



## **SDG 9: Industry, Innovation and infrastructure**

*BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALISATION AND FOSTER INNOVATION*

Several measures, including the state-of-the-art central instrumentation facility, are taken by the Indian Institute of Technology, Gandhinagar (IITGN) to encourage innovation in research and practice. Providing lab infrastructure, including instruments for multidisciplinary research and catering to academic research institutes, universities, and industries for high-end material characterisation, this facility meets the needs of academic research institutes, universities, and industries. Furthermore, it collaborates with regional, national and global organisations and provides training to industry professionals, engineers and government officials.

### **Research**

#### Research projects

- SmartWalk: Intelligent Sensor-fitted Shoes for Gait Monitoring and Rehabilitation in Neurological Disorders-BIRAC design of hearables with psychoacoustic integration-SERB
- Understanding the impact of air pollution on solar photovoltaics and developing surface engineered panel materials for improved performance of solar plants-MHRD
- Developing of bio-inspired transition metal complex for efficient degradation of industrial dyes in wastewater under environment-friendly conditions-DST
- Advanced Optimization Strategies for Efficient Water and Energy Utilisation in Batch Processes: Case studies in Pharmaceutical and Textile Industries-MHRD
- Consultancy services for developing real-time solution for IndustriesChemical-Shoppe Private Limited (CSPL)
- Development of industry-friendly technology for fabricating highly reactive, non-toxic, and transparent antiviral surface coating-GUJCOST
- Brine splitting for energy-efficient textile dyeing effluent reuse- DST
- Drives for Electric Vehicle Applications-SERB

#### Publications

5 research articles have been produced by 9 different authors of the institute. These articles focused on areas such as sustainable cutting fluid strategy, nanomaterial for agricultural and defence purposes, EV aggregator, optimization of water use etc.

### Patents granted

- Low-cost Hand-driven Bamboo-cored Incense-stick Making Machine: Inventors include Keshav Giriyaanavar (a B.Tech alumnus of 2012). Patent number is 375325.
- A catalyst composition and a process for its preparation: Inventors include Prof Sudhanshu Sharma and Pradeep Kumar Yadav.
- A fluorophore molecule and a process for its synthesis: Inventors include Prof Sriram Kanvah Gundimeda, Tarushyam Mukherjee, and Prof Virupakshi Soppina.

### Other research works

- Viral infections and their transmission are major public health hazards causing illnesses such as common cold, flu, measles, and chickenpox, among others. Sometimes these viral infections can also lead to serious, possibly life-threatening complications, such as dehydration, pneumonia, and other secondary infections. With an aim to address the root cause of this health concern, a team of researchers at IITGN has successfully developed an anti-viral surface coating material that is highly effective on non-pathogenic viruses and is non-toxic, environment-friendly, and transparent.
- In a study published in PNAS, Prof Pratik Mutha (Jibaben Patel Chair Associate Professor, Biological Engineering) and his team, which included IITGN PhD students from Cognitive Science, Adarsh Kumar, Gaurav Panthi, and former JRF, Rechu Divakar, at the Centre for Cognitive and Brain Sciences at IIT Gandhinagar probed how limb-independent memories are acquired. They investigated both the algorithm used and the neural machinery causally associated with this process. Using a combination of behavioural experiments and computational modelling of healthy human participants learning arm movements in a novel environment, they first found that effector-independent memories are forged through implicit learning, or learning without conscious realisation of how a skill is being learned. This mechanism contrasts, for instance, with learning using verbalisable or explicit processes such as those employed when learning a list of words.
- A team of researchers at IITGN, including Prof Kabeer Jasuja (Associate Professor, Chemical Engineering), Prof Chinmay Ghoroi (B S Gelot Chair Professor, Chemical Engineering), and a PhD student Harini Gunda, has developed a new class of nano-additives for fuels used in space and defence applications. This new class of nano-additives result in a superlative enhancement in the performance of solid propellants used in rocket propulsion systems and can also help carry additional payload/satellites into an orbit.
- Ms Harini Gunda, a PhD student working with Prof Kabeer Jasuja in the Chemical Engineering discipline at IIT Gandhinagar, has developed a significantly efficient boron-rich nano-additive. It can be used as a single substitute for multiple additives that are conventionally required in propellants. What is more impressive is that this nano-material takes only 1% of the total weight.

