



भारतीय प्रौद्योगिकी संस्थान गुवाहाटी
Indian Institute of Technology Guwahati
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चिन्तितं

The Monthly Newsletter of IIT Guwahati

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2020 has been a year of innovations and aligning to the new normal at IIT Guwahati

For IIT Guwahati, 2020 has been a year of innovations related to COVID19, realigning the way the Institute functions according to the new normal and serving the nation at large.

IIT Guwahati has put in every effort to overcome all unprecedented challenges of 2020: From virtual lessons to ensure continuity of learning for students, to virtual-reality based convocation addressed by Prime Minister Modi wherein 1803 students graduated, to resounding success of virtual placements and virtual internships, to ensuring the safety of students, staff and faculty with COVID19 protocols on campus and to top it all, innovations to tackle COVID19 such as -- self-check kiosks, multiple diagnostic kits, low-cost UVC LED systems for disinfecting surfaces, spray-based antiviral coating and PPEs, developing vaccine, low cost intubation boxes, drones for spraying disinfectants, software for safe air travel and farmers welfare.

Virtual Convocation

Addressing the 22nd Convocation held in September 2020 through a virtual-reality platform, Prime Minister Modi urged students of IIT Guwahati to innovate for the future of the new normal. Prime Minister said, "Convocation is a special day for every student. But this year, it is a different experience for them in the time of pandemic. The pandemic has changed the way convocation is conducted. But still it is as special as it was before. I congratulate students for their bright future. The future of the nation is in what youth think today. Your dreams will shape the reality of India in the future. This is time for you to be Future-Fit and Future-Ready". With his motivating speech, the institute has taken forward the way education is imparted to the students adopting to best practices in a short time.



Virtual learning

During the pandemic, IIT Guwahati has focused on high quality online education and addressing mental health issues of students to prevent loss of academics, including conducting regular online counselling and yoga classes. Student helpline portal was launched where students could get support for accommodation, food, online classes, attendance, examinations, scholarships, health, transport, etc. The institute has been imparting online education for all its courses and has initiated evaluation of the students also via online mode. During the pandemic, IIT Guwahati through E&ICT Academy has enabled the scientific community by organising online courses (both short term and long duration), free 03 months long online summer internships, interactive sessions, and webinars. The annual progress seminars, synopsis and viva-voce examinations of PhD students are also being conducted in an online mode to continuously monitor their progress and to ensure that these uncertainties do not delay their career growth.

Virtual Placements and Internships session 2020-2021

IIT Guwahati organized the virtual summer internship hiring process for pre-final year students from the 1st week of September 2020. Around 51 companies participated in the process this year. Overall internship offer for B.Tech and B.Des is 40.83%. The number of internship offers secured so far is 245 out of the net 600 registered students. The phase I of the placement session commenced in virtual mode from 1st December 2020. Around 127 Companies from various sectors participated in the virtual recruitment process. The overall placement of B.Tech and B.Des students is 72.95%. For B.Tech and B.Des, the number of total job offers so far is 426 (including PPO) out of 584 registered students. The overall placement of M.Tech and M.Des students is 35.52%. For M.Tech and M.Des, the number of total job offers is 173 out of 487 registered students. For M.Sc. programs, 10 students were placed out of 62 registered candidates. Overall placement of all programmes (B.Tech, B.Des, M.Tech, M.Des, M.Sc., MSR, MA, PhD) is 53.75% so far by the end of phase 1 of Placements season.

Innovations to stop the spread of COVID

IIT Guwahati has been in the forefront in the fight to stop the spread of novel coronavirus and has been providing scientific and technological support, extension of sophisticated instrument facilities as well as involved in the immediate development of life-saving equipment to Assam State and Guwahati Medical College and Hospital

Since the initial days of COVID19 outbreak, IIT Guwahati has prepared hand sanitizers at its various departments and academic centres for public distribution. On research front a few projects undertaken/ completed are listed herein.

