# Vijñapti

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## IIT Guwahati celebrates 22nd Convocation with Hon'ble Prime Minister Shri Narendra Modi virtually delivering the Convocation address

Indian Institute of Technology Guwahati celebrated its 22nd Convocation today, 22nd September 2020, with a graduating class of 1,803 students (1532 male & 271 female). Hon'ble Prime Minister of India Shri Narendra Modi graced the occasion as the Chief Guest in the esteemed presence of Shri Ramesh Pokhriyal 'Nishank', Hon'ble Education Minister, Government of India, and Shri Sanjay Dhotre, Hon'ble Minister of State for Education, Government of India, as the Guests of Honor and Shri Sarbananda Sonowal, Hon'ble Chief Minister, State of Assam as the Special Guest.

As the Institute celebrates its 27th Foundation anniversary, it has grown from strength to strength. The Institute has been ranked #7 among all the Engineering institutes as per the India Rankings 2020 conducted by the National Institutional Ranking Framework (NIRF), Ministry of Education, Government of India.

| Data on Graduating Students | | | |
|---|---|---|---|
| Programme | Male | Female | Total |
| B.Tech | 592 | 49 | 641 |
| B.Des | 35 | 11 | 46 |
| M.Tech | 530 | 80 | 610 |
| M.Des | 15 | 12 | 27 |
| MA | 19 | 8 | 27 |
| M.Sc | 109 | 37 | 146 |
| MS | 15 | 3 | 18 |
| PhD | 214 | 71 | 285 |
| Dual (M.Tech + PhD) | 3 | 0 | 3 |
| Total | 1532 | 271 | 1803 |

Presenting the Director's Report, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "It is noteworthy to mention that the research dimension of IIT Guwahati is broadening significantly and the same is now reflected in terms of multiple industrially funded collaborative research with close cooperation with Industry partners. There are 291 research projects in progress with a total sanctioned value of about Rs. 437.00 crore. In the year under report, we received 131 new projects with a sanctioned value of Rs. 183.00 crore. A total of 153 new consultancy projects were carried out during the year. The total value of consultancy projects undertaken during this year is Rs. 10.76 crores and Rs. 11.27 crores was received for all consultancies".

He further added, "The faculty members of the Institute have been actively publishing research papers in international and national journals. The number of publications during the past one year is 2112 (Scopus 2019). In the previous year, 1853 (Scopus 2018) research papers were published by the faculty of the Institute. The increase in research papers in journals is encouraging. The Institute has applied for 31 patents in 2019–2020".

Gold Medal Winners (Class of 2020)

| S.No. | Name | Programme | Medal Details |
|---|---|---|---|
| 1. | Mr. Tushar Yadav | Civil Engineering | Dr. Shankar Dayal Sharma Gold Medal for the Academic year 2019-2020 |
| 2. | Mr. Shubham Goel | Computer Science and Engineering | Winner of the President of India Gold Medal |

For the Convocation, to celebrate the graduate's accomplishments online through virtual mode, the Institute had created a virtual reality-based award distribution where one could experience an avatar of the recipient of the award collecting a medal from Director's own avatar surrogating him, from the comfort of their home. The Institute had also created a photo-booth, with an option of different backgrounds, for students to take pictures at some selected locations on the campus. IIT Guwahati's faculty and students had developed a telepresence module for a virtual visit to the Institute.


Dr. Ramesh Pokhriyal, Hon'ble Minister of Education, GoI


Dr. Rajiv I. Modi, Hon'ble Chairman of BoG, IIT Guwahati


Shri Sanjay Shamrao Dhotre, Hon'ble Union Minister of State for Education, Communications and Electronics & Information Technology, GoI


Shri Sarbananda Sonowal, Hon'ble Chief Minister of Assam


Prof. T. G. Sitharam, Hon'ble Director, IIT Guwahati

## IIT Guwahati Research Team Working Towards Protecting Data from Cyber Attacks

A team of researchers from Indian Institute of Technology Guwahati, in collaboration with scientists from the University of Pardubice, Czech Republic, is working towards developing indigenous algorithms that can protect the Nation's digital data from cyber attacks by advanced computers. The team has also designed encryption architectures that can be used to protect sensitive health data that is transmitted through the internet.