## **Education**

### Courses offered

CL 425: Process Synthesis and Design

ES 201: Introduction to Design and Innovation

ME 461: Integrated Design and Manufacturing II

MS 403: Engineering Entrepreneurship

### Invited lectures

- Case Study: Research in Chemical Industry by Dr Deepak Sharma, Bayer, US on January 28, 2021
- Corrosion Control by Coatings by Mr Urvesh Vala, L&T Chiyoda Ltd on February 25, 2021
- Patents, Innovation & Start Ups by Dr Indranil Saha, Founder, HIINXLEGAL on October 16, 2020

## **Community Outreach**

### Startup's achievement

InfyU Labs, an agritech startup pre-incubated at IIEC and supported under the Nidhi Prayas programme, has raised Rs 1.8 crores in a seed round from Indian Angel Network (IAN). The company, currently part of IITGN Research Park, specialises in creating portable devices that determine the internal quality of fresh fruits without cutting them open.

### Online workshop

- Inspiring Research & Innovation Using IEEE Publications (IEEEExplore) by Dr Dhanukumar Pattanashetti, Senior Client Services Manager at IEEE, January 25, 2021.
- Centre for Creative Learning (CCL) at IITGN launched a '20-20 lamps' series. As a part of this video series, which was launched on the day of Dussehra and would continue for 20 days up to Diwali, every day, the CCL team would release a video on its YouTube channel on how to make a new paper lamp that is based on one of the Mathematical concepts.

### Symposium

- Indian symposium on machine learning: IITGN and IIT Kharagpur jointly organised the first Indian Symposium on Machine Learning (IndoML) on the theme "AI for Science and Science for AI" during December 16-18, 2020. More than 20 experts from all over the world discussed state-of-the-art Machine Learning research and related topics during the event. Around 3000 participants registered for the virtual event from across the globe.
- The IITGN students also successfully organised a half-day virtual symposium on "Climate Change: Connecting Science, Industry, and Policy" in December, which saw tremendous participation from students, researchers, and industrialists from across the country.

### NIDHI seed programme

IIT Gandhinagar Innovation and Entrepreneurship Center (IIEC) has received a sanction of funds worth Rs 10.50 crores from the Department of Science and Technology, Government of India under the Nidhi Seed Support Programme. The funds can be utilised to support promising startups incubated at IIEC by providing them seed funding to the order of Rs 25 to 50 lakhs.

### Amalthea

Amalthea, the one-of-its-kind student-driven annual technical summit of IITGN, is being held virtually this time on the central theme of '**Connect. Collaborate. Create.**' The idea behind the 11th edition of this

premier technical summit is to connect our hearts, collaborate our efforts and create an unprecedented Amalthea amidst the time of a global pandemic. This edition of Amalthea is already creating waves even though interaction methods have changed. So far, the event has received a total of about 2000 participants from various prestigious institutes and colleges from all over the country and the world through registrations in various online events/contests, webinars, and workshops.

### MoUs

- IITGN signed a Memorandum of Understanding (MoU) with the Centre for Development of Advanced Computing (C-DAC), a premier R&D organisation of the Ministry of Electronics and Information Technology (MeitY), Government of India, to install a Supercomputing System at IITGN under the National Supercomputing Mission (NSM). Prof Sudhir K Jain, Director, IITGN, and Dr Hemant Darbari, Director General, C-DAC, signed the MoU in a live online ceremony in the presence of Hon'ble Minister of State for Education, Communications, Electronics & IT and other dignitaries from MeitY and the Department of Science and Technology (DST). Apart from IITGN, C-DAC has signed MoUs with 12 other top higher education institutions in India. As a part of this MoU, IITGN will work with C-DAC to install 650 TF Supercomputing System (70:30 CPU & GPU), with appropriate data centres with storage capacity at the Institute.

### **Operations**

- IITGN Innovation and Entrepreneurship Centre (IIEC)- organised a total of 20 'Mentor Clinics' for 14 teams of IITGN students to discuss their ideas, provide feedback and connect them to the mentors. Each session spanned for around 1-1.5 hours
- Newly commissioned buildings on campus- Campus development continued to make significant progress, and the Guest House, Central Arcade, Open Air Theatre, 1 BHK, 2 BHK, some studio apartments, and some new hostel blocks were occupied by IITGN.
- IIEC introduced LaunchPad, an initiative for final-year students of the Institute to provide them with an opportunity to try their entrepreneurial idea.
- Developing high-growth ventures in turbulent times- In August 2020, IIT Gandhinagar Innovation and Entrepreneurship Council (IIEC) started an intensive three-month programme on Developing High Growth Ventures in Turbulent Times. The programme aimed to identify startups whose operations have been disrupted and work with them to rethink and rebuild a strategy to sail through this phase and grow. Out of a total 51 applications, 14 teams were selected to receive mentorship from successful entrepreneurs, business leaders and technologists. The programme included guest lectures and focused one-to-one mentoring by a very distinguished panel of experts.