- Development of low-cost UVC LED system to disinfect areas amid COVID-19
- Development of affordable antiviral/antibacterial spray-based coating for Personal Protective Equipment to prevent spread of infection
- Development of 3D Printed Ear Guard for Comfortable Use of Face Masks by Healthcare Workers
- Data-driven assessment of COVID-19 situation in India by IIT Guwahati in collaboration with Duke-NUS
- Designing and development of low-cost ventilators
- Designing and development of low-cost intubation boxes
- Development of contactless mobile application for safe air travel
- Development of Low-cost heat-based Sanitizer Trunk
- Development of Injection Mould for mass manufacturing of Face Shield
- Development of Disinfectant Tunnel
- Collaboration with Hester Biosciences Limited to develop vaccine against COVID-19
- IIT Guwahati alumni develops and deploys drones for spraying disinfectant in public spaces to prevent Coronavirus. The drones can also be equipped as Medical Delivery Drone and Thermal Imaging drones.
- IIT Guwahati joined hands with RR Animal Healthcare and supplied lakhs of ICMR approved VTM kits, RNA isolation kits to National Health Mission, Assam and across the country and have also developed RT-PCR kits very soon. Rapid antigen kits have also been developed by the institute to help the cause of Atmanirbhar Bharat Abhiyaan, a first for any educational institute.

Researchers from IIT Guwahati, India, and the Duke-NUS Medical School, Singapore, have used data science models to analyse and predict the total number of COVID19 infected people for different States in India. They have considered the exponential, the logistic, and the Susceptible Infectious Susceptible (SIS) models, along with the model-free daily infection-rate (DIR) using open-source data. At least a dozen companies have begun operation in the newly formed research park at IIT Guwahati resulting in multiple technology transfers, product development and MoU signing with these companies.

New courses during the pandemic

1. IIT Guwahati has introduced for the first time a new programme, MS (Research) in E-mobility. Due to the multidisciplinary nature of the curriculum, the programme is being jointly offered by the Departments of Electronics and Electrical Engineering and Mechanical Engineering from the upcoming academic year 2020-2021.

2. IIT Guwahati is also the first IIT to introduce a course on Sustainable Development Goals (SDGs) 2030 in the Bachelor of Technology (B.Tech) curriculum from this academic year (2020-2021). The course has been offered to all the second year B.Tech students as a compulsory course, to reorient the thinking of young and dynamic individuals towards the path of sustainable development. Due to the interdisciplinary nature of the 17 SDGs, Dept of Humanities and Social Sciences, the nodal department for this course, has collaborated and pooled resources from eight other departments of the Institute to design and implement the course. Faculty members from each of these departments will jointly conduct the course and will provide exposure to B.Tech students on the technological, economical, ecological and societal aspects of these 17 SDGs.

New Education Policy

The new education policy 2020 announced on 29th July 2020 is an important step towards reforming the overall education sector of the country and is likely to transform India into a knowledge hub. Besides incorporating the ethos of Indian Philosophy right from early schooling, it has also incorporated Sustainable Development Goals which IIT Guwahati has been promoting and has already made it a part of its curriculum at the undergraduate level and has been the first institute in the country to do so. Moreover, the goal of allocating 6% of GDP on education, entry of foreign universities in India and setting-up a National Research Foundation will provide tremendous boost to education sector as well as research and development in the country and generate highly trained human resources to realize the dream of "Atmanirbhar Bharat" as we move forward in the 21st century. IITG has also started a "Center for Indian Knowledge, Sanskrit and Yoga" which is in line with NEP 2020. Welcoming the NEP2020, Prof. T. G. Sitharam, Director, IIT Guwahati, who closely followed the NEP 2020 event mentioned that "These reforms in the education sector were long awaited and are likely to transform India into a Global education and research hub if implemented carefully. It takes into account the

changes happening across the country right from the foundation till the student reaches a professional level and several other important objectives of inclusive education".

Rankings

IIT Guwahati has been the only academic institution from India that occupied a place among the top 100 world universities - under 50 years of age - published by London based Times Higher Education (THE) in the year 2014 and continues to do this even today in various International Rankings. Along with older IITs and Delhi University, IIT Guwahati has also been ranked below 500 in the QS World ranking released recently and the only one to improve its ranking from the previous year. IIT Guwahati ranks 6th Overall, 5th in Chemistry, 9th in Physical Sciences, 18th in Earth and Environmental Science, 17th in Life Sciences and 350th Overall world rank as evaluated by Nature, the most reputed scientific research magazine and one of the highest faculty to publication ratio of ~4.5. IIT Guwahati has been ranked 7th (Engineering and Overall) in the national institutional ranking (NIRF) framework conducted by MHRD in the year 2020. IIT Guwahati has also been ranked 3rd in the "Swachhata Ranking" conducted by the Govt and is the only centrally funded technical institute to be among the top 5 consistently for the past three years ever since these rankings were launched.

