IIT Guwahati recently topped the list of ‘Top Universities in Asia Pacific’ region under the ‘Problem solving’ category. According to the report by HackerRank, a technical hiring platform, ranked universities across four important technical skills most sought by employers to determine the top universities for developers across North America, Asia-Pacific, Europe, and the Middle East, and found some interesting outliers.

Universities were ranked based on the following four skills:
- Problem-solving
- Language proficiency
- Data structures knowledge
- Computer science (CS) fundamentals

The research was based on over 1.4 million assessments completed by students on HackerRank’s platform between January 2017 and June 2019. It contrasts with traditional lists, such as the Times Higher Education QS rankings, which focus on factors including teaching, research, international outlook and industry income.


Independence Day Celebration

The 73rd Independence Day was celebrated on the 15 August 2019 at IIT Guwahati with the Director unfurling the Tricolour. The Hon’ble Director Prof. T. G. Sitharam then addressed the IIT Guwahati Community on the occasion.

This was followed by a colourful cultural programme by the students of the Institute, Kendriya Vidyalaya IIT Guwahati, Akshara Primary School, Sishugram and children of the campus.

On this occasion Vijñapti - The monthly Newsletter of IITG was launched by Prof. T. G. Sitharam, Director, IITG. Prof. P. K. Iyer, Dean, PRBR handed over the copies to the Director, who in turn presented the first copies of the newsletter to Prof. P. S. Robi, Dy. Director and Prof. M. G. P. Prasad, Interim Registrar.

The Director also presented three employees of the Institute, Mr. Dipak Lahkar, Jr. Technical Superintendent, Medical; Mr. Manab Mohan Borah, Technical Officer Gr – I, Computer & Communication Centre and Er. T. Jagat Singh, Superintending Engineer (Civil) & Head, Engineering, with letter of appreciation for their dedicated service towards the Institute.

All the residents of the campus were present throughout the function.
Researchers of Indian Institute of Technology Guwahati (IITG) have developed hand-held device to detect bacteria almost instantaneously. This research by IIT Guwahati will enable rapid detection of bacteria, which is important not only in healthcare, but also in anti-bioterrorism measures and environmental monitoring applications.

Bacterial infection is a common cause of morbidity and mortality worldwide and despite development of a range of antibiotics, the challenge continues in detecting and diagnosing bacterial infection early on, as present detection techniques tend to be time-consuming.

The research team led by Prof. Parameswar K. Iyer, Department of Chemistry, and Prof. Siddhartha S. Ghosh, Department of Biosciences and Bioengineering, IIT Guwahati, has developed this novel, low-cost, bio-compatible sensor that can detect bacteria almost instantaneously without the need for cell culture and microbiological assays. The Organic Field Effect Transistor (OFET)-based bacterial diagnostic device has been shown to have the ability to detect $10^3$ cfu mL$^{-1}$ of bacteria and distinguish between Gram positive and Gram negative types.

This research has been patented as well as published in the July 2019 issue of the reputed peer-reviewed Journal of Materials Chemistry A of the Royal Society of Chemistry.

At present, the detection of bacteria in body fluids is done in laboratories. The cells that are derived from the patient are initially cultured or grown so that enough of the bacterial cells are available for microbiological analysis, which is a time-consuming, especially when time is of the essence in administering treatment.

The newly developed techniques such as real-time qPCR can detect bacteria faster than conventional assay-based methods, they are restricted by the need for expensive apparatuses and trained personnel. What would be useful are hand-held rapid detection kits like those used for blood sugar monitoring and pregnancy detection.
India Institute of Technology Guwahati organised the second edition of its workshop on “Internet of Things (IoT) and Cyber Security (sponsored by AICTE).” Approved by the Executive Council, under the AICTE Training and Learning (ATAL) Academy, the objective of this workshop was to train teachers of technical institutions. The five-day workshop was held from 19 to 23 August 2019 at the IIT Guwahati campus. The workshop saw participation from over 55 teachers and post-graduate students from entire North-Eastern region.

The objectives of this workshop were to provide a deeper insight and a platform for training/learning/skill development in the following thrust areas through well designed lectures, demonstrations and lab/hand-out sessions.