The team led by Dr. Gaurav Trivedi, Associate Professor, Department of Electronics and Electrical Engineering, IIT Guwahati, includes Prof. Srinivasan Krishnaswamy, Assistant Professor, Department of Electronics and Electrical Engineering, IIT Guwahati, Prof. Zdenek Nemec and Prof. Jan Pidanic from the University of Pardubice. The team also consists of research scholars Mr. Bikram Paul, Ms Uddipana Dowerah, Mr. Tarun Kumar Yadav, Mr. Balbir Singh, Mr. Abhishek Agrawal, Ms. Meenali Janveja, and Mr. Souradip Pal from IIT Guwahati.

The team's work has been published in the proceedings of IEEE International Conference Radioelektronika (RADIOELEKTRONIKA) and has received 3rd best paper award by IEEE Czechoslovakia Section based on its research contributions.

The recent advances in computer science, such as the development of the quantum computer, are all set to overthrow Moore's law that has ruled the roost for the past half a century. The phenomenal computational power of quantum computers not only embodies possibilities of astronomical progress, but also enormous threats. For example, while sensitive data is stringently protected by encryption (the virtual 'lock' for precious data), the power of quantum computers can easily break even apparently "invincible" encryption codes. It is generally feared that once quantum computers become the predominant workhorse of the near-future digital era, almost all existing data-protective encryption schemes would become vulnerable and obsolete.

"It has become indispensable to design new encryption schemes that can resist both quantum computer- as well as classical computer-based attacks," says Dr. Trivedi. This need has given rise to a new field of research, called Post-Quantum Cryptography (PQC) and state-of-art research teams all over the world, such as the one at IIT Guwahati, has been working on developing algorithms to secure data from attacks by advanced computers. The team has developed various PQC-based encryption algorithms and designed indigenous soft IPs which can be integrated into Systems-on-Chip (SoC) to protect them from cyber attacks. These algorithms and IPs would enable critical data such as national security data and citizen information to be under unbreakable lock-and-key, thereby enhancing the safety of our nation against cyber-attacks.

The IIT Guwahati team has also worked towards enhancing data security in the healthcare sector that is increasingly using the Internet-of-Things (IoT) to cater to the needs of the country. IoT healthcare aids in the real-time diagnosis of diseases by keeping a patient digitally connected to a medical expert 24*7, thus avoiding the visits and admissions in the hospital, a facility particularly critical in these pandemic times. For example, wearable health sensors, such as ECG devices, can automatically transmit data to the health care provider, but the transmitted data must be encrypted to prevent intentional or accidental modifications to it, which could affect diagnosis and treatment. In fact, the Indian government mandates that only encrypted health data and reports may be transmitted over the Internet.

"We have developed an area- and power-efficient Advanced Encryption Standard (AES) architecture that can encrypt and decrypt ECG data for transmission across the Internet. This is also suitable for low power IoT applications," says Dr. Trivedi.

Speaking about the work done by Dr. Trivedi's team, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "Both these electronic devices are the results of the joint efforts of IIT Guwahati and the University of Pardubice with whom we have successful collaboration for the past nine years. These devices are in-line with India's vision of self-reliance and independence from foreign technology".

Photograph of the Research Team

## IIT Guwahati in Collaboration with Workspace Metal Solutions Pvt. Ltd. Develops a First-of-its-kind Self-Check Kiosk

Indian Institute of Technology Guwahati in collaboration with Workspace Metal Solutions Pvt. Ltd., Udaipur, has developed a first-of-its-kind self-check kiosk. The small structure helps by streamlining the flow of people through the kiosk. The Kiosk only takes about 30 seconds to check whether the person safe to enter the premises or not. It is quick but very accurate contactless check which can determine if an individual is running a fever, low blood oxygen levels and, therefore, potentially has COVID-19 or any another viral or bacterial infection.

The self-check kiosk has been developed by Dr. Senthilmurugan Subbiah, Associate Professor, Department of Chemical Engineering, IIT Guwahati, and Mr. Puneet Talesara, Founder, Workspace Group, and alumnus of IIT Guwahati. The cost of a self-check kiosk varies from 3.5 lakh to 7.5 lakh depending on the specification and features. The product has already been commercialised. The Institute has also installed self-check kiosk at its campus as well. The team has also filed for a patent.

