

Indian Institute of Technology Bombay Celebrates International Day of Yoga 2021 (Online)



International Day of Yoga (IDY) is celebrated throughout the world every year on June 21 to raise awareness about the benefits of Yoga in daily life. Yoga brings balance between body, soul, and mind. Yogastha, IIT Bombay has been organizing regular yoga sessions, workshops, yoga competitions and various lecture sessions at the IIT Bombay campus.

IIT Bombay celebrated the **7th International Yoga Day** on June 21, 2021. The event witnessed the online participation of large number of the members of the IIT Bombay community including faculty, students, staff, and their family members. Common Yoga Protocol (CYP) was organized in the morning. IIT Bombay Director **Prof. Subhasis Chaudhuri** addressed the participants and welcomed the Chief Guests Padma Shri awardee **Dr. H.R. Nagendra**, Chancellor, S-VYASA, and **Dr. Hansa Jayadeva Yogendra**, Director, The Yoga Institute.

The flagship event of Yogastha on the eve of IDY, Yogathon: 108 Suryanamaskar Challenge was organized in the evening. Though the events were organized online, IIT Bombay community members participated enthusiastically and proved that fitness cannot take a back seat during tough times.

The participants were encouraged to upload their videos on social network sites. To continue the yoga-related activities for the IIT Bombay community, a Yogathon cooldown session was conducted on the next day of IDY. The Institute and the Yogastha club are conducting virtual yoga classes after celebrating IDY.

Following events were organized by the Yogastha team in the run-up to International Day of Yoga:

An 'Improve focus with Yoga' workshop was conducted on March 13, 2021 by **Ms. Riya Bhansali**, a Yoga instructor and life coach with a strong background in finance. The workshop focused on delivering some simple and effective methods which can be used to relax the mind and enhance concentration while working and studying. The instructor explained and demonstrated the impact of these techniques with live experiments during the workshop.

The three-day **Ashtanga Vinyasa Yoga Workshop** was organized by Yogastha during May 23-25, 2021. The workshop focused on powerful practices like the Suryanamaskar and a series of asanas and other practices designed to energize our entire system. The instructor for the session was **Mr. Sandeep Shiva Shankar**, one of the very few authorized yoga instructors from the world-renowned yoga shala, K. Pattabhi Jois Ashtanga Yoga Institute (KPJAYI), Mysuru. Over 50 yoga enthusiasts participated in the workshop to learn and practice asanas under the instructor's supervision from their homes.



The three-day online workshop on Breathing Practice and Meditation was during June 9 - June 11, 2021 during to give yoga enthusiasts a fresh perspective about breathing practices in order to relax internally, even during unpleasant situations. The instructor for the session was **Mr. Devang Shah** from Utsav Institute. More than 60 participants participated in the

workshop. **Prof. Neeraj Kumbhakarna** welcomed the instructor and highlighted the significance of learning yogic breathing practices. The instructor started the first day of the workshop by talking about the basics of breathing in yoga and its impact on the mind and body.

Due to the lockdown imposed by competent authorities to fight the Covid-19 pandemic, the following events were conducted online by the Yogastha team using social media and other technologies:

An '**online quiz series**' was conducted on the theme origin of Yoga and International Day of Yoga (IDY) during June 3-20, 2021 and several members of the IIT Bombay community participated in it.



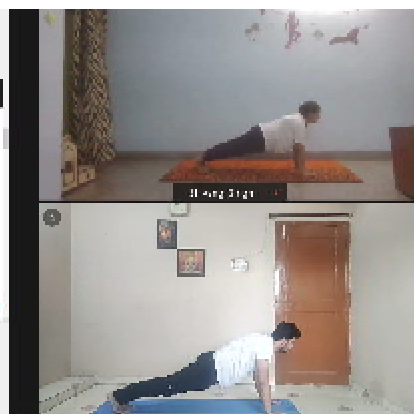
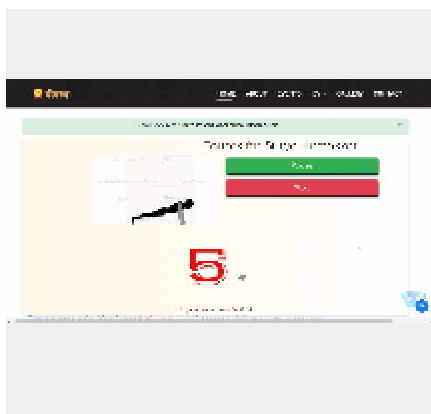
A '**2-minute Yoga Challenge series**' was conducted during June 5-20, 2021. The participants were requested to post their pictures and videos of standing, sitting and on-spine asanas on social media platforms.