The sessions include:
- Overview of IoT
- Wireless Communication Technologies in IoT
- Introduction to Smart Sensors and Actuators - the “Things” in IoT, IoT Access Technologies – 6LoWPAN, ZigBee, LoRaWAN
- IoT Protocols: RPL, CoAP, MQTT
- Bio-inspired agent based IoT/CPS
- Programming agents in IoT (Demos and Hands-on)
- IoT application development using ESP8266 and Cloud Infrastructure
- Security in IoT
- Basics of Cyber Security with application

The workshop was inaugurated by Prof. P. S. Robi, the Deputy Director of IIT Guwahati along with Prof. Rohit Sinha, Head, Department of Electronics and Electrical Engineering and the coordinators of the workshop.

The workshop was coordinated by Prof. Sunil Khijwania, Head, Center for Educational Technology and Professor at Department of Physics, Prof. Ratnajit Bhattacharjee, Department of Electronics and Electrical Engineering and Prof. S. B. Nair, Department of Computer Science and Engineering.

A new bio-ink made of Muga silk-proteins and live cells that can be used to 3D-print human tissue, organs or even implants at low cost has been invented by researchers at IIT Guwahati. The technology could go a long way in reducing the wide gap between patients in need of organ transplants/implants, and the dearth of healthy donors.

At the Biomaterials and Tissue Engineering Laboratory in IIT-Guwahati, Dr Biman B Mandal has been working with silk proteins to try and create an artificial implant that mimics the architecture and structure of real tissues, organs, bone, and cartilage. Mandal and his team of researchers have created prototypes of bone, cartilage, and knee-meniscus — structural tissues. Soft tissues like liver, heart and skin tissue have also been printed with the bio-ink successfully by the team, which is now awaiting patent certificate for the Muga silk protein bio-ink.

To begin with, a virtual 3D model of the organ/implant is constructed using MRI and CT scans to match the patient’s exact requirement. The Muga silk bio-ink is then incorporated with stem cells from the patient before the artificial tissue is printed. The tissue or organ is then matured in a laboratory (the stem cells are programmed to specialize/differentiate and form all the different cell types in an organ/tissue) before it is implanted to take the place of a defective body part.

Once implanted, the mature stem cells in the 3D printed patch continue to grow and proliferate. Meanwhile, the silk protein degrades into amino acids, facilitating the regrowth of damaged parts of the organ.

This technique also does away with the need for additional surgery to remove the implant.
Membrane to remove oil and dyes from industrial waste water

Researchers from Indian Institute of Technology Guwahati have developed a membrane that promises to help simultaneously remove oil and dyes from industrial and other wastes.

Amid the looming water crisis, deterioration of quality of river waters due to discharge of effluents from industries is also a major concern in India. As per the reports of Central Pollution Control Board, river Ganga alone receives 500 million litres of toxic waste water from 764 industries, affecting the lives of millions who reside along its bank and use its water for their daily needs. The tale is no different for other Indian rivers where high pollution levels affect public health and disrupt the ecosystem of the water bodies.

Dyes are led into water bodies by effluents from textile, printing and cosmetic industries whereas oil enters water due to spillages during oil refinery operations. A single solution to remove both these pollutants was difficult to find since while dyes dissolve in water, oil doesn’t.

Scientists led by Dr. Uttam Manna have sought to tackle the problem by developing a membrane using graphene oxide, cotton fibre and dopamine, an organic chemical, which is more known for its functions as a hormone and a neurotransmitter in human body.

For developing the membrane, scientists first synthesized molecules of poly-dopamine. They then deposited them on the surface of cotton fibers and subsequently coated the combo with graphene oxide.

Scientists tested the membrane on a water sample containing two dyes - methylene blue and crystal violet. Due to their positive charge, the dyes were attracted to and adsorbed on the negatively charged membrane, leaving behind clean water. They then tried it on a sample containing a mix of water and oil. They found that the membrane was able to remove around 98% of oil from the water.

The membrane’s properties remained unaffected by bending, creasing, twisting, rolling, rubbing with sand paper and treatment with water with extreme salinity. Further, it was found that it can be used for up to ten times.

The study team included Upama Baruah and Avijit Das. The findings have been published in the journal ACS Applied Materials and Interfaces.

Flood relief camp by Social Service Club of IIT Guwahati

A flood Relief camp was organised by the students of IIT Guwahati in the Khulagaon village of Morigaon district on 25 August, 2019. This village was submerged under water during the recent flood. This camp was an initiative of the Social Service Club of Students' Welfare Board, IIT Guwahati.

