

“न कदापि स्वप्नदर्शनात्त्वरमिष्यामि” - I Dream Non-stop Therefore I Am



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Research - fundamental as well as applied – is vital to the advancement of a society, as has been firmly established through countless examples since time immemorial. Research brings new knowledge essential for the prosperity of a civilization. This has never been truer than now as we observe individual and collective research outcomes changing the lives of millions over the planet. Research is also changing the way we live. We are living in an exciting time to pursue research as it portends that focused endeavors on specific goals can achieve miracles. Importantly, as the pursuit of research becomes more and more accessible to a larger population, the extent of contributions in a more equitable manner can have far reaching consequences for diverse populations across the globe. Importantly, research outcomes are increasingly being used for public good across the world and that is a welcome omen.

Thus, the question is no more whether to pursue research or not; the question is at what level an institution ought to pursue research in order to bring prosperity for all. An academic institution works as a pivot for taking a society forward in all spheres of human activity. An academic institution respects human intellect and takes advantage of that for collective prosperity. This is usually achieved through development of knowledge, a significant part of which is dedicated to scientific research. The prosperity of a society is thus a direct reflection of the level of new knowledge that is churned out through constant pursuit of research at the frontiers. Research is an endeavor that needs to be kept alive and celebrated.

Research is an opportunity. Thus, it is incumbent upon the learned members of the society to pursue research at the forefront of knowledge. This can only be achieved when the members challenge themselves to solve the latest problems and turn them into potential advantages for a larger populace. The problems can be addressed through individual as well as collective efforts, depending on the nature of the problems. However, the key challenge is to identify and understand the problem scientifically. More importantly, members of the society need to identify the importance of supporting the culture for research that enhances the freedom of human spirit. The more an organization realizes the importance of actively pursuing research - in order to push the boundaries of knowledge - the better is the health of the organization and the society it envisions to support.

In institutions across the world, scientific research has traditionally been pursued by individual efforts, although the fields of specializations of the members attributed specificity and sometimes collectiveness to the works. The current stress of investments on infrastructure and achievements of a significant number of institutions suggest a large-scale pursuit of faculty and students' ambitions through efforts that try to solve well-defined problems individually as well as collectively. Also, this has helped create and nurture a culture of largely interdependent research. Thus, for any academic institution of higher learning, it is imperative to take advantage of these efforts and aim for specific research goals that are to be achieved in a time-bound manner. That not only requires planning at a high level but also investments to nurture and grow talent in fields of current importance. In addition, based on the interests of faculty and students, socially relevant research projects may also be the focus of institutional efforts.

For an institution that aims to achieve high degrees of eminence in academics, it is important to plan for the future, keeping in view the current global focuses on research in both fundamental and applied sciences. In addition, one needs to consider the interests and expertise of the members. Thus, that there is a need for planned approach involving all researchers for future pursuits of research is clear now. This is where the office of the Research and Development could take proactive measures in bringing to fructions the plans and their executions for individual research on topics of high importance and group research focusing on solving important problems. There is also a need to have the appropriate number of faculty strengths in each field of special emphasis. Yearly planning of infrastructure development and research outcome could bring great dividends out of the efforts.

An important aspect in pursuing research is collaboration that takes advantage of the expertise and facilities of several researchers and enhances the outcome. For an institution that focuses on research, it is imperative that collaborative research is pursued in order to achieve the best potential outcome possible. This can be at the institutional, national or international level. This needs to be made an important objective of furthering the research environment and outcomes. At an institutional level this is to be encouraged and vigorously pursued through planned efforts.

Another important aspect of research is to work on problems of current importance. This can not only have influence over science and technology but also on the society. The results can also have great influence in the current context of the development of science and technology essential for the society. Here are some of the proposed areas where there can be special emphasis for developing expertise and making original contributions. It is needless to mention that choice of research at individual and collective levels as decided by the researchers needs to be respected. Here are a few suggested topics of current importance and any academic institution may want to increase the bench strength and invest in the pursuit of the fields.

