



Indian Institute of Technology Guwahati  
भारतीय प्रौद्योगिकी संस्थान गुवाहाटी  
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# सिंहवर्षि

The Monthly Newsletter of IIT Guwahati  
Volume III, Issue IV, April 2021



View of Barak and Umiam Hostel

Photo: Amartya

## IIT Guwahati celebrates its Alumni achievements and contributions through Alumni Awards 2020

Indian Institute of Technology Guwahati recently celebrated Alumni Awards 2020 in recognition of its alumni network's glorious professional achievements and contributions to the society. This award ceremony was organised by the Alumni and External Relations Office of the Institute in the esteemed presence of Prof. T. G. Sitharam, Director, IIT Guwahati, as the Chief Guest and Mr. Aman Mathur, the President, IIT Guwahati Alumni Association, as the Guest of Honor on 27th March 2021.

Speaking during the award ceremony, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "I congratulate our Alumni for their extraordinary achievements and success, and wish them the best for their future. It is a proud moment for me to announce that IIT Guwahati has created the Alumni Portal to bridge the gap and create a special bond between the current and former students at our prestigious Institute."

Alongside the Award ceremony, Prof. Sitharam also announced the future plans of establishing 'IIT Guwahati Foundation' in the USA and launching of an 'IITG Alumni Newsletter' which will be devoted exclusively for highlighting alumni achievements and activities of the campus.

Since its inception in 1994, IIT Guwahati has been working for academic excellence, reaching new heights in R&D, and continues to attract outstanding talent from around the world around in the form of its students. Its vast reservoir of talent is now spreading its footprint everywhere showcasing the best that IITG has to offer. A major source of this recognition that the institute is garnering is through its alumni community who have ventured to different parts of India and the world to share and spread their knowledge, wisdom and expertise.



## About the Award Winners -

**Mr. Ankit Nagori, Alumnus, Class of 2008, IIT Guwahati, and Co-Founder CUREFIT, with the Outstanding Service Award** in recognition to his extraordinary journey from joining as a young Manager at Flipkart to becoming the Chief Business Officer, and then becoming the Co-Founder of CUREFIT. He has also been featured in the 40 under 40 list of Forbes Magazine 2016.

**Dr. Harpreet S. Dhillon, Alumnus, Class of 2008, IIT Guwahati, and Associate Professor, Department of ECE, Virginia Tech, USA, with the Young Alumni Achiever Award** in recognition to his extensive research and success in areas of wireless communications and networking. Dr. Dhillon has contributed to the performance analysis of large-scale communication systems using advanced mathematical tools from the area of stochastic geometry. He has more than 160 publications in premier IEEE venues, including 80+ journal papers, and four patents.

**Mr. Kiran Kumar Thota, Alumnus, Class of 2000, IIT Guwahati, and Product Lead, Amazon AWS, President, PAN IIT USA, with the Distinguished Alumni Award** in recognition to his outstanding services to expand the reach of IIT Guwahati Alumni Association. Mr. Thota has represented IIT Guwahati at all forums including PanIIT USA and PanIIT Global and served as Board member, Mr Thota has expanded PanIIT USA services to an alumni base of over 50,000. As President, he conducted 65 events for alumni and built digital platforms and processes to scale it up. As the board member, he has generated about 1 Million USD revenue for PanIIT USA through fundraising.



## IIT Guwahati to setup Mehta Family School of Data Science and Artificial Intelligence

Indian Institute of Technology Guwahati has signed a Memorandum of Understanding (MoU) with the Mehta Family Foundation (MFF), USA, today, on 28th April 2021, to set up the Mehta Family School of Data Science and Artificial Intelligence at IIT Guwahati with the objective to promote Data Science and Artificial Intelligence (AI) courses at a undergraduate and postgraduate level. The first batch of B. Tech students for this school will be admitted through JEE in the academic year 2021- 22.

