



## Electronic Product Design Program to Develop Indigenous Electronic Devices Supported by Ministry of Electronics and Information Technology, GoI Initiated by IITG Design Department

Department of Design, IIT Guwahati and Ministry of Electronics and Information Technology, Government of India recently signed a memorandum of understanding 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 forms and functions. 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 following domains:

- Consumer electronics
- Healthcare and Medical electronic devices
- Electronic peripherals
- Automotive electronics
- Electronic Toy
- Home Automation

### Objectives of the programmes are as follows:

- To develop facilities for supporting the design, development and prototyping of electronic devices.
- To develop commercially viable electronic products through Industry-academia collaboration.
- To develop human resources for the entrepreneurial venture in electronic product design and manufacturing
- Registration and protection of Intellectual Property Rights

### The program will be funded by the ministry for 5 years, and the following are the objectives and expected deliverables:

- To start and execute a post-graduate academic programme in the field of Electronic Product Design for 4 batches of MDes students with 30 students per batch. Therefore, altogether 120 MDes students will be graduated in 5 years.
- To conduct Executive Development Programme in the field of Electronic Product Design for industry experts. It is expected that 2 batches of Executive Development Programme to be organized every year for 5 years. The batches will be held in summer and winter with 20 executives registering in each batch. Therefore, altogether 200 executives will participate in the span of 5 years.
- There will be an intake of 4 Doctoral Researchers who will work on advanced research topics in Electronic Product Design for the award of PhD (Design).

## Multi-Institutional Joint Centre for Depression Diagnosis and Medication Adherence at IITG

The centre for depression diagnosis and medication adherence is a joint centre of cooperation support by the **Ministry of Science and ICT (MSIT) Korea** and the **Department of Biotechnology, India**. The centre, with various researchers from India and Korea, will focus on various mental health issues. IIT Guwahati, IIT Ropar, IIT Dharwad, and NIMHAN Bangalore are part of this centre from India. Soongsil University, Hankuk University of Foreign Studies (HUFS), Ghent University Global Campus, The State University of New York (Korea), and Mental Health Research Institute are participating from Korea. IIT Guwahati is the coordinating institute of this centre from India, and Soongsil University is the coordinating institute from Korea. The work of this centre is interdisciplinary, which is at the intersection of psychiatry, mathematics, system theory, psychology, data science, computer vision, signal processing, and VLSI. EEE and the HSS department will contribute to this project in system theory, data science, VLSI, and psychology.

*Project Coordinator: Dr. Hanumant Singh Shekhawat, EEE department.*

# New Additions @R&D

## Research Projects

- Cancer immunotherapy initiative In India (DUCI<sub>3</sub>): Repurposing anti-COVID<sub>19</sub> immunity for cancer immunotherapy.  
Funding Agency: **Dalhousie Medical Research Foundation**  
Principal Investigator: Dr. Sachin Kumar
- Recombinant Newcastle Disease Virus Based Breast Cancer Therapy: A Novel Oncolytic Viral Approach  
Funding Agency: **BBCI**  
Principal Investigator: Dr. Sachin Kumar
- Cognitive Interfaces for Software Engineering with Multimodal Brain Imaging  
Funding Agency: **DST**  
Principal Investigator: Dr. Cota Navin Gupta
- Investigating Enzymatic reactions in Crowded Physiological spaces AND Structural changes in SARS-Cov-2 S protein in response to Drug  
Funding Agency: **DST**  
Principal Investigator: Dr. Rajaram Swaminathan
- DC side low-frequency ripple reduction in SBI and q-SBI based PV system with non-linear local loads and distorted PCC voltage.  
Funding Agency: **SERB**  
Principal Investigator: Dr. Ravindranath Adda
- Design and Development of Robotic Vaccinator for mass vaccination  
Funding Agency: **OTHER**  
Principal Investigator: Dr. Subramani Kanagaraj
- Development of a numerical model and the stability analysis of dynamic keyhole in deep penetration laser welding process using the phase-field method  
Funding Agency: **SERB**  
Principal Investigator: Dr. Swarup Bag
- Classification of water for drinking purpose  
Funding Agency: **Power Grid Corporation of India**  
Principal Investigator: Dr. Mihir Kumar Purkait
- Centre for depression diagnosis and medication adherence  
Funding Agency: **DBT**  
Principal Investigator: Dr. Hanumant Singh Shekhawat
- Examining nature-society relations through urban infrastructure (Project-NATURE)  
Funding Agency: **Academic institute-KTH Royal Institute of Technology**  
Principal Investigator: Dr. Anamika Barua
- Analysis of genome-wide restoration of estrogen regulated gene expression network post epigenetic reactivation of ERalpha in ER-negative breast cancer cells  
Funding Agency: **ICMR**  
Principal Investigator: Dr. Anil Mukund Limaye
- Preparation of DPR for the treatment of Pagladia River under Nalbari Zilla Parishad.  
Funding Agency: **Govt. of Assam**  
Principal Investigator: Dr. Mihir Kumar Purkait
- Quantification of subsoil response of Birpur, Basopatti and adjacent regions of Madhubani, Bihar located adjacent to central seismic gap towards minimizing future earthquake induced damages  
Funding Agency: **Ministry of Earth Science**  
Principal Investigator: Dr. Abhishek Kumar
- Experimental Investigations on Flow Boiling Instabilities in Mini- and Microchannels  
Funding Agency: **SERB**  
Principal Investigator: Dr. Manmohan Pandey