Quantum Information; Quantum Materials, Artificial Intelligence, High Performance Computing, Flexible and Wearable Electronics, Robotics, Disaster Management, Molecular Materials, Systems Chemistry, Systems Biology, Structural Biology, Communicable Diseases, Alternative Energy Science and Technology, Water Purification Technology, Renewable Materials, Cyclic Chemistry, Molecular Medicine, and Understanding Human Consciousness. These need to be supplemented by fundamental research in the sciences, engineering, mathematics and humanities and social sciences.

Finally, it is a childhood dream of all scientists to be able to nurture science at the highest level; to be able to cross the barrier of knowledge and to be able to create new knowledge in order to support the humanity. In modern times – while science has become more accessible for a larger populace -; however, pursuing science in isolation may not provide the best of outcomes. Thus individual, collective and institution efforts must be made in order for all to realize the dreams that have been constant companions for many years. For that to be fulfilled one must not stop dreaming in the first place.

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New Research Projects

- Lignocellulosic biomass utilization for lactic acid and bioethanol production
Funding Agency: DBT
Principal Investigator: Dr. Arun Goyal
- Water Filtration, Advanced-oxidation and Capacitive-deionisation Treatments for removal of Emerging Contaminants in Water
Funding Agency: DST
Principal Investigator: Dr. Selvaraju Narayanasamy
- Combinatorial approach for enhancing surface oxidation and reduction kinetics for value added products from renewable sources
Funding Agency: DST
Principal Investigator: Dr. Mohammad Qureshi
- Intelligent Disturbance Observer based Adaptive Control of DC-DC Power Converter for Nonlinear Loads
Funding Agency: DST
Principal Investigator: Dr. Praveen Kumar
- Localized Therapeutic Delivery Systems Based on Water Insoluble Thixotropic Hydrogels of Small Peptides for Breast Cancer Treatment
Funding Agency: SERB
Principal Investigator: Dr. Debapratim Das
- CRISPER based diagnosis of Covid-19 using paper microfluidics
Funding Agency: DBT
Principal Investigator: Dr. Pranab Kumar Mondal
- Modelling human liver microarchitecture and cellular physiology in vitro using 3D bioprinting for drug toxicity and high throughput drug screening applications
Funding Agency: DST
Principal Investigator: Dr. Biman Behari Mandal
- Timing Synchronization in Cell-free massive MIMO Systems
Funding Agency: SERB
Principal Investigator: Dr. Sudarshan Mukherjee
- The non-canonical estrogen receptor repertoire in breast cancer: towards refined disease classification and therapeutic decision
Funding Agency: ICMR
Principal Investigator: Dr. Anil Mukund Limaye
- Variational Calculus Method for Solving Microflows in a Rotating Platform
Funding Agency: DST
Principal Investigator: Dr. Pranab Kumar Mondal
- Role of Trigger factor in caseinolytic protease system of *Leptospira*
Funding Agency: DST
Principal Investigator: Dr. Manish Kumar
- Biocatalytic desulphurization of crude oil by high performing genetically engineered microorganisms
Funding Agency: CSIR
Principal Investigator: Dr. Vijayanand S. Moholkar
- Study of ejection mechanism from magnetized accretion disk around rotating black holes
Funding Agency: SERB
Principal Investigator: Dr. Santabrata Das
- Stochastic Games for Continuous-time Stochastic Processes
Funding Agency: SERB
Principal Investigator: Dr. Subhamay Saha
- Synthesis of Cobalt -Nitrosyl Complexes having $\{Co(NO)\}_9$ Configuration as a Source of Nitroxyl/HNO
Funding Agency: SERB
Principal Investigator: Dr. Biplab Mondal
- Dynamically tunable resonances in terahertz metamaterials using 2-D materials
Funding Agency: SERB
Principal Investigator: Dr. Gagan Kumar