The MoU was signed virtually by Prof. T. G. Sitharam, Director, IIT Guwahati, and Mr. Rahul Mehta, Chief Executive Officer, Mehta Family Foundation, USA, in the presence of a galaxy of luminaries and Dr Rajiv I. Modi, Chairman Board of Governors, IIT Guwahati, and Prof. Krishnaswamy Vijayraghavan, FRS, Principal Scientific Advisor, Government of India, as the chief guests and Prof. Sandeep Verma, Secretary, SERB as the special guest.

Speaking on the occasion, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "IIT Guwahati has always endeavoured to play a leadership role by diversifying the flavour of its academic programs. Mehta Family School of Data Science and Artificial Intelligence is another important initiative at IIT Guwahati that will bridge the gap of highly skilled personnel that exists in these emerging fields. I take this opportunity to thank Mehta Family Foundation for its enormous support in establishing this school which will offer both undergraduate and postgraduate programs, B. Tech in Data Science and Artificial Intelligence from this academic year and we expect that the school will be able to attract the best talents in the country to join this program."

Highlighting the collaboration between IIT Guwahati and the Mehta Family Foundation, Mr. Rahul Mehta, Chief Executive said, "The explosion of data across all fields of knowledge continues unabated. Just like computer science changed the world, data science and artificial intelligence are posed to do the same. These fields will shape the methods used in education and research across the spectrum of human knowledge. Global interdisciplinary collaborations as envisioned in this new school will lift our understanding of society and nature. Bringing together



global talents such as Professor Shankar Subramaniam, Professor Rajesh Gupta (both Univ. of California, San Diego), and Professor Ananth Grama (Purdue Univ.) can accelerate the expansion in these fields. IIT Guwahati has the vision of the new talent India needs. Together we will build the framework for the future.”

Through this MoU, MFF will provide support for the development of the school’s infrastructure and programs at IIT Guwahati campus. The school will offer programs for visiting students and faculty between the school and US institutions. The school will host conferences and establish chairs attracting world class talent. Finally, the school has access to strategic advisors. These are distinguished professors from top US universities providing time and expertise for academic and research activities in this new school. This is the most unique aspect of this school and is a first in India.

While addressing the gathering, Prof. K. Vijayraghavan, Principal Scientific Advisor, Govt. of India, mentioned, “I am delighted to know that Mehta foundation has supported setting up of this Mehta Family School of Data Science and Artificial Intelligence at IIT Guwahati while working cooperatively through his time of pandemic. With the available expertise, I believe, IIT Guwahati will take up this school as a foundation to set-up data collection sites in the eastern region of the country for various sectors such as healthcare, climate, transportation, security and other areas and convert the huge data into effective knowledge and understanding to serve the society in a better way.”

Sharing his vision at the event, Prof. R. Bhattacharjee, Head, Mehta Family School of Data Science and Artificial Intelligence, IIT Guwahati mentioned “This new School will be an abode of academic excellence imparting state-of-the-art teaching, supported by research and technology development in frontier areas of data science and artificial intelligence. The curriculum has been developed to provide a strong theoretical foundation as well as emphasis on different interdisciplinary application areas. One of the objectives of the school is also to take up targeted multi-year interdisciplinary research projects and solve the problems which benefits society at large, a deep rooted vision of IIT Guwahati. The close association and support from Mehta Family Foundation has added international flavor to this school from its very inception.”

All other dignitaries including, Prof. Sandeep Verma, Secretary of Science and Engineering Research Board (SERB), India; Prof. Shankar Subramaniam and Prof. Rajesh Gupta, University of California, San Diego, USA; Prof. Ananth Grama, University of Purdue, Indiana; Prof. Sashindra Kakoty, Deputy Director, IIT Guwahati; Prof. Chitralekha Mahanta, Dean of Academic Affairs, IIT Guwahati; Prof. T. Punniyamurthy, Dean of Faculty Affairs, IIT Guwahati; Prof. Parameswar K. Iyer, Dean PRBR, IIT Guwahati, and Prof. Ratnajit Bhattacharjee, Head, School of Data Science and Artificial Intelligence, IIT Guwahati, also graced the event with their virtual presence and expressed their enthusiasm and appreciation of the broad activities of this school in their brief statements.