- To capture and investigate physiologically relevant interactome in UPF3B knockout cells mimicking mental retardation (MR) patients' condition.  
Funding Agency: **ICMR**  
Principal Investigator: Dr. Kusum Kumari Singh
- Bioengineered skin equivalent for treatment of burn injuries  
Funding Agency: **DBT**  
Principal Investigator: Dr. Biman Behari Mandal
- Design, Development, and Demonstration of Solar-PV integrated On-board and Off-board Electric-Rickshaw Charging Infrastructure  
Funding Agency: **DST**  
Principal Investigator: Dr. Ravindranath Adda
- Enhancement of the Chemotherapeutic Potential of Anticancer Drugs: Biothiol-stimulated Fluorogenic Strategies for Adjuvant Delivery of Anticancer drug and GSTP1 inhibitor  
Funding Agency: **ICMR**  
Principal Investigator: Dr. Krishna Pada Bhabak

# Memorandum of Understanding (MoU)/ Memorandum of Agreement (MoA)

- Research Agreement between **KTH Royal Institute of Technology** and IITG **signed on 23.06.2021**. This Research Agreement has been signed to perform the research project titled "Examining nature-society relations through urban Infrastructure". This agreement is effective on 01.06.2021 and will terminate on 28.02.2022. This agreement was initiated by Dr. Anamika Barua of Department of Humanities and Social Sciences at IIT Guwahati.
- MoU between **Sociograph Solutions Pvt. Ltd.** And IITG **signed on 25.06.2021**. This MoU has been signed to promote co-operation in collaborative research, design and development of relevant resources. This MoU will VE VALID FOR A PERIOD OF 5 YEARS from the date of its signatures. This agreement was initiated by Dr. Abhishek Shrivastava of Department of Design at IIT Guwahati.
- MoA between **DBT and IITG signed on 05.07.2021**. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to 'DBT's Twining Programme for the NE titled 'ISOLATION, SYNTHESIS, AND STRUCTURE FUNCTION ANALYSIS OF FROG AND TOAD-SKIN DERIVED ANTIMICROBIAL, ANTICANCER AND WOUND-HEALING PEPTIDES.'" This MoA will remain in force for the duration of the project (3 years from the date the project has been sanctioned by DBT) and until all claims are settled between DBT and IITG. This agreement was initiated by Dr. Nitin Chaudhary and Dr. Sachin Kumar of Department of Biosciences & Bioengineering at IIT Guwahati.
- MoA between **DBT and IITG signed on 16.07.2021**. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to Design and Characterization of peptide-based cell targeting domains with live cell and animal imaging methods. This MoA will remain in force for the duration of the project (3 years from the date the project has been sanctioned by DBT) and until all claims are settled between DBT and IITG. This agreement was initiated by Dr. Vibin Ramakrishnan and Dr. Nitin Chaudhary of Department of Biosciences & Bioengineering at IIT Guwahati.
- MoA between **DBT and IITG signed on 25.07.2021**. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to Lignocellulosic biomass utilization for lactic acid and bioethanol production. This MoA will remain in force for the duration of the project (3 years from the date the project has been sanctioned by DBT) and until all claims are settled between DBT and IITG. This agreement was initiated by Dr. Arun Goyal of Department of Biosciences & Bioengineering and Dr. V. S. Moholkar of Department of Chemical Engineering at IIT Guwahati.
- MoA between **DBT and IITG signed on 10.08.2021**. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to 'Continuous fermentative production of D (-) Lactic acid using whey as a feedstock in automated membrane integrated bioreactor. This MoA will remain in force for the duration of the project (3 years from the date the project has been sanctioned by DBT) and until all claims are settled between DBT and IITG. This agreement was initiated by Dr. Senthilkumar Sivaprakasam and Dr. Selvaraju Narayanasamy of Department of Biosciences & Bioengineering at IIT Guwahati.
- Memorandum of Understanding among **Pollution Control Board Assam** and Indian Institute of Technology, Guwahati and Guwahati Municipal Corporation, Guwahati **signed on 03.09.2021**. Under the NCAP, city specific interventions and action plans will be formulated for implementation by the PCBA and GMC, along with //f as a technical partner for the City of Guwahati. The National Knowledge Network (NKN), Central Pollution Control Board (CPCB) and MoEF & CC will be overseeing the coordination and technical compliance. The MoU shall be effective from the date of signing by all the Parties which shall be the Zero Date and shall remain in force till the extent of NCAP. The Parties may extend the term in writing on year-to-year basis subject to the continuation of NCAP scheme. This agreement was initiated by Dr. Vimal Katiyar of Department of Chemical Engineering at IIT Guwahati.