'**Best yoga pose**' competition was conducted during June 15-20, 2021 consisting of balancing and stretching asanas. This event saw active participation from family members of students, faculty, and staff members. The event comprised solo pose and group/ family pose categories to encourage the theme 'Yoga with family'.

Slogan competition on the theme **Yoga@Home** was conducted and participants were encouraged to share their slogan on their social media platforms.

Poster making competition on the themes Yoga@Home was conducted where the participants submitted either digital or painted/ sketched posters and were also encouraged to publicize them on their social media sites. School children of IIT Bombay employees have actively participated in this event.

The events are organized to help students, faculty and campus residents live stress-free and develop a healthy lifestyle. The session also helps to nurture the yogic practice among the IIT Bombay community. We have been getting onewhwhelming response from the IIT Bombay Community.



IIT Bombay Secures First Position In QS World University Rankings 2022



IIT Bombay has secured the **first position** in India and 177th rank this year in the **Quacquarelli Symonds (QS) World University Rankings (2022)**. The results were released on June 08, 2021 by QS, a British company.

IIT Bombay secured an overall score of 46.4 out of 100. The Institute has a score of 51.3 in academic reputation, 79.6 in employer reputation, 55.5 in citation per faculty, 32.5 in faculty-student ratio, 1.5 in international

faculty and 1.6 in international students, all scores out of a maximum of 100 points. Among these six parameters, Employer Reputation indicated the strongest one for IIT Bombay with a rank of 72 globally.

The Director of the Institute **Prof. Subhasis Chaudhuri**, in his remark said, *"I am glad to see that the Institute has done better on three of the key parameters (Academic reputation, Employer reputation, Citations per faculty) with respect to the last year. A much larger number of students were admitted to the Institute than earlier years, because of which we lost some points on the Faculty-student ratio, and our overall rank fell marginally. With the Institute progressing well on all fronts, we are confident of attaining much better rank in the coming years"*.

In the 2022 edition, the Institute performed among the top 14% in the QS World University Rankings.

IIT Bombay Manufactures Indigenous CAR-T Cell Therapy



Team of ACTREC, Tata Hospital and Prof. Rahul Purwar, Department of Bioscience and Bioengineering

The first **Chimeric Antigen Receptor T-cell (CAR-T cell therapy)**, a type of gene therapy, was conducted at **Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Hospital** in Mumbai. The CAR-T cells were designed and manufactured at the **Department of Bioscience and Bioengineering (BSBE)** of IIT Bombay.

CAR-T cells are the patient's own immune cells, which are engineered in the laboratory to fight Cancer. It is a type of gene therapy that is one of the most effective treatments for blood

Cancer. The CAR-T cell therapy is completely indigenous and developed at IIT Bombay. The typical CAR-T cell therapy costs approximately Rs. 3 to 4 crores for each patient and is not available in the country at any price.

This is '**first-in-India**' gene therapy and the dedicated efforts and excellent collaboration between IIT Bombay and Tata Hospital, Mumbai brought this state-of-the-art technology to India at a fraction of the cost. Efforts were made by **Prof. Rahul Purwar** and **Dr. Gaurav Narula** of Tata Hospital and their teams in bringing this platform to all the patients who will benefit and save millions of lives for the true service of the nation.