Prof. T. G. Sitharam, Director, IIT Guwahati



Mr. Rahul Mehta, CEO, Mehta Family Foundation, USA



Prof. Rajiv I. Modi, Chairman, Board of Governors, IIT Guwahati

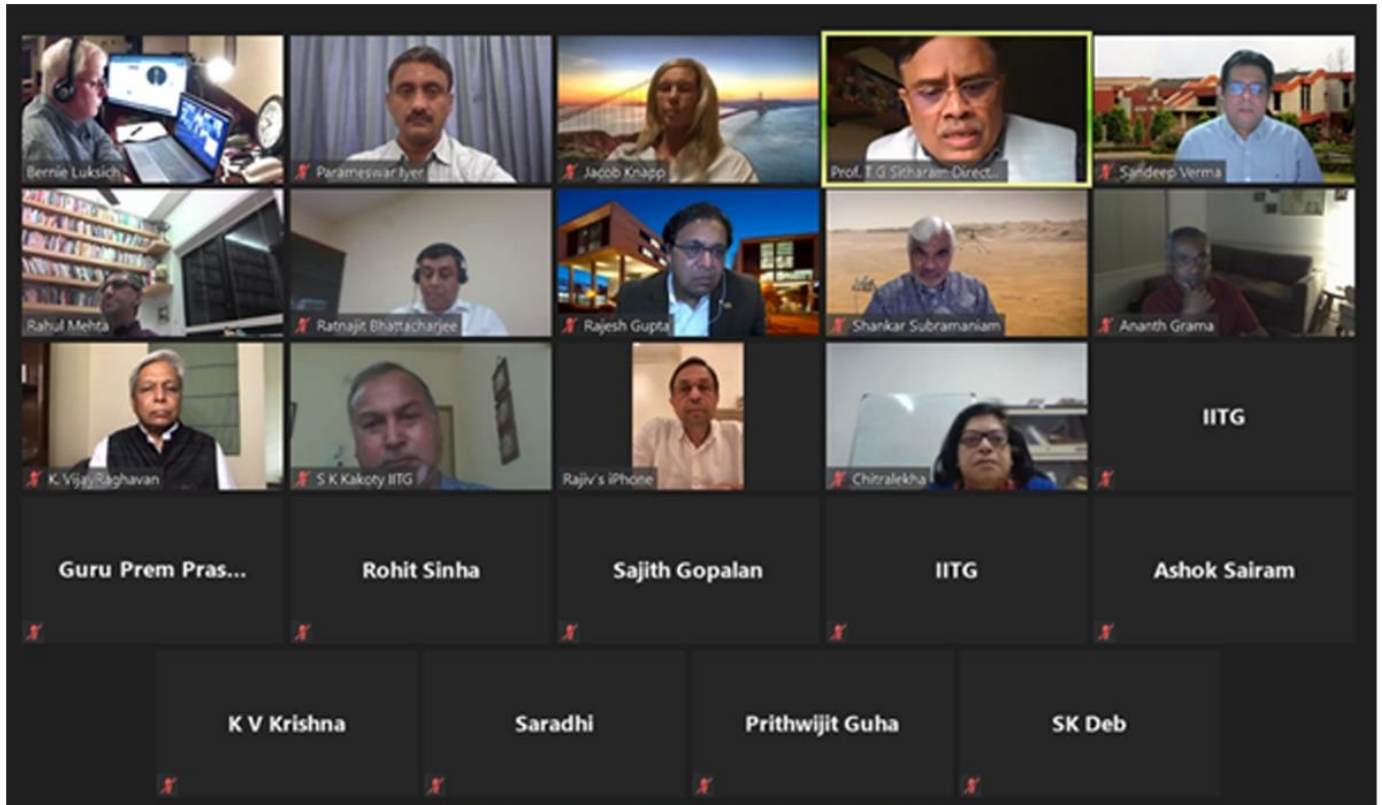


Prof. K. Vijayraghavan, FRS, Principal Scientific Advisor, GOI



Dr. Ratnajit Bhattacharjee, Head, School of Data Science and Artificial Intelligence, IIT Guwahati





Screenshot of the MoU signing event

### Award & honours



Mr. Kaviraj Prithvi C. A., B.Tech. 2nd Year was placed 3rd in the innovation challenge jointly conducted by FlexE Centre, IIT Kanpur and Ministry of Electronics and Information Technology for his project titled 'Continuous Blood

Pressure Monitoring System', along with a cash prize of 50000/-. He will also be given an opportunity to jointly develop this technology with NCFlexE.



