the satellites that are going to expire soon, he said further. The Ariane-5 vehicle (Flight VA247) also carried Saudi Geostationary Satellite 1/Hellas Sat 4 along with GSAT-31. GSAT-31 separated from the Ariane-5 in an elliptical Geosynchronous Transfer Orbit with a perigee (nearest point to Earth) of 250 km and an apogee (farthest point to Earth) of 35,850 km, inclined at an angle of 3.0 degree to the equator, ISRO said in a release after the launch. After separation from Ariane-5, the two solar arrays of GSAT-31 were automatically deployed in quick succession and ISRO's Master Control Facility at Hassan in Karnataka took over the command and control of GSAT-31 and found its health parameters normal, it said. In the days ahead, scientists will undertake phase-wise orbit-raising manoeuvres to place the satellite in Geostationary Orbit (36,000 km above the equator) using its on-board propulsion system. During the final stages of its orbit raising operations, the antenna reflector of GSAT-31 will be deployed, and following this, the satellite will be put in its final orbital configuration, the space agency said, adding that the satellite will be operational after the successful completion of all in-orbit tests. Weighing about 2,536 kg, the Indian satellite, GSAT-31, will provide continuity to operational services on some of the in-orbit satellites. The satellite derives its heritage from ISRO's earlier INSAT/GSAT satellite series, the space agency said, adding that it will provide communication services to Indian mainland and islands. GSAT-31 is the country's 40th communication satellite which is configured on ISRO's enhanced 'I-2K Bus', utilising the maximum "bus capabilities" of this type. This satellite will augment the Ku-band transponder capacity in Geostationary Orbit, ISRO said. With a mission life of around 15 years, GSAT-31 will be used for supporting VSAT networks, Television uplinks, Digital Satellite News Gathering, DTH-television services, cellular backhaul connectivity and many such applications. It will also provide wide beam coverage to facilitate communication over large oceanic region, comprising large parts of Arabian Sea, Bay of Bengal and Indian Ocean, using a wide band transponder. According to ISRO, two Ku-band beacon down link signals are transmitted by the satellite for ground tracking purpose. "GSAT-31 has a unique configuration of providing flexible frequency segments and flexible coverage," ISRO chairman, K Sivan said. "GSAT-31 will provide DTH Television Services, connectivity to VSATs for ATM, Stock-exchange, Digital Satellite News Gathering (DSNG) and e-governance applications. The satellite will also be used for bulk data transfer for a host of emerging telecommunication applications," he said in a release. Riding in Ariane-5's upper position, HS-4/SGS-1 was released first in the flight sequence, with its separation occurring about 27 minutes after the lift-off. Comprising two payloads, Saudi Geostationary Satellite 1/Hellas Sat 4, also called HS- 4/SGS-1, is a geostationary condosat for KACST (King Abdulaziz City for Science and Technology Saudi Arabia) and Hellas Sat (Greece Cyprus). HS- 4/SGS-1 will provide telecommunication capabilities, including television, Internet, telephone and secure communications in the Middle East, South Africa and Europe, Arianespace said on its website. GSAT-30 is another geostationary satellite to be lofted soon by Arianespace for ISRO.