Blackstone Asia Head Amit Dixit Gifts IIT Bombay Its First Woman Faculty Chair



Mr. Amit Dixit, Blackstone
Asia Head for Private Equity

The Indian Institute of Technology Bombay announced the establishment of the Institute's first woman faculty chair, sponsored by **Mr. Amit Dixit**, Blackstone's Head of Asia for Private Equity. The Chair, named "**The Amit Dixit Chair**," has been created through Mr. Dixit's generous contribution to support the Institute in its efforts to honor outstanding women faculty members. It is a critical step toward recognizing women leaders in academia who can serve as role models for aspiring students.

Mr. Dixit's donation will also support the Student Mentorship Program's recruiting initiatives to attract women applicants to IIT Bombay. Mr. Dixit is an alumnus of IIT Bombay's Civil Engineering Department, Class of 1995. He graduated at the top of his program and received the Institute's Silver Medal for outstanding work in his discipline.

Mr. Dixit said, "*India has risen to global prominence for its strong talent pool particularly in the STEM (Science, Technology, Engineering, Mathematics) disciplines. IIT Bombay and its alumni have created a large impact on the global technology industry. It is increasingly important to promote diversity and support women so they have the opportunity to secure global leadership positions. At Blackstone, we firmly believe that a diverse and inclusive workforce builds better businesses. I hope this new position can inspire faculty and students and widen the funnel to develop women leaders in technology. I'm thrilled to return to IIT Bombay and help steer its diversity efforts.*"

According to data published by the Department of Science and Technology, Government of India, women comprised only 14% of India's STEM workforce in research and development in the 2017-18 period.

Prof. Subhasis Chaudhuri, Director, IIT Bombay, said, "*As one of the leading academic institutions in India, we are proud to take the lead in raising awareness of the importance of women leaders with the support of Mr. Amit Dixit. The government has also played an instrumental role in our diversity efforts, introducing the supernumerary quota for women in IITs. This has helped increase the admission of women from just 8% in 2016 to 18% in 2020. However, there's always room to do more. We are grateful to Mr. Dixit for his generous contribution, which has laid the groundwork for change and set an example for others in the education sector.*"

Institute Receives First-Of-Its-Kind Donation To Set Up Professorship

IIT Bombay received a donation from **Ms. Nina Kar**, wife of late **Prof. Subir Kar**, to set up **Prof. Subir Kar Chair Professorship** in the Department of Mechanical Engineering. Ms. Kar bequeathed her property to the Institute.

Prof. Subir Kar was one of the early batch professors responsible for the growth of IIT Bombay. He was a well-known researcher in fluid mechanics and was instrumental in setting up the Biomedical Engineering program at IIT Bombay. He passed away in 2001.



Ms. Nina Kar bequeaths her property to the Institute

Ms. Kar formally handed over her will to IIT Bombay. This is the first-of-its-kind case of a bequeath by a donor to the Institute.

IIT Bombay Launches New Centre for Digital Health With Support From Koita Foundation

IIT Bombay has set up the ‘**Koita Centre for Digital Health**’ (KCDH) with a generous contribution received from its alumni **Ms. Rekha Koita** and **Mr. Rizwan Koita**, under the aegis of the Koita Foundation. KCDH will be the first of-its-kind in India, focused on driving academic programs, research, and industry collaboration in Digital Health.

Improving the quality, accessibility, and affordability of healthcare is one of the world's biggest priorities. Digital Health, including healthcare informatics, has a profound impact on the quality of care and efficiency of healthcare delivery. Consequently, there is substantial focus globally on enhancing Digital Health and Informatics. In India too, the launch of the National Digital Health Mission (NDHM) in 2020 is expected to drive Digital Health adoption at a national scale.



Mr. Rizwan Koita, Founder, Koita Foundation and Ms. Rekha Koita along with IIT Bombay Director Prof. Subhasis Chaudhuri

KCDH's academic and research focus areas include clinical applications (including electronic patient records and medical imaging), healthcare data management (including healthcare data privacy and security), healthcare analytics, healthcare AI/ ML, consumer health, public health, and public policy. KCDH will offer minor, dual degree, Masters and Ph.D. programs in Healthcare Informatics. KCDH will conduct industry/ outreach programs for healthcare and industry professionals in digital health and enable them to act as force multipliers.