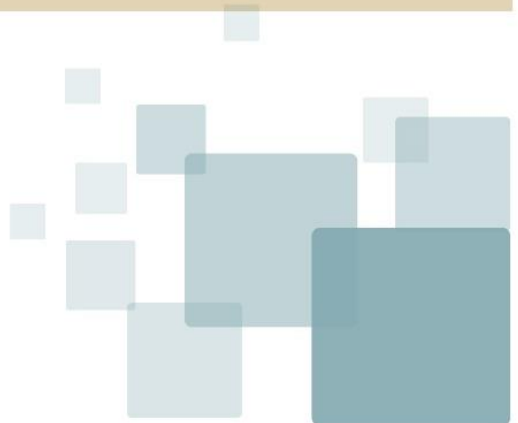
Dr. Chandan Karfa, Assistant Professor, Dept. of Computer Science & Engineering has received the 2021 Qualcomm Faculty Award.

The QFA program was created to recognize distinguished faculty research that inspires students & sparks new approaches in key technology areas.



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## IIT Guwahati Researchers develop advanced technique to boost overall performance of rechargeable Lithium-ion battery used in Electric Vehicles

A team of researchers from the Indian Institute of Technology Guwahati, India has recently developed an advanced technique which can precisely estimate one of the most important battery internal states known as state of charge (SOC). The research team consists of three members: Mr. Gautam Sethia, Research Scholar, Dr. Sisir Kumar Nayak, Associate Professor, and Prof. Somanath Majhi, Professor. All of them are associated with the Department of Electronics and Electrical Engineering, IIT Guwahati. The research findings are recently published in IEEE Transactions on Circuit and System I: Regular Papers, a highly reputed international scientific journal (<https://ieeexplore.ieee.org/document/9307253>). The research team is currently also working on various other important battery issues such as cell balancing, monitoring state of health, state of power, etc.

State of Charge (SOC) reflects the remaining capacity of the battery, i.e., how much more charge can be withdrawn from the battery before it gets fully discharged. The knowledge of remaining capacity helps to optimize battery's capacity utilization, prevent overcharging and undercharging of the battery, increases its lifespan, reduces cost, and ensures safety of the battery and its surroundings. Unfortunately, such a vital parameter cannot be directly measured by any sensor. We can only infer SOC by using the available measured quantities such as battery terminal voltage and current. However, the highly non-linear characteristic of the lithium-ion battery makes it difficult to estimate the SOC accurately. Hence, a well-developed estimation algorithm is crucial, which can ensure precise, reliable, and cost-effective SOC estimation.

In recent years, lithium ion batteries are widely recognized in various applications due to their low carbon emission, high energy density, low self-discharge rate, and low maintenance cost. Apart from the various day-to-day small devices such as cell phones, laptops, etc, they have been also widely used in various other important applications such as electric vehicles, Renewable Energy Sources (RES) integrated smart grids, micro grids, etc.

The emission of greenhouse gases in burning fossil fuel in the combustion engine has made the transportation sector the highest contributor in increasing air pollution. The greenhouse gases are known to be heat-trapping and thus cause global warming. The electric vehicles (EVs) are becoming the most suitable alternatives to the conventional fossil fuel-based vehicles. The battery acts as the prime energy source of electric vehicles. In RES integrated smart grid, the availability of solar and wind energy is intermittent in nature. Hence, an energy storage system such as a battery is required to store the energy when available and use it later when needed. In smart-grid, batteries can be used for the purpose of peak shaving, voltage regulation and frequency regulation by storing or feeding energy. In micro-grids, intermittent RES are integrated with the battery so that it can store energy in off-peak hours and supply energy in peak hours or during the unavailability of renewable energy. It can also assist in some emergency situations. In all these applications, the precise estimation of SOC plays a vital role for their efficient operation.