With the gradual easing of public lockdown measures and return to normal life, it is the need of the hour to ensure safe entry to any premises. The fully automated touchless self-check kiosk has been designed as per the WHO guidelines. It instantly detects and records the syndromes associated with COVID-19 like body temperature and blood oxygen content and raises alarm in case it is beyond the limits. The Kiosk features first of its kind UV-C disinfectant box capable of killing viruses/bacteria present on the surfaces of luggage, bags, keys, mobiles, wallet etc. thereby reducing the risk of spreading.

The individual who is entering a premise will have to follow the following steps:

1.Stand on the footmarks marked in front of the kiosk; remove the face mask and align the face in the grid displayed on the screen to measure the body temperature

2.Once the temperature is measured, the individual will have to wave its hand over the sensor of the UV-C chamber to open its door for keeping the belongings inside. UV-C box will perform $360^0$ disinfection on all the exposed surface

3.The individual will have to place its index finger on the $SpO_2$ sensor to check the oxygen saturation in the body. (Oxygen above 95% is a sign of a healthy human body)

4.After this, the individual can disinfect the hands by placing them below the automatic sanitizer dispenser unit

5.Post hand sanitization, the individual can collect the belongings from UV-C chamber and can proceed further

**Talking about the innovation, Dr. Senthilmurugan Subbiah, Associate Professor,** Department of Chemical Engineering, IIT Guwahati, said, "The kiosk installed at IIT Guwahati campus is IoT enabled and its data analysis system is capable of face identification and creating employee/person health historical data. Kiosk's AI-based software system is capable of monitoring an individual's health from historical data and in case of abnormal temperature and SpO2 level measured than the kiosk generates the alarm to health department authorities of their company/organisation/institute. The innovative UVC system design is capable of emitting UVC radiation from 6 surfaces of UVC box and that provides 99.99 % of viruses'/bacteria disinfection in 10 seconds."

He further added, "Overall, the kiosk system developed by IIT Guwahati and Workspace Metal Solutions Pvt. Ltd. Udaipur can provide a community solution to fight against COVID 19 by ensuring surveillance of an individual's health and disinfection of the items belonging to the individual".

Speaking about their work, Mr. Puneet Talesara, IIT-Guwahati Alumni and Founder, Workspace Metal Solutions Pvt. Ltd. Udaipur, said, "Current catastrophic situation made us realise the importance of hygiene for a safe environment. 'The self-check kiosk' is an invaluable solution for quick detection of illnesses and reduce the spread of bacteria & viruses. This is a 100% Indian product and I feel that it will be a very good resource to fight the pandemic".

Self-check kiosk offers a level of public access safety and accuracy that cannot be matched by existing human-error prone processes. It maximises user convenience and safety without compromising the organisation's need for efficiency and security. In future, the recorded data can be transferred or

accessed from the central control room for monitoring purpose.

Self-Check Kiosk installed at the main entrance gate of IITG


**IIT Guwahati organises a session for its students pursuing MS (Research) in e-mobility programme with Mr. Amitabh Kant, CEO of NITI Aayog, to make them aware of the state-of-the-art in the EV technology**

Indian Institute of Technology Guwahati organised an interactive session for the students of the first batch of MS (Research) in e-mobility programme on Saturday, 19th September 2020. The session was attended by Mr. Amitabh Kant, CEO, NITI Aayog; Mr. Anil Srivastava, Mission Director, NITI Aayog; Prof. T. G. Sitharam, Director, IIT Guwahati, faculty and students of MS (Research) in e-mobility of the Institute.

Speaking during the session, Prof. T. G. Sitharam, Director, IIT Guwahati, said, "The faculty has put together a multi-disciplinary programme which much before the National Education Policy 2020 was announced and also brought in industry partnership. From this year, we have introduced a policy such that every academic department should have at least 3 successful industry advisors who are successful in research and development in industry so that the curriculum can be inclusive of industry relevant problems over a period of time. We can increase the internship and externship. Additionally, we have also started with the idea of appointing Professors of Practice (PoPs) at the institute, so that having faculty from the industry who can provide expertise in industrial oriented problems is also inculcated as part of our curriculum. If we look at the government's policy, India wants to achieve 30 per cent of e-mobility by 2030 for which major initiatives which have been initiated".