8. Across the Spectrum: Researchers Find Way to Stabilize Color of Light in Next-Gen Material

A team of Florida State University physicists has found a way to stabilize the color of light being emitted from a promising class of next-generation materials that researchers believe could be the basis for efficient and more cost-effective optoelectronic technologies that can turn light into electricity or vice versa. This particular work is solving a critical problem that has inhibited the development of viable applications based on these materials. The researchers were working with a class of materials called halide perovskites. Researchers believe these materials have great potential for optoelectronic technologies because they are inexpensive to obtain and highly efficient. However, in these technologies, scientists need to be able to tune the bandgap or the color of the light emission. In halide perovskites this has been a bit tricky. Color tunability has always been possible with halide perovskites, but it's not been stable. For example, a device with this material might shine one color such as yellow, but then turn to red quickly if illuminated continuously by UV light. The researchers initially set out to make a higher-quality halide perovskite film that was smoother and more uniform than existing samples. They embedded nanocrystals in a special matrix in their sample. They were not prepared for this to affect the bandgap, or the physical property that determines the color of light being emitted or absorbed by the material. "We were working on this synthetic approach and this nanostructure that was a part of that," they said. "Then we noticed the colors weren't changing. "This unique nanostructure turned the previously unstable materials into extremely stable ones even when they are stimulated by concentrated UV light 4,000 times more intensive than the solar radiation. The scientists said they hope other researchers in the field will follow up on their work by examining further electrical behaviors with this composite structure.

Source <https://www.sciencedaily.com/releases/2019/02/190211083156.htm>

9. Developed Self-Controlling 'Smart' Fuel Cell Electrode Material

A research team led by Professor Kang Taek Lee in the Department of Energy Science and Engineering developed electrode material for a new form of high-performance Solid Oxide Fuel Cell (SOFC). Since SOFC, which generates electricity by reacting hydrogen (fuel) with oxygen in the air, emits only water after reaction, is ecofriendly, and has little restrictions in installation place, it is drawing limelight as a new and renewable energy technology that is appropriate for distributed generation. However, it has been difficult to obtain stable supply due to the rapid performance decline of electrode generating power amidst sudden stop and the suspension of fuel supply. Professor Lee's team developed a new electrode material designed in a double perovskite structure to solve the stability of SOFC electrode. Inside the electrode material is planted with nickel (Ni), a catalyst which increases the oxidation reaction efficiency of hydrogen. Once the fuel cell operates, nickel voluntarily transfers outside the electrode surface, generating exsolution' which forms nano metal catalyst. The exsolved nickel catalyst helps the high-efficient oxidation reaction of fuel cell, improving the stability and performance of fuel cell at the same time. While exsolution has recently been researched among many scientists, most research has been focusing on temporary improvement of performance in the formation of metal nano catalyst and the catalyst's oxidation reaction. In contrast, Professor Kang Taek Lee's team focused on researching and developing a fuel cell electrode to have a stable oxidation reaction in oxidation-Redox Cycle, improving SOFC performance and advancing its technological commercialization. Also, the research by Professor Lee's team is expected to open a new horizon for developing a new material electrode that guarantees high-performance and high-durability by proving the structural changes of reversible surface for the exsolution of nickel nano metal catalyst based on fuel cell supply. Professor Lee said "While the electrode of existing SOFC has excellent performance, its performance declined rapidly when the hydrogen supply became unstable, which was difficult to recover the original performance. The development of electrode that brought high performance and improved the stability of oxidation-Redox Cycle will lead the commercialization of SOFC, through the control of voluntary nano metal catalyst exsolution."