Speaking about the work with the research team, the researchers at IIT Guwahati briefly explained the technical/methodology part as follows: "In our work, we have divided the problem into two parts. First was to derive the mathematical model of the lithium-ion battery, which can closely exhibit its dynamic characteristics. Then, using few advanced system control and mathematical concepts such as sliding mode theory, we have tried to estimate the battery internal states precisely. The proposed technique shows the highly robust characteristics and works accurately even in the presence of various external disturbances such as sensor inaccuracy, temperature variation, etc. Compared to the existing techniques, the proposed technique not only increases the accuracy but also reduces the computational time, and hence needs a cost-effective microcontroller chip for its implementation/commercialization."



IIT Guwahati Researchers develop an advanced technique to boost/enhance the overall performance of rechargeable Lithium-ion battery used in electric vehicles

		
<p><b>Prof. Somanath Majhi</b> Professor Dept of Electronics and Electrical Engineering IIT Guwahati</p>	<p><b>Dr. Sisir Kumar Nayak</b> Associate Professor Dept of Electronics and Electrical Engineering IIT Guwahati</p>	<p><b>Mr. Gautam Sethia</b> Research Scholar Dept of Electronics and Electrical Engineering IIT Guwahati</p>



## IIT Guwahati researchers use a hollow fiber membrane to remove micro-plastics from seawater before salt extraction

Indian Institute of Technology Guwahati researchers have developed a microfiltration process to remove microplastics from seawater in order to prevent the inclusion of plastic residues in edible salt extracted from it. Prof. Kaustubha Mohanty and Dr. Senthilmurugan Subbiah, Department of Chemical Engineering, IIT Guwahati, have recently published the results of this research in the journal *Environmental Technology & Innovation*, in a paper co-authored by their research scholar, Mr. Naveenkumar Ashok Yaranal.

Plastic pollution is rampant all over the world and while there is some level of awareness, the seriousness is not yet understood. Micro-plastics – plastic pieces smaller than one-fifth of an inch – are now found in almost all oceans and marine animals. What’s worse, sea salt has been found to have considerable amounts of micro-plastic. Research performed in East Asia has shown that 90 percent of the table salt brands sampled worldwide has micro-plastics. Another study by IIT Bombay showed that eight brands of Indian sea salt were contaminated with micrometre sized particles of polyesters, polyethylene terephthalate (PET), polyamide, polyethylene, and polystyrene. Micro-plastics ingested by human beings can disrupt hormones, leading to infertility, and cause nervous system problems, and even cancer.

While there have been many studies to identify and quantify micro-plastics in various food products, including salt, there have been fewer attempts at finding ways to remove them. The IIT Guwahati team has, for the first time, shown efficient removal of micro-plastics from synthetic seawater using hollow fibre microfiltration (HF-MF) membranes.

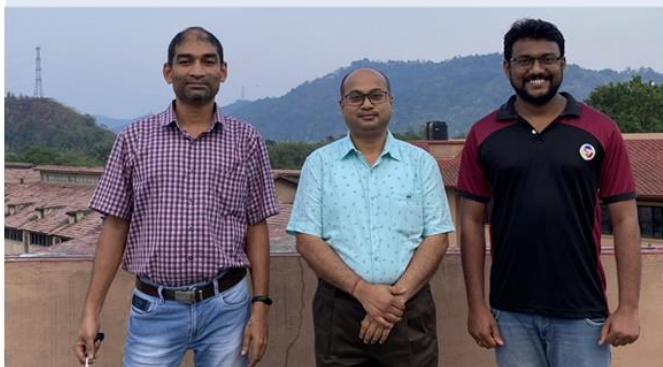
“In our hollow fibre membrane filter, hundreds of tiny straw-like tubes are bundled together to create a filter matrix,” explained Dr. Mohanty. The walls of these tubes are filled with microscopic pores, and when water is passed through the tubes, the micro-plastics are trapped inside, thus freeing water of this pollutant.