As a part of the curriculum, the Institute offers to conduct sessions and seminars delivered by industry experts. The aim behind these sessions is to make the students aware of the state-of-the-art in the EV technology and foster industrial problem-solving skill in them.

Addressing the students during the event, Mr. Amitabh Kant, CEO, NITI Aayog, said, "I would like to first congratulate the Director, faculty and students for starting such a unique course at IIT Guwahati. This is a path-breaking initiative because India is in the middle of a mist of technological disruption and revolution.This disruption will lead to a huge and-massive shift from combustion vehicles to electric vehicles and we are heading towards a shared and connected zero-emission world. The government has taken several measures to push for electric motilities - it has introduced FAME and FAME 2 scheme, it has brought down the rate of taxes on electric vehicles at 5 % as compared to 28 % for other vehicles & 43 % forhybrid vehicles. We also give tax exemption, up to Rs. 1 lakh, to people who are buying electric vehicles.As a consequence of all this, the focus on electrification will be huge and if India has to emerge as a

leader in clean, connected and shared mobility there are two important things to keep in mind: One is that India is a major user of 2 and 3 wheelers and 80 per cent of people travel in these vehicles and secondly battery will be an important component. Battery manufacturing and storage will be a key component and storage will have to be linked to renewable energy integration with the grid".

He further added, "During a mobility conference, the Prime Minister had stressed on the 7Cs: Common, Connected, Convenient, Congestion free, Charged, Clean and Cutting-edge. And the course should focus on how India can achieve these objectives

While addressing the questions, Mr. Anil Srivastava, Mission Director, NITI Aayog, said, "We are looking forward to making more energy-efficient and less costing batteries. The e-vehicles are not required to give much tax. India is a great user of two and three-wheelers and e-vehicles will make a great opportunity in it".

He further added, "In the case of batteries we also have to see the market interest that what materials will be good to undertake the making of the batteries. We have to think practically what sources can be undertaken for the success of e-vehicles".
While highlighting the unique features of the curriculum, Prof. Praveen Kumar, Coordinator of the MS(R) programme said, "We have given the emphasis on project work, and the projects will be executed in collaborations with industry partners. Moreover, industry expert lectures, from India, European Union (EU), and Japan, on topics related to e-mobility such as vehicle design philosophy, light-weighting, new battery chemistries, are planned. Furthermore, Professors of Practice (PoPs) will deliver lectures on niche topics like AUTOSAR, advanced control techniques, vehicle design, and we will develop a centre of advanced research in e-mobility at the Institute."

The adoption of EVs has opened new opportunities. To prepare and train the next generation in EV technology and to extract maximum out of this unique opportunity, IIT Guwahati launched this unique programme. It is being jointly offered by the Departments of Electronics and Electrical Engineering and Mechanical Engineering and the classes began in September 2020. The syllabus cover topics such as E-mobility, Electric and Hybrid Vehicles; Modelling, Dynamics and Control of EVs; and, Energy Storage and Conversion. The Institute is offering a total of 20 seats for the programme. 10 seats are for the students who have completed their B.Tech. in Electrical Engineering, Electrical and Electronics Engineering, Mechanical Engineering and Production Engineering. The other 10 seats are for the industry-sponsored candidates. The programme also covers topics such as smart mobility, EV drivetrain design and control, EV testing standards and protocols, charging infrastructure and V2G, among other topics

## Awards & honours

Prof. Debasis Manna and his student, Nirmalya Pradhan, Department of Chemistry, IIT Guwahati received the prestigious fellowship - the Intel Research Fellowship 2020.

The Intel® Higher Education Program in India collaborates between Intel and leading engineering and research institution to promote the next generation of technology into an ecosystem that supports innovation and entrepreneurship. The Intel India Research Fellowship is a prestigious and unique fellowship program for PhD/MS/MD students. The fellowship is only awarded to exceptional students pursuing cutting edge and high impact research in key focus areas identified by Intel Technology India Pvt Ltd. Prof. Debasis Manna and his student, Nirmalya Pradhan, Department of Chemistry were awarded this prestigious fellowship in the 'Artificial Intelligence' focus area with project title 'Implications of Artificial Intelligence in drug design for Immunosuppressive Indolamine 2,3-dioxygenase 1 enzyme; experimental validation for the advancement of Cancer Immunotherapy.'

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