New Research Projects

- Development of a reduced-basis numerical continuation method
Funding Agency: SERB
Principal Investigator: Dr. Satyajit Panda
- Fabrication of Electrical Actuators with Special Wettability Surfaces for Efficient Handling of Micro/Nano Droplets
Funding Agency: SERB
Principal Investigator: Dr. Kalyan Raidongia
- Connecting Navier-Stokes equation with dynamical equations in gravity: a new perspective
Funding Agency: SERB
Principal Investigator: Dr. Bibhas Ranjan Majhi
- Reheating the universe: Decoding the observational signatures
Funding Agency: SERB
Principal Investigator: Dr. Debaprasad Maity
- Powering the Ultra-Low-Power Wireless System/IoT Node by Scavenging Multi-Band Radio Frequency (RF) Energy
Funding Agency: SERB
Principal Investigator: Dr. Roy Paily Palathinkal
- Study on the bioactive compounds of five ethno-medicinal plants of Assam
Funding Agency: SERB
Principal Investigator: Dr. Vibin Ramakrishnan
- Probing the effect of strong gravity around the black hole X-ray binaries through AstroSat observations
Funding Agency: ISRO
Principal Investigator: Dr. Santabrata Das
- Development of an ultra-low head flow-induced vibration turbine
Funding Agency: SERB
Principal Investigator: Dr. Atul Kumar Soti
- Tandem Ring-Opening Cyclization/Cycloaddition of Small Ring Heterocycles with Nucleophiles for the Assembly of Medically Important Heterocycles
Funding Agency: SERB
Principal Investigator: Dr. Tharmalingam Punniyamurthy
- Teachers Associateship for Research Excellence (TARE)
Funding Agency: SERB
Principal Investigator: Dr. Poulouse Poulouse
- Technology Development & Innovation Engineering for Value Chain Development for Citrus Fruits of North East Region
Funding Agency: DBT
Principal Investigator: Dr. Siddhartha Singha
- Metamaterials based Compact Broadband Tunable Modulator for Terahertz Photonics
Funding Agency: DEITY
Principal Investigator: Dr. Gagan Kumar
- An Advanced Predictive Maintenance Tool for Equipment and Machines Using Industry 4.0 Concepts
Funding Agency: SERB
Principal Investigator: Dr. Deepak Sharma
- A Study of Selmer Groups of Elliptic Curves and Their Applications
Funding Agency: SERB
Principal Investigator: Dr. Anupam Saikia
- Development of diagnostic Kits for quick detection of CTV, HLB and Phytophthora rot diseases in Citrus of North East India
Funding Agency: DBT
Principal Investigator: Dr. Lingaraj Sahoo

- Use of non-toxic nanoformulations for prolonging shelf life and reduction of post-harvest loss of Khasi mandarin orange (*Citrus reticulata*) of North East India
Funding Agency: DBT
Principal Investigator: Dr. Vimal Katiyar
- Understanding the regulations of RNPS₁ by miRNAs and RNA-Binding Proteins under ER stress
Funding Agency: DBT
Principal Investigator: Dr. Kusum Kumari Singh
- Design and Development of a Bulk Material Handling Device for Metering, Mixing, and Delivery of Powder Feedstock
Funding Agency: DST
Principal Investigator: Dr. Sajan Kapil
- Design and development of an intelligent extrusion device for 3D printing of concrete structures
Funding Agency: DST
Principal Investigator: Dr. Biranchi Narayan Panda
- Development of signal & channel models, circuits & antennas for next generation wireless systems with emphasis on vehicular communication
Funding Agency: Ministry of Electronics and Information Technology (MeitY)
Principal Investigator: Dr. Ratnajit Bhattacharjee
- A Numerical and experimental investigation of Renewable energy from Flow-induced vibrations
Funding Agency: IIT Guwahati
Principal Investigator: Dr. Atul Kumar Soti
- Exploring Beyond the Standard Model Physics: Multi-Scalar and Darkmatter Studies
Funding Agency: Shastri Indo-Canadian Institute
Principal Investigator: Dr. Poulouse Poulouse