IIT Guwahati researchers develop an efficient method to harvest drinking water from air

Researchers at Indian Institute of Technology Guwahati have developed novel materials that can efficiently harvest water from humid air. A research team led by Dr. Uttam Manna, Associate Professor, Chemistry department and Centre of Nanotechnology, IIT Guwahati, along with his research scholars Mr. Kousik Maji, Mr. Avijit Das, and Ms. Manideepa Dhar, has published the results of this path-breaking work in the prestigious journal of The Royal Society of Chemistry.

With increasing water scarcity throughout the world, there have been attempts to collect and conserve water through non-traditional means. Scientists have turned to nature to design ways of water harvesting. For example, in regions of the world with naturally scanty rainfall, plants and insects have devised ingenious strategies to pull and collect water right out of the air. Mimicking this, scientists worldwide are trying to build technologies that can pull out water from thin air, both literally and figuratively.

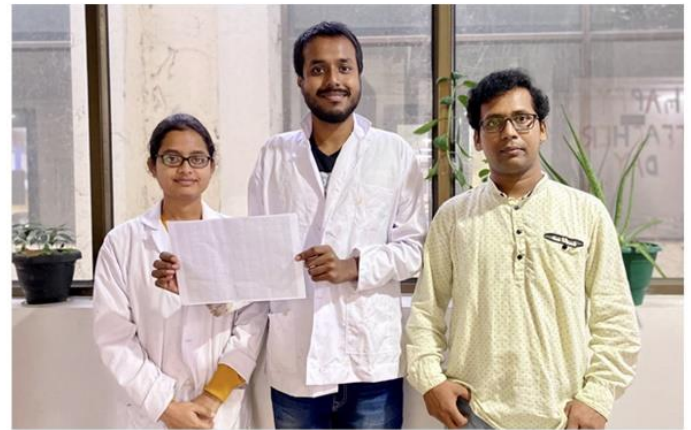
“Such water-harvesting techniques use the concept of hydrophobicity or water-repelling nature of some materials”, explains Dr. Manna. The concept of hydrophobicity can be understood by looking at the lotus leaf. The lotus leaf is water repellent because there is a layer of trapped air between the leaf surface and the water droplet, which causes the droplet to slide off the leaf. However simple hydrophobicity such as this is unsuitable for water harvesting from highly humid environments because high moisture content can displace the trapped air and cause permanent damage. Instead, researchers mimic the pitcher plant, an ‘insect-eating’ plant, that has a slippery surface that causes insects that land on it to fall into its tube-shaped structure, to be digested. In the past geometries of Rice leaves and cacti are associated with ‘Slippery Liquid-Infused Porous Surface(s)’ or SLIPS to improve the water harvesting performance.

The research team from IIT Guwahati has used the concept of chemically patterned SLIPS for the first time, to effectively harvest water from moist air. The researchers produced a patterned hydrophilic SLIP by spraying a sponge-like porous polymeric material on top of a simple A4 printer paper. Further, chemically modulated hydrophilic spots were associated on the coating prior to lubricating with two distinct types of oils - natural olive oil and synthetic krytox. This surface could harvest water from foggy/water vapour laden air without the need for any cooling arrangement.

“We have produced a highly efficient water harvesting interface where the fog collecting rate is as high as $4400 \pm 190 \text{ mg/cm}^2/\text{h}$ ”, says the lead researcher, Dr. Uttam Manna. The researchers have also compared the performance of their pitcher-plant inspired SLIPS materials to other bio-inspired ideas and have found theirs to be superior in terms of efficiency of water harvesting.

Given that more than 50% of India’s population has no access to safe drinking water and about 200,000 people die every year due to lack of access to safe water, the inexpensive method for harvesting water from water vapour or fog droplets in air can potentially alleviate the water scarcity issues in the country.