Hollow fibre membranes are already used extensively in daily life applications such as RO pre-treatment, industrial water/wastewater, juice processing, and

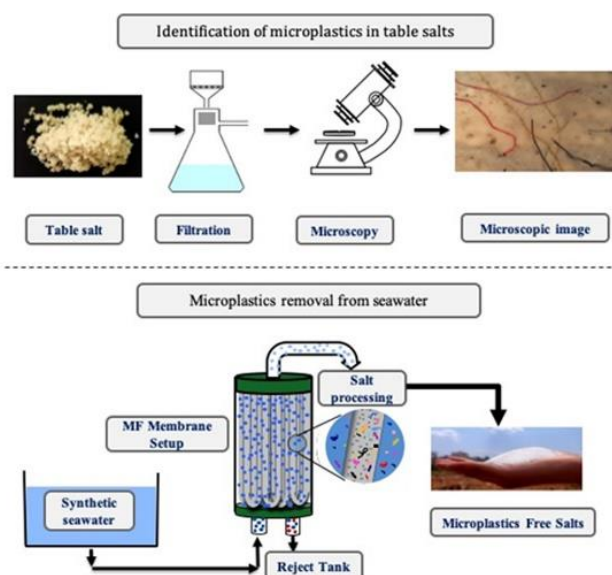
other biotech applications, including in dialysis membranes used for kidney ailments. The hollow fibres are made of many kinds of materials and the ones used by the IITG team was made of polypropylene and a silk protein called sericin.

“We were able to remove 99.3 % of the micro-plastics present in seawater, without any reduction in the salt content”, said the key researcher. If this filtered water is used to extract salt, it would be free from micro-plastics. The researcher clarifies that this can only remove micro-plastics from seawater before salt extraction, and obviously cannot remove micro-plastics that get added during salt production, such as through the use of descaling agents in the desalination process itself.

Some advantages of hollow fibre membrane technology that make it promising for pre-treatment of seawater include simplicity of installation and use, cost effectiveness, no need for power supply, no generation of waste, and operability under low water pressure.



(L to R) Dr. S. Senthilmurugan, Prof. K. Mohanty, Mr. Naveenkumar A. Yaranal, from IIT Guwahati





## IIT Guwahati to provide expertise to the Northeast Frontier Railway for better operation and expansion of the rail network across the Northeastern states

Indian Institute of Technology Guwahati has signed a Memorandum of Understanding (MoU) with the Northeast Frontier Railway (NFR) on 23rd April 2021 to collaborate on research projects to better serve the needs of the northeastern states. NFR is one of the 17 railway zones of the Indian Railways and is responsible for operation and expansion of rail network all across Northeastern states and some districts of Bihar and West Bengal.

The MoU was signed by Prof. Vimal Katiyar, Dean, Research & Development, IIT Guwahati, and Mr. Yogesh Verma, Chief Planning & Design Engineer, NFR, in the graceful presence of Prof. T. G. Sitharam, Director, IIT Guwahati.

Speaking on the occasion, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "Under this collaboration, both the organizations will jointly execute various research projects in the areas not limited to Geo technical assistance, Structure, Bridges, Information Technology, Overhead equipment, Signalling & safety assessment, Artificial Intelligence (AI) based predictive maintenance systems, Internet of Things (IoT) design features, Improving maintenance and operations of rolling stock, yards, train operations and Green Technologies in order to cater the needs of Northeast people and has agreed to partner NFR in developing world class railway stations in this region."

Further, IIT Guwahati will also support NFR to make their stations plastic free by providing alternate Biodegradable polymer based technologies.

Mr. Yogesh Verma, Chief Planning & Design Engineer, NFR, emphasised that the multi-disciplinary approach would be adopted to find solutions to the problems with an aim towards improving maintenance & operations of train running and other identified fields under this cooperation.

Expressing his views on this collaboration, Prof. Vimal Katiyar, Dean, Research & Development, IIT Guwahati, said, "IIT Guwahati will take a lead to provide cutting edge technical know-how and training support in multi-facet areas to fulfil NFR requirements."