MoU/MoA Established

- MoU between IIT Bombay and IIT Guwahati (Digital Gatimarg) has been signed on 19.10.2020. This MoU aims to bring together academia, industry and government entities to develop home-grown solutions for optical networks across the country. Hence this national level program aims to boost research and development activities in the country in the area of optical communication systems and networks. MoU is initiated by Dr. Ramesh Kumar Sonkar from Department of Electronics and Electrical Engineering at IIT Guwahati.
- MoA between IIT Guwahati and JV Micronics has been signed on 19.10.2020. This Memorandum of Agreement has been signed for Research Collaboration under impacting research innovation and technology -II (Imprint-II Scheme of the Ministry of Human Resource Development, Government of India). MoA is initiated by Dr. Sisir Kumar Nayak from Department of Electronics and Electrical Engineering at IIT Guwahati.
- MoA between Department of Biotechnology (DBT), Govt. of India and IIT Guwahati has been signed on 23.10.2020. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the "Modulation of connexin-43 and histone deacetylase to comprehend cancer therapy". MoA is initiated by Prof. Siddhartha S. Ghosh from Department of Biosciences and Bioengineering at IIT Guwahati.
- MoU between Vikram Sarabhai Space Centre (VSSC) and IIT Guwahati has been signed on 03.11.2020. This MoU has been signed for development of enhancement algorithms for STR-Tools under Imprint2 programme. MoU is initiated by Dr. Sachin Singh Gautam from Department of Mechanical Engineering at IIT Guwahati.
- MoA between DBT and IITG has been signed on 11.11.2020. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the "Investigating the role of peroxisomes in Parkinson's disease". MoA is initiated by Dr. Shirisha Nagotu from Department of Biosciences and Bioengineering at IIT Guwahati.
- MoU between IITG and Umeandus Technologies India Private Limited (UTIPL) has been signed on 21.12.2020. The objective of the MoU is to promote interaction between IITG and UTIPL in mutually beneficial areas and to provide a formal basis for collaboration between IITG and UTIPL. MoU is initiated by Research & Development Section at IIT Guwahati.
- MoU between IIT Guwahati and IIT Roorkee has been signed on 24.12.2020. This MoU between two institutions shall seek to promote the exchange of students or project staff for pursuing research work for the mutual benefit of both institutions, the exchange of academic & research materials and publications/IPs, collaboration in setting up and upkeep of the relevant infrastructure in both the institutions, publication of research papers in international scientific

institutions, the exchange of academic & research materials and publications/IPs, collaboration in setting up and upkeep of the relevant infrastructure in both the institutions, publication of research papers in international scientific journals and in the conferences, publication of Intellectual properties (IPs) developed jointly through project/research collaboration. MoU is initiated by Dr. Gaurav Trivedi from Department of Electronics and Electrical Engineering at IIT Guwahati.

- MoU between IIT Guwahati and Assam Panchayat & Rural Development has been signed on 05.01.2021. This MoU has been signed for the preparation of DPR (Details Project Report) for the treatment of Polluted Kamalpur Beel under Kamrup Zilla Parishad. MoU is initiated by Dr. Mihir Kumar Purkait from Department of Chemical Engineering at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 06.01.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the project “Tailor-made peptidomimetics designing against Islet Amyloid Polypeptide (IAPP) aggregation: A therapeutic approach associated with Type-2 Diabetes. MoA is initiated by Dr. Bhubaneswar Mandal from Department of Chemistry at IIT Guwahati.
- MoA between IIT Guwahati and State Innovation & Transformation Aayog has been signed on 13.01.2021. State Innovation & Transformation Aayog has agreed to support the project named ‘Solar power driven water treatment plant by providing financial assistance of Rs. 41,40,000/- under its initiative in Assam as per estimates submitted by IIT Guwahati. MoA is initiated by Dr. Mihir Kumar Purkait from Department of Chemical Engineering at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 18.01.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the Enhanced carbonate precipitation of ureolytic and nitrifying microbe treated rubber wastewater. MoA is initiated by Dr. V. V. Goud from Department of Chemical Engineering at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 16.02.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the “Functional Collagen Nanoparticle Impregnated Silk Nano-Ceramic Composite 3D Matrices for Flat Bone Regeneration”. MoA is initiated by Dr. Biman B. Mandal from Department of Biosciences and Bioengineering at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 23.02.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the “NIRMAN 3D – Novel minimally invasive implants for reconstructive surgery using materials providing mechanical instruction and prepared by 3D printing”. MoA is initiated by Dr. Biman B. Mandal from Department of Biosciences and Bioengineering at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 24.02.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the “Innovative algae platform for Industrial wastewaters valorization (InWAP)”. MoA is initiated by Dr. Kaustubha Mohanty from Department of Chemical Engineering at IIT Guwahati.
- MoU between Centre for Cellular and Molecular Platforms (C-CAMP), an initiative of Department of Biotechnology, Ministry of Science and Technology, Govt. Of India and IIT Guwahati has been signed on 08.03.2021. C-CAMP and IIT Guwahati has entered into a strategic partnership with the objective of setting up “Centre for Bio-entrepreneurship” at IIT Guwahati to build an entrepreneurship ecosystem to nurture and promote Women Led Entrepreneurship and Woman Entrepreneurs in the field of life sciences. MoU is initiated by Dr. Dipankar Bandyopadhyay, Head, Centre of Nanotechnology at IIT Guwahati.
- MoA between DBT and IIT Guwahati has been signed on 19.03.2021. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the “Use of non-toxic nanoformulations for prolonging shelf life and reduction of postharvest loss of mandarin orange (*Citrus reticulata*) of North East India”. MoA is initiated by Dr. Vimal Katiyar from Department of Chemical Engineering at IIT Guwahati.
- Department of Design, IIT Guwahati and Ministry of Electronics and Information Technology, Government of India recently signed a memorandum of understanding (MoU) on starting a new two year Masters’ program in Electronic Product Design. The primary goal of the program is to strengthen the country’s capacity to develop indigenous electronic devices which are excellent in both form and function. The aim is to equip the students with the necessary skills to collaboratively design aesthetically pleasing, user centric, contextually appropriate and indigenous products which fall in one or more of the domains including Consumer electronics, Healthcare and Medical electronic devices, Electronic peripherals, Automotive electronics, Electronic Toy and Home Automation. The program will be funded by the ministry for five years.