Source <https://www.sciencedaily.com/releases/2019/02/190207102615.htm>

10. Green Water-Purification System Works Without Heavy Metals or Corrosive Chemicals



Scientists at the Institute of Process Engineering (IPE) at the Chinese Academy of Sciences in Beijing and Yangzhou University (YZU) in Jiangsu have developed an effective and energy-efficient technique for purifying water by using graphitic carbon nitride sheets. Their prototype purified pathogen-rich water in 30 min, killing over 99.9999% of bacteria, such as *E. coli*, meeting China's requirements for clean drinking water. Unlike metal-based photocatalytic disinfectants, it achieved this standard without leaving behind secondary pollution or heavy-metal-ion residues, offering a promising alternative to less eco-friendly technologies. "The future application of photocatalytic disinfection technology can significantly relieve clean-water scarcity and global energy shortage," says Dan Wang, a professor at the Institute of Process Engineering and a senior author on the paper. Unlike traditional water-purification processes using ultraviolet light, chlorination, or ozone disinfection, photocatalytic methods offer environmentally safe water treatment -- as long as they use the right catalyst. But unfortunately, these greener catalysts tend to be less efficient than metal-based varieties. Widely studied carbon-based catalysts, such as carbon nanotubes and graphene oxide, aren't quite effective enough for practical water-treatment purposes because they fail to produce enough reactive oxygen to overcome pathogens. The team from IPE and YZU manages to bypass these failings with a unique catalytic design. They utilize nanosheets of graphitic carbon nitride, an ultra-thin two-dimensional material with the right electronic properties to absorb the light and generate reactive oxygen. This configuration helped to facilitate the reaction by generating plenty of hydrogen peroxide, which efficiently kills bacteria by oxidizing their cell walls and wreaking havoc on their chemical structures. Ultimately, Wang believes that these results, as well as the simplicity of the design and inexpensive materials, mean the technology should be relatively easy to develop on a larger scale. "The scale-up for both the catalysts and the device is not difficult," he says. "The construction of this material is completely metal-free, and one of the key components, the plastic bag, is commercialized, which makes it easy to obtain." The team intends to hone the technique before it is ready for commercial use. As the next steps, they plan to improve efficiency by expanding the edge of the material's ability to absorb photons, develop antibacterial fibers, and refine the nanosheet preparation process. However, he acknowledges that this bacteria-killing system is not intended to single-handedly purify water. "Purification needs other devices for removing heavy-metal ions, adjusting pH, and removing residue," he says. "We need to combine our system with others to meet water-purification requirements."

Engineering Innovation in India

Researchers come up with Technology for Enhanced Finger Printing System



The institutes have developed a technology to enhance latent fingerprinting to increase the efficiency of forensic detection, among other things.

The research work jointly undertaken by IIT Kharagpur and NIT Durgapur, has been published in *Nanoscale*. The institutes have developed a technology to enhance latent fingerprinting to increase the efficiency of forensic detection, among other things. In this joint project by IIT Kharagpur and NIT Durgapur, funded by the HRD Ministry and the Council for Scientific Research, the institutes have developed a technology to enhance latent fingerprinting to increase the efficiency of forensic detection, among other things. “Fingerprint detection is becoming more and more important these days. Apart from being vital in the forensic sciences and helping in solving crimes, latent fingerprinting (LPF) has become imperative in many areas like for Aadhaar cards, visas and also at airports. Our endeavour is to see how to get better latent fingerprints,” said Prof Chandrashekhar Tiwari of the department of Metallurgical and Material Engineering at IIT Kharagpur. Head of Physics department at NIT Durgapur, Prof Pathik Kumbhakar, who is also the main supervisor of the project, said, “When we place our hand on a surface, a secretion from our fingers touches the surface which creates a fingerprint. But this doesn’t remain for long. In our study, we have used the nanostructure material that we have developed for up to two months and have found that the fingerprint stays longer. Also, this material is luminescent under ultraviolet lights which is a huge advantage.” “Security concepts, such as LPFs, encoding information for anti-counterfeiting, encryption of confidential data, etc., are now widely used in the forensic department. The topologically unchanged ridge pattern of the human finger produces a unique fingerprint. Not only does it differ from one individual to another, it also differs from one finger to another. During contact between a finger and a surface, the secretion present at the surface of the skin are transferred to the substrate which leaves an impression of the ridge pattern. Therefore, fingerprints represent the best reference for personal identification in forensic science due to their high stability, uniqueness and complexity of ridge patterns,” the paper stated. What we have done is used zinc sulphide, which is commonly used, and doped it (mixed in very small quantity) with copper and manganese. This as a material which picks up latent fingerprints has optimal visibility with a far more enhanced fingerprint,” said Tiwari. The mixture can be used as a powder, liquid solution, gel or paste. “The other advantage is that it can be applied to the fingertips and fingerprints can be lifted without the use of sophisticated expensive equipment”, Tiwari added.

Source <https://indianexpress.com/article/technology/science/kolkata-researchers-come-up-with-technology-for-enhanced-finger-printing-system-5547645/>