Apart from water harvesting, SLIPS could be used for other purposes, such as easily cleanable household appliances, in underwater hulls of ships and submarines to prevent biofouling and anti-icing windows for aircraft.



(L to R) Ms. Manideepa Dhar, Mr. Avijit Das and Prof. Uttam Manna IIT Guwahati

Entrepreneurial Development Program on Grill Fabrication conducted at IIT Guwahati for skilling youth under Unnat Bharat Abhiyaan

Unnat Bharat Abhiyan (UBA) Cell, IIT Guwahati in association with the Department of Mechanical Engineering, IIT Guwahati, and Yuva Vikash Kendra, Guwahati organised a 15-day hands-on Training on Entrepreneurial Development Programme (EDP) on Grill Fabrication from 1st December 2020. The key theme of the intense training programme was skilling the youth so that they can initiate their own small business enterprises.

11 youth from Rudreswar Tilingaon, Lothia Bagisa, Majgaon, Tetelia Gaon, Chakia Para, Ledo Bangali Gaon, Azara, Changsari, Jalukbari, and Uzan Bazar, participated in the training programme held at the Central Workshop facility of IIT Guwahati.

One of the participants expressed that “Soon after getting this high quality and intense training from IIT Guwahati, I wish to start my own fabrication workshop in my village. I am also looking forward to attending more related trainings at IIT Guwahati to enhance my skills and to make my future business a bigger enterprise”

IIT Guwahati’s Central Workshop In-Charge Prof. Sukhomay Pal said “The purpose of the workshop was to impart rigorous hands-on training on Grill Fabrication to the youth so that they can start their own small business.”

UBA Regional Coordinator, Prof. Konjengbam Darunkumar Singh, said, “The training is one of the of initiatives from UBA Cell - IIT Guwahati, to leverage

the state-of-art facilities here at IIT Guwahati, to accelerate rural development, by creation of entrepreneurs. However, due to the pandemic protocol requirements, the training has been limited to a small number of participants.”

Yuva Vikas Kendra, Project Executive, Sri Ravindra Hanmattekar, “This training is going to skill the trainees, to initiate small businesses of Grill Fabrication, with minimal investment.”

Director, IIT Guwahati, Prof. TG Sitharam remarked, “IIT Guwahati, as a leading national institute of this region, is happy to work on enhancing rural livelihood and development for the holistic growth of the nation’.”

Unnat Bharat Abhiyan is inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India. The Mission of Unnat Bharat Abhiyan is to enable higher educational institutions to work with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth.



IITG UBA Participants with Grill



IITG UBA Participants

IIT Guwahati students’ start-up develops Ag-Speak, a multi-lingual Smartphone AI-based Application for farmers to smartly manage their crops and farms

The start-up is co-founded by the students of IIT Guwahati and alumni of NIT Silchar and Dibrugarh University, Assam

AgSpert, an agri-tech startup, co-founded by the students of IIT Guwahati, and alumni of NIT Silchar and Dibrugarh University, Assam, has developed Ag-Speak, a multi-lingual smartphone application for farmers to smartly manage their farms and remotely monitor distress activities. Developed with a goal of optimising the in-farm productivity through Artificial Intelligence (AI), this application will help the farmers in making decisions and managing farm activities by the click of a single button on their smartphone or computer. AgSpeak was launched by Prof. T. G. Sitharam, Director, IIT Guwahati on 13/12/2020 at Guwahati.

Co-founded by Mr. Siddhartha Bora (NIT Silchar alumnu), CEO, Mr. Manik Mittal (IIT Guwahati student), COO, Mr. Akash Sharma (IIT Guwahati student), SDE, Mr. Nitin Chauhan (IIT Guwahati student), Cloud Systems Architect, Mr. Dhritiman Talukdar (NIT Silchar alumnu), SDE and Mr. Kookil Pran Goswami (Dibrugarh University alumnu), Hardware Developer, AgSpert is leading this initiative in the North-Eastern India which has untapped potential, with diverse ecosystems having agriculture as the major economic activity. The developed application is multi-lingual and has an option of Assamese as well. This feature is a first among all the agri-tech applications available in the market.