- Memorandum of Understanding Between **Panchayat & Rural Development, Government of Assam** and Indian Institute of Technology, Guwahati **signed on 07.09.2021**. This MoU has been signed for the treatment of Polluted “Panchnoi River under DRDA, Udalguri” in the district of Udalguri. This agreement was initiated by Dr. Mihir Kumar Purkait of Department of Chemical Engineering at IIT Guwahati.
- Memorandum of Agreement between **DBT and Indian Institute of Technology, Guwahati signed on 08.09.2021**. This MoA defines the role and responsibilities of the participating agencies, monitoring and other matters related to the Creation of Bioinformatics Infrastructure Facility (BIF) for the promotion of Biology Teaching Through Bioinformatics (BTBI) Scheme of BTISnet. This MoA will remain in force for the duration of the project and until all claims are settled between DBT and IITG. This agreement was initiated by Dr. Latha Rangan of Department of Biosciences & Bioengineering at IIT Guwahati.
- Memorandum of Understanding between **North Eastern Regional Load Despatch Centre (Nerltdc)**, Posoco and IIT Guwahati for Knowledge Sharing and Capacity Building in The Concern Areas **signed on 16.09.2021** towards For knowledge sharing and capacity building in the concern areas. This MOU, unless extended by mutual written consensus of the parties, shall be valid for a period of five years from the date of execution of the MOU. This agreement was initiated by Dr. Karuna Kalita of Department of Mechanical Engineering at IIT Guwahati.
- Memorandum of Understanding Between **Central Ayurveda Research Institute (CARI), Kolkata Under Central Council for Research in Ayurvedic Sciences (CCRAS)** and Indian Institute of Technology, Guwahati **signed on 28.09.2021**. To carry out the collaborative research project entitled ‘Mechanistic investigations on the efficacy and mode of action of Ashwagandha and Yogaraj Guggulu, using a hybrid Proteomics-Cheminformatics-Network medicine approach for the treatment of Osteoarthritis’. MoU shall be valid for a period of two years from the date of signing the agreement or till the completion of the project whichever is earlier, and its extension, continuation shall be jointly decided by CCRAS and IIT two months prior to end of the above period. This agreement was initiated by Dr. Vibin Ramakrishnan and Dr. Nitin Chaudhary of Department of Biosciences & Bioengineering at IIT Guwahati.

## Awards / Achievements

- **Prof. V. Venkata Dasu**, Department of Biosciences and Bioengineering, IITGuwahati elected as a Fellow of the Royal Society of Biology.
- **Prof. Sandip Paul**, Department of Chemistry, IITGuwahati received the Chemical Research Society of India (CRSI) Bronze Medal of 2022. This honor is given to young researchers who have done very well in Chemical research.
- **Dr. Sudip Mitra**, Associate Professor, School of Agro & Rural Technology, IIT Guwahati become the Editorial Board of PLOS Climate international journal.
- **Dr. Biranchi Panda**, Department of Mechanical Engineering, IIT Guwahati became the Editorial Board member of Springer Journal “Materials Circular Economy”.
- **Dr. Selvaraju Narayanasamy**, Department of Biosciences & Bioengineering (BSBE), IIT Guwahati became the Editorial Board of Nature Publishing Group Journal “Scientific Reports”.
- **Prof. Debapratim Das**, Department of Chemistry, IITGuwahati become as an Associate Editor in the journal Frontiers in Chemistry: “Supramolecular Chemistry”