The preparation for the camp was initiated on 13 August, 2019 with about 60 active volunteers and social service club members. These volunteers visited rooms of students residing in 12 hostels of IIT Guwahati for the fund collection. The camp was coordinated by Nikhil Kumar, Flood Relief Coordinator and Shreyash Meena, Secretary, Social Service Club. Work of the camp was monitored by Mohit Mishra, Vice president, Students’ Gymkhana Council and Aaditya Sanwal, General Secretary, Students’ Welfare Board. After about 9 days of fund collection drive, an amount of about Rupees 1.5 lakhs...
Joint Research on Breast Cancer

IIT Guwahati and IISc Bangalore collaborated for an experiment to show how breast cancer cells spread through blood to other parts of the body. The multidisciplinary, multi-institutional team seeks to bridge this gap in understanding and works towards unravelling the mechanisms involved in the growth and spread of breast cancer.

The research led by Prof. Siddhartha Ghosh, Dr. Amaresh Dalal from IIT Guwahati, Dr. Mohit Kumar Jolly from IISc Bangalore together with a research fellow Dr. Binita Nath and research scholars, Anil Bidkar and Vikash Kumar developed a PDMS based complex flow passage with an overall diameter of 184 micrometres (one micrometre = ten thousandth of a cm), with built-in blockages at certain locations that reduce the effective flow passages with a diameter of 7 micrometres. The complex flow passage mimics a capillary endothelial barrier followed by a capillary network. Their work has recently appeared in the Journal of Clinical Medicine, published from Switzerland.

This structure was designed to mimic broken membranes through which cancer cells find way into the blood stream. The PDMS passage was then connected to channels that mimicked network of blood vessels. The cells undergo Epithelial–Mesenchymal Transition. The EMT Cells then brought back through the mimicked endothelium into the tissue compartments. The reversion process is termed as MET. The movement of the cells through the various sections of the complex microchannel was captured using high speed camera, and the video-graphs showed the ways in which cancer spread from one site to another, through such narrow passages.

The team found that the EMT cells had enhanced migratory properties and retained 50% viability, even after migration through wells and constricted passages. They also found that the cells collected at the channel outlet regained epithelial character.

Perhaps the most important observation that the team made was that the EMT cells were more resistant to drugs compared to the original epithelial cells and the reconverted epithelial cells.

As flood leads to increase in mosquitoes, germs, power cuts and shortage of other essential commodities, this money was used to buy commodities such as solar lamps, blankets, mosquito nets, sanitary pads, disinfectants etc. Furthermore, a large quantity of clothes was donated to the victims of floods.

This camp was flagged off by Prof. T.G. Sitharam, Director, IIT Guwahati and Dr. Dilwar Hussain, Chairman, Students’ Welfare Board at 9 AM on 25th August, 2019. The director expressed his happiness over this social service activity of the students and motivated them to continue such efforts in the future. A bus consisting of 35 students and a truck of commodities reached Mayong circle office for distributing relief materials at around 12 Noon. Flood victims of the village gathered in a community hall where relief materials were distributed. Few officials from the circle office assisted students during the distribution of materials. Mrs. Sanghamitra Baruah, ACS, Circle Officer, Mayong Revenue Circle assisted and accompanied students throughout the camp. About 251 families comprised of about a thousand people were benefited by this relief camp. They expressed their happiness and thanked students for their support during the time crisis.
The symposium witnessed interactive dialogues and expert talks by eminent scientists from across the nation including:

- Prof. S. Sivaram, Ex-Director, National Chemical Laboratory (NCL) Pune
- Prof. S. Ramakrishnan, President, Society for Polymer Science (SPSI) and Professor at Indian Institute of Science (IISc) Bangalore
- Dr. Ajayaghosh A., Director, Council of Scientific & Industrial Research (CSIR) - National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram
- Dr. Pradeep Kr. Srivastava, former Deputy Director, Central Drug Research Institute (CDRI), Lucknow
- Prof. Dhiraj Bora, Vice-Chancellor, Assam Science and Technology University (ASTU)
- Prof. Okhil K. Medhi, former Vice-Chancellor, Gauhati University

The symposium also included the dissemination of joint research activities of IIT Guwahati with various countries on sustainable polymers. The event was a perfect platform for spreading and exchanging knowledge with eminent scientists, invited speakers and distinguished delegates in the field of sustainable chemistry, polymers and allied subjects from all across India and few SAARC countries.