## IIT Guwahati to set up School of Health Sciences and Technology

Indian Institute of Technology Guwahati has decided to build a School of Health Sciences and Technology, as a part of the National Vision of 'Health for all'. The scalable, sustainable, and replicable model of the proposed school is also envisioned to mitigate the 'global burden of diseases' as well. In a way, the build-up of our nation has been galvanized through some of epoch-making moments in the form of green and white revolutions, land reforms, space research, defence organization, information technology, IITs, IIMs, telecom and heavy industries, banking and insurance reforms, rural income reforms, and rail and road networks, among others. Then came the recent transformational programs such as Atmanirbhar Bharat, Digital India, Unnat Bharat Abhiyan, Make in India, Start Up India, and Ayushman Bharat, among others. Today, the entire nation stands united at the crossroads in witnessing the "Youth of the Nation" to step up the required paradigm and assume the role as the torch-bearer to the rest of the world as a Developed Nation. The recently released National Education Policy - NEP 2020 have ushered that the build-up of such a nation germinate in the multi-disciplinary scientific and technological educational programs. In particular, the n-COV saga opens up a plethora of opportunities focusing on the Institutional Healthcare along with the wider under-served archetypes. In this direction, the school is planning to build an academic framework that will,

- Foster cutting-edge research, invention, innovation, and manufacturing of healthcare technologies.
- Establish new standards and methods of health sciences education.
- Build efficient and cost-effective equitable healthcare facilities.
- Create a shield of evidence-based affordable healthcare.
- Promote public health education.

The school is expected to train the gen-next academic leaders of Team-India to promote an upshift in the science and technological inventions under the guidance of the world class educationists, physicians, and engineers. The major targets in this regard will be to perform high impact research, diminish expensive biomedical imports, and engender an academic curriculum that substantiates the vision of Employment for a Billion.



**Prof. Dipankar Bandyopadhyay**  
Head, Nanotechnology





## IIT Guwahati to set up School of Energy Science and Engineering

The proposed School will be an academic hub involving multi-disciplinary research and teaching for generation of technocrats, techno managers, entrepreneurs, researchers and skilled manpower from grass root level in the area of sustainable energy and its allied offsets.

**Vision:** Envision to initiate cutting edge research and technology development along with translational programs to enhance the innovative solutions for economically viable, environmentally responsible, and sustainable energy needs.

### Mission of the School:

- Fundamental Research in materials and processes for energy generation, storage applications.
- Applied technology and product development addressing sustainable energy needs and development goals (SDGs).
- Assessment of potential, need and requirements and technological interventions for sustainable development of North-East India.
- Advances the Science and Engineering of energy efficiency, sustainable transportation, green building, renewable power technologies and provides the knowledge to integrate and optimize energy systems.
- Human Resource and knowledge generation in sustainable energy practices.
- Commercialization of energy efficient technologies along with grass root awareness and implementation of community based projects for effective implementation of UN SDG's.
- Partnership with Industry and Govt./Non-Govt. think tanks for policy development and decision making for deployment of key energy technologies

and resource generation for mitigating climate change.



**Prof. Kaustubha Mohanty**  
Head of SESE

## IIT Guwahati to set up School of Agro and Rural Technology- (SART)

School of Agro and Rural Technology is being set up with a vision to address Agro and Rural Technology challenges faced at the stakeholders end through the activities in the research and academic domain. This will help tailoring customized solution to the entire Rural mass. The school is successfully running M.Tech and PhD programme in Rural Technology. Shortly appropriate B.Tech programme and certificate course will be introduced. The academic and research programmes will continue to be interdisciplinary and multi-disciplinary in nature trying to address issues in Agro-biotechnology, Mechanical intervention in the agro - rural sector, Automation in agro-rural technology, Agro business management, Land and water management, Rural housing and Rural energy, Tele and community medicine and agri-clinics, Rural economy in its spectrum. Besides bringing the output of regular research projects to the field, the school will also be taking up societal projects with direct communication with the stakeholders. Currently the school is having 3 core faculties and 12 associated faculties, who are taking up the responsibilities in various domains. The academic and research programmes will be in line with New Education policy and will accentuate upon giving education a vocational orientation.



**Prof. Sanjukta Patra**  
Head, CRT



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