Centre of Excellences

Centre of Excellence for Research & Development of Nanoelectronics Theranostic Devices, PI: Prof. Dipankar Bandyopadhyay, Sponsored by Ministry of Electronics and Information Technology – MeitY

About a decade back, the North-Eastern (NE) region of India needed appropriate infrastructure for the pursuit of advanced research in micro/nanoscale electronics in order to improve the quality of life through technological intervention. In particular, in the healthcare domain, the diseases burdens associated with cancers, cardiac failure, viral, pathogenic and parasitic infections needed special attention. In this direction, Centre for Nanotechnology of IIT Guwahati have taken a lead role since 2014 for the scientific and technological developments in the area of health care through this Centre-of-Excellence in the NE region of the country. In the past seven years, this initiative has been able to establish a state-of-art multi-disciplinary experimental facility for the fabrication, characterization, and testing of micro/nano electronic devices. The group of academic leaders along with the students and research staff members have utilized the facility to develop efficient micro/nano electronic sensors, FETs, SAW devices, and MEMS devices, pertaining to the burgeoning healthcare necessity of the country, in particular, the NE region. The initiative also helped in amalgamating industry and start-ups with IIT Guwahati to develop marketable products. Thus far, the project led to more than 60 PhD theses, 100 MTech/BTech Projects, 270 publications (more than 20% in the high impact domain), 40 patents, 30 prototypes, Transfer-of-Technologies, 2 start-ups, training of 530 highly skilled manpower, and constructing a state-of-art facility in the form of the New Centre for Nanotechnology Building in the campus with ISO 5 and 6 clean room facilities. The Centre of Excellence has enabled towards improving the quality of scientific and technological assets and outputs by developing cutting edge indigenous devices, generating quality employment, and trained manpower together with speeding cutting-edge scientific and technological education in this developing part of the country.

Centre for Excellence in Disruptive Innovations & Product Development for Affordable Rural Healthcare, PI: Prof. Dipankar Bandyopadhyay, Sponsored by Indian Council of Medical Research – ICMR