Digital Health and Informatics need cross-functional expertise – computer science, statistics, AI/ machine learning, bioinformatics, and medicine. KCDH will foster strong collaboration with Digital Health Partners - hospitals, medical research institutes, industry.

KCDH and its Digital Health Partners will establish joint academic and research programs. In addition, KCDH will actively collaborate with healthcare technology companies, healthcare NGOs, and government organizations.

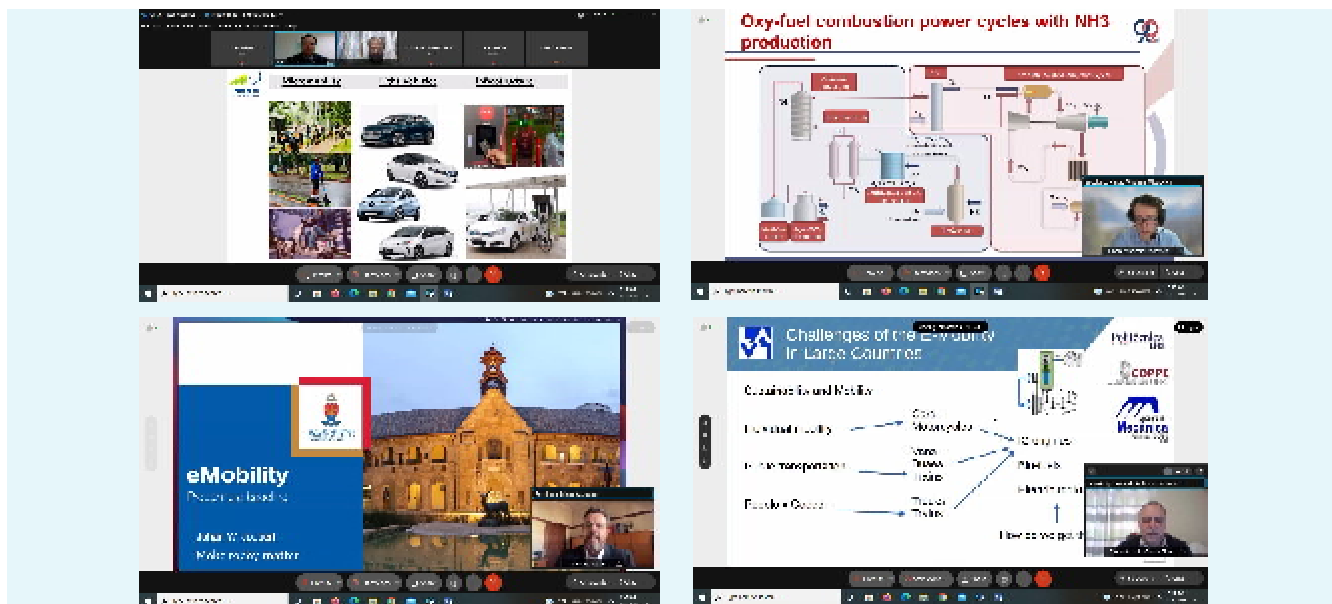
KCDH is establishing a world-class advisory board consisting of experienced healthcare professionals, academics, healthcare technology and industry veterans. The advisory board will provide an overall vision and guidance to KCDH.

“The Center will enable an ecosystem that can help address the healthcare challenges that have been so glaringly exposed by the Covid-19 pandemic. Digital Health and Informatics need cross-functional expertise,” said **Prof. Subhasis Chaudhuri**, Director, IIT Bombay. *“At KCDH we hope to enable seamless cross-functionality across these streams. We hope this new initiative will open up exciting opportunities for our graduates, including spearheading research, launching startups, and much more”.*

Koita Foundation will work closely with the Center to help scale its operations and work with Digital Health Partners on joint digital health initiatives (e.g., internships, research programs). Koita Foundation can also provide financial support to Digital Healthcare Partners, as part of its overall commitment to Digital Health. In addition, Koita Foundation will help the Center establish industry relationships e.g., healthcare technology and medical device companies.