Driven by hyper local crop data coming from satellite and smart IoT devices, AgSpeak considers up to 20 local crop parameters which are key indicators of their health like temperature, rainfall, sunlight hours, soil health status, among others, to alert farmers about probable crop threats in advance and suggest best practices to tackle the incoming threat, hence optimising the resources used and maximising productivity.

The app along with the IOT hardware has been tested for past 3 months with 500 farmers and 2 tea estates. Some of the major breakthroughs by the algorithm were precise prediction of BLIGHT IN POTATO and TEA MOSQUITO BUG, along with WATER STRESS in winter crops. These are major reasons of woes to

farmers and small tea growers of Assam and cause lakhs in crop damages if not controlled in time.

Major commercial users of the product include commercial plantation farms (tea, lemon orchards, grape vineyards). The New Farm Bill 2020 is likely to boost formation of Farmer Producer Organizations (FPOs)/ Farmer Producer Companies (FPCs) among general crop growers to work as a business as well, which is likely to increase adaptation of paid services that comes with the mobile app.

Nearly 250 farmers have already been provided hands on training in utilizing the full potential of the app. However, the user friendliness and multilingual features of the app make it extremely easy for farmers to use and seldom require training.

The mobile app is completely free for general small farmers. There are in app purchases like soil testing and agri-doctor consultation. Besides this, the IOT devices can be rented on monthly /yearly purposes by commercial farms to further enhance precision farm management. It has been tested with many farmers and its practical utility established.

Congratulating the young entrepreneurs, Prof. T. G. Sitharam, Director IIT Guwahati, said, "It is a matter of immense pride that our students are working to bring out a state-of-the-art technology for India's farmers. India is a leading agricultural country with immense potential, yet 2 billion people globally did not have regular access to safe, nutritious and sufficient food in 2019 alone. To end this global starvation, we need to double agricultural productivity in the next 15 years. Unless we use technology appropriately in the agricultural sector, this would be impossible. Additionally, to meet the UN Sustainable Development Goals (SDG), we have ten more years to fulfil this SDG and to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. In all these directions, unless new technology is used, we will not be able to succeed. India aspires to become a US\$ 5 trillion economy, and unless the younger generation of today's India don't stand up we cannot take on this challenge. I'm immensely proud of our students and wish them all the best for the immense contribution they are making for the farmers of our country."

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their health like temperature, rainfall, sunlight hours, soil health status, among others, to alert farmers about probable crop threats in advance and suggest best practices to tackle the incoming threat, hence optimising the resources used and maximising productivity.

Highlighting the need of technological advancement in the agriculture sector, Mr. Manik Mittal, Chief Operating Officer, AgSpert, said, "Technological development in the agricultural sector has been very slow, with farmers relying on traditional methods, which are getting out-dated day by day due to several factors including population growth and climate change. We at AgSpert believe that technological intervention using Artificial Intelligence and drones will ensure food security, by increasing the productivity more than two-fold."

Apart from this, the start-up is also focusing on a high-tech product for large commercial plantation farms. Large plantation farms like tea, which are in abundance in North-East India, are facing a tremendous farm-labour crunch, especially post-COVID. To address this challenge, the AgSpert is developing a unique platform for plantation farm managers to automate scouting processes and realise areas of distress like disease, pest incidence and water stress, using drones. This technology will help the farm managers in identifying crop threats in a short period of time and take timely interventions to save the crop. The drone monitoring system is currently in the R&D stage. AgSpert is testing the product in collaboration with Assam Agricultural University and Tocklai Tea Research Institute, Assam. These are likely to expanded to several other regions and farms in the future.

AgSpert is a self-funded start-up as of now.



Online launch of AgSpeak by Prof. Sitharam



Akash Sharma,
SDE
(IIT Guwahati)



Dhritiman Talukdar,
SDE
(NITS)



Kookil Goswami,
Hardware Developer
(Dibrugarh Univ.)



Manik Mittal,
COO
(IIT Guwahati)



Nitin Chauhan,
Cloud Systems Architect
(IIT Guwahati)



Siddhartha Bora,
CEO
(NIT Silchar)

Agspert team



Farmer using AgSpeak

Awards & Hohours



Dr. Uttam Manna, Department of Chemistry and Center for Nanotechnology has been invited to join the Advisory Board of Royal Society of Chemistry Journal "Materials Horizons".