Disruptive innovations of novel scientific and technological pathways stimulate societal progress. For example, the point-of-care (POC) detection of the concentration of excretory products in blood serum, e.g., creatinine, urea or uric acid, or the nutrients in urine, e.g. protein, can help in the prognosis of an array of diseases at the early stage. Frugal innovations around such biomarkers, emulating the principles of glucometer or pregnancy kits, can foster novel biomedical innovations. A large-scale manufacturing of such Health Care Technologies (HCT) involves multiple steps which include idea-formulate-implement-prototype-product. Presently, such HCTs are designed and developed in abroad, which seldom considers parameters specific to the nation. Manufacturing indigenous HCT considering the demographic conditions, purchase capacity, and user-environment is perhaps the need of the hour. Thus, in this Centre for Excellence, we attempt to develop minimum five such low-cost and portable HCTs for the POC detection of biomarkers in blood serum or urine. The markers will be selected from creatinine, urea, uric acid, proteins, electrolytes, enzymes, lipids, various cancer biomarkers, and E-Coli, targeting health care solutions for the rural population. The devices will employ state-of-art principles of microfluidics, electrochemical, colorimetric, and optoelectronics. We plan joint IPR/Publication/Productization of such devices through IITian-start-ups in collaboration with the leading doctors/scientists/engineers in India and abroad with the help of the proposed 'immersion program'. The POC devices will be connected with AI-ML-IOT enabled data-analytics and data-science lab for data storage, security, analysis, and prediction. Further, pilot-scale E-Health clinics will be established to provide evidence-based, low-cost, and sustainable primary-care facilities for the rural India. This setup will enable the Electronic Health Record (EHR) software based systematic data validations of the POC prototypes following the ICMR ethical guidelines. A successful execution of such objectives is expected to improve quality of indigenous scientific and technological assets of the country.

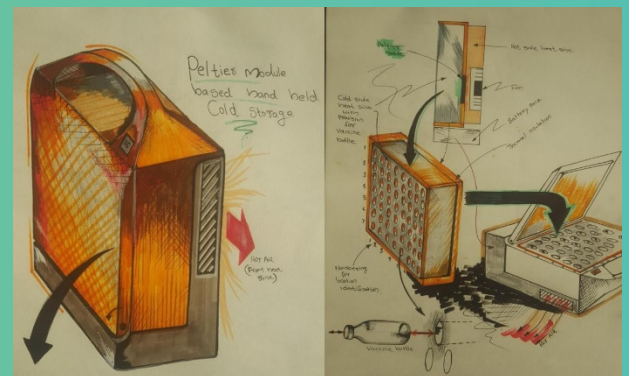
Development of signal & channel models, circuits & antennas for next generation wireless systems with emphasis on vehicular communication, PI: Prof. Ratnajit Bhattacharjee, Sponsored by Ministry of Electronics and Information Technology – MeitY

The next generation of mobile wireless communication systems, popularly known as the fifth-generation new radio (5G-NR) is required to operate in the millimeter-wave (mm-wave) frequency bands, known as frequency range 2 (FR2), in the range of 24-40 GHz in addition to the conventional sub 6GHz frequency bands. Out of the five available FR2 bands (n257 to n261) available for 5G-NR, the n260 band lying spanning the frequencies between 37 GHz and 40 GHz is the least explored. This is reflected by the fact that only a handful of the current available user equipment (UE) technologies focus on this band. Moreover, even the research community, including the 5G testbed research group in India, is mainly focused on developing the circuits/systems/antennas for the other FR2 bands. Therefore, our main aim in this project is to develop complementary-metal-oxide-semiconductor (CMOS) integrated mm-wave radio front-end circuits for the n260 band. Due to the high operational frequencies, these mm-wave RFE circuits need to have a feature size of less than 100 nm. Packaging of CMOS chips at such high frequencies is another challenge, since there are no known vendors providing mm-wave packaging services to universities. Our efforts will be to deliver a working CMOS transceiver chip for the n260 band. Further, orthogonal time-frequency space (OTFS) modulation has recently emerged as a frontrunner waveform for next generation wireless systems. However, several key questions in this direction should be answered, before considering a physical implication of this system. This project aims at developing important intellectual property in this direction to bolster the nation's research capital. Another important aspect of wireless communications is the availability of accurate channel information at the transmitter and receiver, that is required for error free high-rate communication. This project aims to use the state of the art in artificial intelligence and machine learning to obtain accurate estimates of mm wave channels that are otherwise nontrivial to obtain. The key deliverables of this project will include but are not limited to, a transmitter chip covering n260 band, a receiver chip covering n260 band, and a matching Antenna and evaluation board. All of these deliverables will be suitably patented, and the findings will be published in high quality peer reviewed journals. In addition to this, the project engineers involved with different parts of the project will be trained appropriately to work in the respective areas. Moreover, the Ph.D. and M. Tech students working under the supervision of the investigators will be trained in the appropriate areas.