 <p><b>Congratulations</b> to <b>Prof. V. Venkata Dasu</b> Department of Biosciences and Bioengineering, IIT Guwahati for being elected as a Fellow of the <b>Royal Society of Biology</b></p>	<p><b>Prof. Sandip Paul</b> Department of Chemistry, IIT Guwahati for his selection to receive the CRSI Bronze Medal of 2022. This honor is given to young researchers who have done very well in Chemical research.</p> 
<p><b>CONGRATULATIONS</b> to <b>Dr. Selvaraju Narayanasamy</b> Department of Biosciences &amp; Bioengineering (BSBE), IIT Guwahati for joining the Editorial Board of Nature Publishing Group Journal <b>“Scientific Reports”</b></p> 	<p><b>Congratulations</b> to <b>Dr. Biranchi Panda</b> Department of Mechanical Engineering IIT Guwahati for joining the Editorial Board member of Springer Journal <b>“Materials Circular Economy”</b>. <small>Materials Circular Economy provides a platform for research related to the science, engineering and technologies of sustainable materials, 6Rs (reuse, recycle, redesign, remanufacture, reduce, recover), lifecycle engineering and life cycle assessment of materials</small></p> 
<p><b>Dr. Sudip Mitra</b> Associate Professor, School of Agro &amp; Rural Technology, IIT Guwahati for joining the <b>Editorial Board of PLOS Climate international journal</b></p> 	<p><b>Congratulations</b> to <b>Prof. Debapratim Das</b> Department of Chemistry IIT Guwahati for joining as an Associate Editor in the journal <b>Frontiers in Chemistry: “Supramolecular Chemistry”</b></p> 

## Events / Initiatives by R&D Section

- Initiative measures have been taken to establish new Centre of Excellences with industrial and academic interventions including  
CoE- Sustainable Transportation & Logistics,  
CoE- on Quantum Technologies,  
Industrially focused CoE-on Artificial Intelligence,  
International Research Centre with Deakin University on Sustainable Polymers, Australia  
Industry driven R&D activities with Taiwanese counterparts  
All these COE will start function in due course of time based on the funding agencies and other administrative policies
- An orientation program was organized for all the Project staff of the institute on Aug 09, 2021. The main agenda of the program is towards the role and responsibilities of the project staff, the efficacy of a project team for timely deliverables thereby complimenting the growth of the institute. Hon'ble Director Prof. T.G. Sitharam graced the occasion and given his valuable inputs for building the character of the project staff. A total of 160+ staff were present virtually and in the program our director sir initiated an award for the meritorious project staff award based on performance. The R&D Section is currently developing the guidelines for the same which will be implemented from the next academic calendar.

## New Joining's @ R&D Section



Dr. Kiran Kumar Gali joined as Assistant Project Officer who is looking after the Research Liaison activities at R&D



Miss. Dipjyoti Kalita joined as office assistant who is associated with Purchase section, R&D



Miss. Sikhamoyee Gogoi joined as office assistant who is associated with Finance & Accounts section of R&D

## Abdul Kalam Technology Innovation National Fellowship



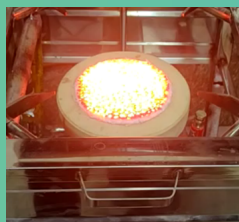
Prof P Muthukumar, Mechanical Engineering

Available LPG and Bio-gas cook stoves in India have low thermal efficiency in the range of 45-55 % for biogas of 1-3 kW, 60-65 % for LPG of 1-3 kW and 30-45% for LPG of 5-15 kW capacities. Prof. Muthukumar's research group at IIT Guwahati has succeeded in developing Porous Radiant Burners (PRB) for domestic and commercial cooking applications using LPG, Bio-gas, Methanol and Kerosene fuels, and reported about 25 - 60 % fuel saving and about 80 % reduction in CO and NOx emissions. In addition to fuel saving, developed PRBs also showed about 30 % reduction in cooking time. Since, the major components of the PRB are made up of low-cost ceramic, the manufacturing cost of the PRB can be reduced to 30-40 % in comparison with their respective conventional counterparts. **Considering the daily LPG consumption of about 50 lakh cylinder per day, commercialization of PRB based LPG stoves leads to an annual saving of Rs 50,000 cr. for Indian Govt.**

Most of the commercially available medical waste incinerators (MWI) and sanitary napkin disposal units are less efficient and are mainly operated by electricity. No attempt has been made to develop incineration devices with energy efficient combustion system. Considering the prevailing Covid-19 pandemic, it is very important to develop energy efficient LPG operated portable cremation system for the safe disposal of Covid-19 infected human bodies. Further, ceramic Industries also consume huge amount of LPG / PNG for drying of tiles and other components. PRB is an ideal choice for these industries, as the PRB provides uniform radiant heating and also provides higher rate of heat transfer compared to the conventional free flame combustion burners. Initial test trials of PRB based furnace carried out at ceramic industry located in Gujarat showed a fuel saving of 40-50 % in comparison with the existing furnace. Pictorial views of the PRBs developed for various fuels and applications are given below.



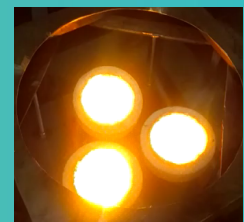
PRB for Domestic LPG Stove



PRB for Commercial LPG Stove



PRB for Domestic Bio-gas Stove



PRB Cluster LPG Stove

This Quarterly newsletter is published at Research and Development Section of IITG. For any clarification/ information/ Collaboration contacted at:

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