The aim of the symposium was also to create vast impact upon developing awareness on sustainable polymers, chemistry and engineering practices among the participants from multiple institutes and industry of North East, India. This symposium and the SPSI-North East chapter are a step forward towards strengthening the scientific and technological growth of the north-eastern institutions and industry.

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**IIT Guwahati signs MoU with RD Grow Green India for safer drinking water**

Indian Institute of Technology Guwahati has signed a Memorandum of Understanding (MoU) with RD Grow Green India Pvt. Ltd on 22nd August 2019. The Technology Transfer Signing Ceremony was held at the IIT Guwahati campus between Dr. T. G. Sitharam, Director IIT Guwahati and Mr. Rajeev Saikia, MD, RD Grow Green India Pvt. Ltd.

The technology is based on the ‘Apparatus and Method for Removal of Fluoride, Iron, Arsenic and Microorganisms from Contaminated Drinking Water’ by Prof. Mihir Kumar Purkait, Department of Chemical Engineering, IIT Guwahati. The technology is patented by Prof. Mihir Kumar Purkait under the Indian Patent Number: 286481.

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**Conference / Seminar Abroad**

- Dr. Pratima Agarwal, Professor, Physics attended the “28th International Conference on Amorphous & Nano-crystalline Semiconductors (ICANS28) held at Ecole Poly Technique, Palaiseau, France from 04.08.19 to 09.08.19.
- Dr. Alika Khare, Professor, Physics attended the “28th International Conference on Amorphous & Nano-crystalline Semiconductors (ICANS28) held at Ecole Poly Technique, Palaiseau, France from 04.08.19 to 09.08.19.
- Dr. Shakuntala Mahanta, Associate Professor, Humanities & Social Sciences presented a paper at “19th International Congress of Phonetic Sciences (ICPhS) 2019”, held at Melbourne Convention & Exhibition Centre, Melbourne, Australia from 05.08.19 to 09.08.19.
- Dr. Aryabartta Sahu, Associate Professor, Computer Science & Engineering presented a paper at “The 21st IEEE International Conference on High Performance Computing & Communications (HPCC-2019)”, held at Zhangjiajie, Hunan, China from 10.08.19 to 12.08.19.
- Dr. Debaprasad Maity, Assistant Professor, Physics attended the “Rencontres du Vietnam: Cosmology 2019 – ICISE Quy Nhon Vietna” held at Quy Nhon, Vietnam from 11.08.19 to 17.08.19.
Dr. Chandan Mukherjee, Associate Professor, Chemistry attended the “19th International Conference on Biological Inorganic Chemistry (ICBIC-19)”, held at Congress Centre Kursaal, Interlaken, Switzerland from 11.08.19 to 16.08.19.

Dr. Vinay Vilas Wagh, Associate Professor, Mathematics attended the “GAP SINGULAR Meeting & School” held at PfalZakademie, Lambrecht, Germany from 15.08.19 to 23.08.19.

Dr. Jubaraj Bikash Baruah, Professor, Chemistry delivered a Invited talk at the “International Conference on Advances in Functional Materials in UCLA (AAAFM-UCLA)”, held at University of California, Los Angeles, USA from 19.08.19 to 22.08.19.

Dr. Bodhisattva Sengupta, Associate Professor, Humanities & Social Sciences present a paper at “75th Annual Congress, IIPF”, to be held at Adam Smith Business School, University of Glasgow, Glasgow, Scotland from 21.08.19 to 23.08.19 and deliver an “Invited Lecture” at Leeds University Business School, Leeds, England from 25.08.19 to 26.08.19.

Dr. P. S. Robi, Professor, Mechanical Engineering presented a paper at the “4th International Conference on the Science & Engineering of Materials (ICoSEM2019)”, held at Hotel Armada, Petaling Jaya, Kuala Lumpur, Malaysia from 26.08.19 to 28.08.19.