Events Organized by R&D Section

COVID-19 Grand Idea Challenge

A Covid 19 Grand Idea Challenge was organised by Research and Development Section for the students of IIT Guwahati in the area of cost effective handheld cold storage and safe delivery system for Covid-19 vaccine. Submission of a two-page document depicting an innovative idea in the above-mentioned area within a stipulated deadline was a prerequisite for the grand challenge. 7 students from IIT Guwahati participated in the grand challenge. An expert committee comprising Dr. Sachin Kumar from Biosciences and Bioengineering Department, Prof. S Kanagaraj from Mechanical Engineering Department and Prof. Vishal Trivedi from Biosciences and Bioengineering Department was set up for evaluation of the submitted proposals. Mr. Vishnudath P, a master student from Design Department was chosen as the winner of the grand challenge for suggesting an innovative Peltier module-based hand-held storage for covid 19 vaccines. The winner was virtually awarded by the director of IIT Guwahati in association with NRL- Centre of Excellence for Sustainable Materials with a cheque of rupees ten thousand (Rs. 10,000/-) and a certificate of honour on 18.12.2020.



Virtual Outreach Day

Research & Development Section of IIT Guwahati hosted a full day Virtual Outreach Programme on 18.12.2020 in response to the invitation received from the Principal Coordinator of Outreach Programme and Ministry of Earth Sciences, Government of India. The Outreach Programme was organised in association with India International Science Festival (IISF) 2020 under the theme of Science for Aatmanirbhar Bharat and Global Welfare. The purpose of the programme was to showcase and present the research activities of IIT

Guwahati faculty members, research scholars and postdoctoral fellows related to "Self-Reliant India" national mission and global issues. The presentations from PhD students and research scholars were evaluated by faculty members namely Dr. Lalit Mohan Pandey from Biosciences and Bioengineering Department, Dr. Pankaj Tiwari from Chemical Engineering Department and Dr. Kingsuk Mahata from Chemistry Department. Best paper presentation award comprising a book and a certificate of honour was given on 24.12.2020 to Mr. Sayantan Sinha from Chemistry Department and Mr. Mohammed Rafi Uz Zama Khan from Biosciences and Bioengineering Department for their talks on "A Photocatalytic approach in Medicinal Chemistry for synthesis of 1,2,3- Triazole compounds of Pharmaceutical/Biological importance" and "Potentials of ayurvedic formulations as anti-cancer agents" respectively.

Virtual Research Meeting on Robotics, Drones & Automation

Research and Development Section of Indian Institute of Technology Guwahati organized a Virtual Research Meeting on Robotics, Autonomy and Drones on 21.01.2021 as a part of the Research for Resurgence Meeting Series. The purpose of the meeting was to showcase the expertise of IIT Guwahati faculties working on the above-mentioned research areas and connect associated faculty members with prospective collaborators from academia, Government and industry stakeholders. The meeting was attended by 96 participants. Prof. Santosha Kumar Dwivedy of Mechanical Engineering Department chaired the session consisting of faculty presentations from IIT Guwahati. Dr. A.K. Garg, Scientist 'F'/Director MeitY, Government of India, Dr. K.R. MuraliMohan, Head FFT Division, DST and Shri P.L.N Raju, Director of North Eastern Space Applications Centre (NESAC) and Mr. Raj K. Sharma, President AIRCA took part in the research meeting and shared their valuable thoughts. 14 eminent scientists from research/academic institutes of National importance across the country such as IIT Bombay, IIT Kanpur, IISC, and IIIT Hyderabad also participated in the meeting. The meeting was also enriched by participation from CEOs/Founders/Directors of reputed companies such as Marut Dronetech, Indrones Solutions and Systematics India Pvt. Ltd