Prof. Kaustubha Mohanty, Department of Chemical Engineering and Center for Energy has been invited to join the Editorial Board of Elsevier's journal "Renewable Energy".



Dr. Chandan Karfa, Department Of Computer Science and Engineering has been elevated to the IEEE Senior member.



Dr. Sachin Kumar, Department of Biosciences and Bioengineering, IIT Guwahati has been selected for the ICMR Award for his research in virology in India.



Mr. Jayprakash Patidar a student of Dr. Chandan Karfa, Department of Computer Science & Engineering has been awarded The Intel Research Fellowship 2020 For The Project "C-to-RTL Equivalence Checker For High-level Synthesis"



Ms. Urbashi Bordoloi, Centre Rural Technology has been selected for PMRF, May 2020 Cycle



Mr. Dhananjay Kumar, Department of Mechanical Engineering has been selected for PMRF, May 2020 Cycle.

Arun Jain Alumni of IIT Guwahati and former president of IITGAA has been elected as Vice President of PanIIT USA with tenure starting from 1 January 2021 to 31 December 2022.

Alumni Award, IIT Guwahati 2020

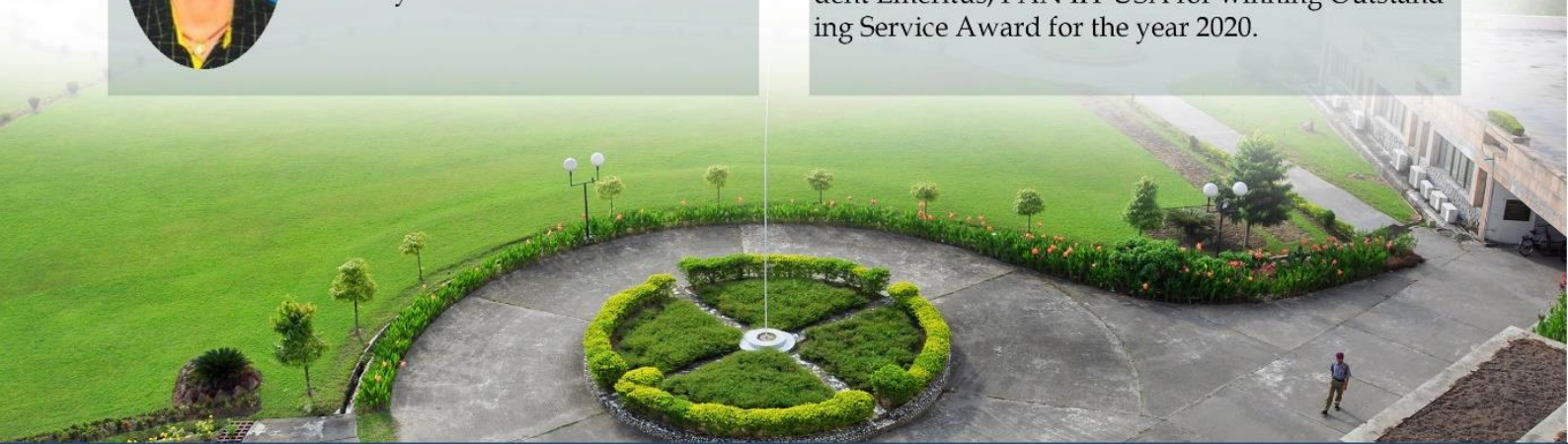
Alumni Award is the first ever initiative of IIT Guwahati to recognize the professional achievements and contributions made by IITG alumni community in different spheres of their professional and social engagements by conferring upon the awards.



Dr. Harpreet Singh Dhillon Mr Ankit Nagor Mr Kiran Thota

Dr Harpreet Singh Dhillon, Associate Professor, Virginia Tech. Blacksburg, USA and Mr Ankit Nagori, Co-founder, Cure-fit, Bangalore, India wone Young Alumni Achiever Award 2020.

Mr Kiran Thota, Product Lead, Amazon AWS, President Emeritus, PAN IIT USA for winning Outstanding Service Award for the year 2020.



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