Prof. Tamal Banerjee, Department of Chemical Engineering, has been declared as one of the top five Indian Authors of ACS Omega which is an interdisciplinary journal publishing new findings in chemistry and interfacing areas of science and engineering. Prof. Banerjee’s research is aimed at both emerging aspects namely environmental remediation and energy generation. His publications in ACS Omega ranges from areas such as Cellulose–Xylan Hydrogel for Vitamin B12 release and reprocessing of spent nuclear fuel involving cesium ions. Further he has also reported the hydrogen production from chemical hydrides; and Deep Eutectic Mixtures as novel thermal fluids for Concentrated Solar Power.

Prof. Biman Mandal, Department of Bioscience & Bioengineering has been awarded the Young Scientist Award 2019 by the Asian Polymer Association (APA). Prof. Mandal has been invited to receive the APA Young Scientist Award (YSA) in Goa during APA-2019 conference in 16-18 October, 2019. He shall also be delivering an Invited talk on this occasion.

Mr. Rajib Dey has been inducted in the Assam Book of Records as the Youngest National Coach of India (Swimming) who has produced many national and international medalists in swimming from the state of Assam. Mr. Dey joined IIT Guwahati in the year 2014 as Assistant Coach, presently he is holding the position of Physical Training Instructor.

IIT Guwahati team develops Al Chatbot ‘ALBELA’ to teach and support first year students of Electrical & Electronics Engineering (EEE)

- ALBELA will provide round-the-clock support to students of IIT Guwahati by providing AI tutors
- ALBELA will provide smart content and personalized learning at new efficiencies (The teacher to student ratio will no longer be a limiting factor)
- ALBELA will transform the role of ‘Teacher’ in the conventional classroom and introduce AI to pioneer a new landscape of technical education

The world of technology is rapidly changing, and one must adapt to it quickly in order to survive in the race of ‘survival of the fittest’. Prof. Praveen Kumar and Prof. Samarendra Dandapat along with a team of postgraduate students from Indian Institute of Technology (IIT) Guwahati, are developing an Artificial Intelligence-enabled Chatbot – ALBELA - to teach and support the first year students of Electrical & Electronics Engineering (EEE). The researchers are from the Department of EEE.

Hence, an AI Chatbot is projected to be a suitable mechanism also capable of addressing the queries and doubts that each of the approximately 850 students pursuing EEE at the Institute may have.

With features like lecture schedule, faculty information, examination queries, course curriculum, the Chatbot also has a unique feature of extracting useful information from unstructured data, i.e., it can scan any format of documents – PDF or Word and provide results relevant to the query asked.
As a part of its 21st Edition, Techniche – IIT Guwahati organized its 11th edition of Guwahati Half Marathon, a running event organized to promote a better social and human interaction amongst the residents in and around Guwahati.

One of the largest events of its kind organized by a student body, the Marathon has evolved coherently over the years since its inception in 2009 to become the largest half Marathon in North East India. The marathon was initiated to provide a platform for people from different walks of life to come and spread their cognizance and sense of concern for a better society. The 9th edition of the marathon was successfully organized on 25th August 2019 to raise awareness on Clean Water – a basic human need, something that is in grave danger.

The marathon was subdivided into three events. The Spirit Run, an open-to-all 6-km racing event, with no age limit, The Glory Run, a 21-km racing event, with participant above 14 years of age and The Courage Run, a 6 km racing event for the specially-abled people.

Techniche 2019 - the annual Techno-Management Festival of the Institute - was organized from 29 August to 1 September, 2019. Since its beginning in 1999, Techniche has grown to become one of the premier Techno-Management festivals of the nation. With a reach of thousands of colleges and school students from across the country, Techniche plays a phenomenal role in bringing out the true potential of the young generation.

This editions lecture series saw eminent personalities from various fields as keynote lectures, sharing their experiences and stories. They included Padma Vibhushan Dr. V.K. Aatre, former Director General, DRDO on the topic Battle field technologies, Dr. Murli Manohar Joshi, former Union Minister of HRD, Mr. Pete Michels, Director of shows like Rick and Morty, Family Guy and The Simpsons, Mr. Paul Arion, VFX Head for movies like Avengers, Jungle Book.

The 21st edition of the annual technomanagement also witnessed various events like Panel Discussion on Artificial Intelligence: Morals, machines and robot reign, various Workshops, Funniche, Robotics, NEXUS, CORPORATE, Techolympics, Techexpo, Exhibitions.

Techniche 2019 ended with Pronites, an event with mix of comedy, music and dance, featuring Comicstaan winning comedian Nishant Suri and popular Bollywood singer Amit Mishra.