Virtual Research Meeting on 3D & 4D Printing

Research and Development Section of Indian Institute of Technology Guwahati hosted a Virtual Research Meeting on 3D & 4D Printing on 18.02.2021 as a continuation of the Research for Resurgence Meeting Series. The meeting showcased the expertise of IIT Guwahati faculties working on the above-mentioned research areas in order to connect the associated faculty members with prospective collaborators from Government and industry stakeholders. Dr. Shrikrishna N. Joshi of Mechanical Engineering Department chaired the session consisting of faculty presentations from IIT Guwahati. The meeting was enlightened by the participation of corporate stakeholders including Mr. Indrakumar Hariramani, General Manager, MSME Technology Centre, Indo German Tool Room Ahmedabad, Mr. P.L.N. Raju, Director, North Eastern Space Applications Centre, Mr. Raja Upputuri, President, Indian Additive Manufacturing Forum and Mr. Veejey Kapse, Regional Head, SLM Solutions India Pvt Ltd.

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Virtual Research Meeting on Application Software Development

Research and Development Section of Indian Institute of Technology Guwahati organized a Virtual Research Meeting on Application Software Development on 25.02.2021 as a part of the Research for Resurgence Meeting Series. The purpose of the meeting was to highlight the expertise of IIT Guwahati faculties working on the above-mentioned research areas and connect associated faculty members with prospective corporate stakeholders from industry and government organizations. Dr. Sanasam Ranbir Singh of Computer Science and Engineering Department chaired the session consisting of faculty presentations from IIT Guwahati. Dr. Dibyajyoti Chutia, Sci./Engr. 'SF', North Eastern Space Applications Centre took part in the research meeting and shared his valuable thoughts.



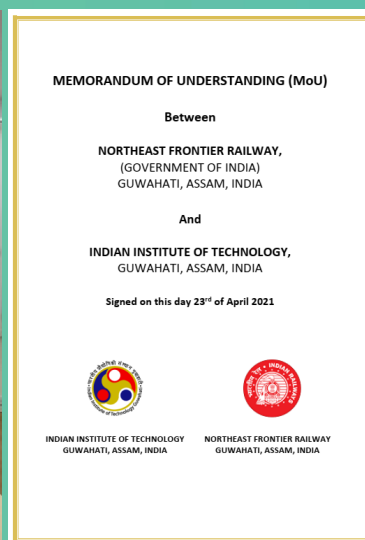
NF Railway & IIT Guwahati Joint Research Initiative



Research & Development Section of IIT Guwahati conducted a technical workshop at NF Railway Headquarter on 05.03.2021. The meeting aimed at discussing technical issues of Geo-technical assistance in hillsection, bridges, signalling - safety assessment, AI based predictive maintenance systems, IOT design features, improving maintenance and operations of rolling stock, OHE design issues especially in hilly terrain / station yards. Faculties from Mechanical, Civil and Electronics and Electrical Engineering Departments highlighted their expertise via PowerPoint presentations in the context of the meeting. A follow up meeting was also held at IIT Guwahati on 10.03.2021 with referenceto the

meeting held at NF Railway Headquarter and the presentations delivered therein. The follow up meeting focused on presentations from concerned IIT Guwahati faculties on solutions for the topics including wheel shelling in railway coaches, breakage of coil springs fitted in the suspension system of railway coaches, biodegradable and non-biodegradable solid waste management at railway stations, use of biodegradable plastics to make stations plastic free, STP/ETPs for application at railway stations and water recycling plants for railway stations.

Subsequently, 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. 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.” Along with this, IIT Guwahati will also support NFR to make their stations plastic free by providing alternate Biodegradable polymer based technologies. Mr. Yogesh Verma from NFR emphasized 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. IIT Guwahati will take a lead to provide state-of-the-art technical know-how and training support in multi-facet areas to fulfil NFR requirements Please provide information on how IIT Guwahati will be taking a lead in this collaboration.



Virtual Workshop on Prime Minister’s Fellowship Scheme for Doctoral Research

Research & DevelopmentSection of IIT Guwahati organised a virtual workshop on Prime Minister’s Fellowship scheme for doctoral research in association with Science and Engineering Research Board (SERB), Federation of Indian Chambers of Commerce and Industry (FICCI) and Orthotech India Private Limited on 19.03.2021. A presentation was given by Mr. Vishal Khanna, Deputy Director, FICCI on the fellowship scheme covering topics including eligibility criteria, facts and figures, objectives, benefits to scholars, academia and industry and supporting documents.