“Digital Health is critical to improve healthcare at scale. We are delighted to support IIT Bombay in establishing the Center, which can play a pivotal role in improving healthcare in India and across the world,” added **Mr. Rizwan Koita**, Founder Koita Foundation. *“We look forward to supporting KCDH establish and drive digital health partnerships and industry collaboration”.* Mr. Koita is also the co-founder and CEO of CitiusTech (www.citiustech.com), a global healthcare technology company.

IIT Bombay Hosts BRICS NU Conference 2021



The Chairmanship of BRICS NU (Brazil, Russia, India, China, South Africa – Network University) is with India for the year 2021. The National Coordinator, the Indian Institute of Technology Bombay, organized a three-day **BRICS NU World Conference 2021** on **‘Electric Mobility’** during June 16-18, 2021.

The virtual conference had 20 distinguished speakers from leading universities of BRICS countries, who shared and exchanged their experiences on all aspects of Electric Vehicle Technologies.

On the first day, the conference started with talks related to sustainable urban transportation, the impact of electric mobility on livelihoods, the contribution of MagLev vehicles in smart cities, to name a few. The speakers presented their research and answered questions raised by the participants.

The inaugural event progressed with a brief talk by **Mr. Amit Khare**, Hon’ble Secretary, Higher Education Department who guided on the ways to enhance and foster international collaborations under BRICS NU.

The highlight of day one was the plenary talk by the Chief Guest **Mr. Nitin Gadkari**, Hon’ble Minister for Road Transport & Highways and the Minister of Micro, Small and Medium Enterprises Government of India who shared his valuable insights on the theme of the conference. The Chief Guest Mr. Nitin Gadkari encouraged IITs to do more research in the area of electric mobility as it can lead to cost-effective sustainable transport, less pollution, and create employment opportunities as well. He inspired all by sharing his ideas on finding new and innovative ways to make electric vehicles in India and eventually leading the country into a major producer of electric vehicles. His talk ended with a promise to support research that the Indian institutes are carrying out in this area.

On the second day, the conference highlighted the Energy and Environmental related advantages of adopting Electric Mobility and the technological challenges that need to be overcome.

The objective of this conference was to provide a platform and opportunities for researchers, to exchange their research experiences and share new ideas to promote their research progress in the field of Electric Vehicles with a discussion on practical issues, challenges encountered and solutions adopted.

It also provides a platform for understanding the extent of the adoption of this latest technology in each of the five BRICS countries.

On the third day, the conference had researchers sharing their research related to Lithium-ion and lithium metal battery, challenges of electro mobility in large countries, establishing an e-mobility baseline to name a few.

The three-day conference served as a networking opportunity for establishing international relationships, the exchange of ideas and experiences. The conference paved a way to get together researchers from five BRICS countries to talk about e-mobility from different angles and together find a solution to the common problems.

Towards the end of the conference was a discussion on ways of exploring global engagement opportunities within BRICS network universities like having university-level agreements that facilitate student and faculty exchanges, and having more research-related interactions among the faculty members by conducting workshops or conferences in focused areas.

First Faculty From IIT Bombay Elected In European Molecular Biology Organization

Prof. Roop Mallik from the **Department of Biosciences and Bioengineering** at the Indian Institute of Technology Bombay has been elected as an associate member of the **European Molecular Biology Organization (EMBO)** to join the life scientists' community. Prof. Roop Mallik is the fifth scientist from India to be elected as an EMBO Associate Member.



EMBO announced that 64 life scientists have been elected to its membership. The new EMBO members and associate members will join the community of more than 1,800 leading life scientists.

"I am honoured to be elected as an EMBO associate member. I hope that such recognitions will foster closer collaboration between the European and Indian scientific communities," said **Prof. Mallik**. Prof. Mallik, an Indian biophysicist works on nanoscale molecular motor proteins that transport material such as viruses, mitochondria, endosomes; etc. inside living cells.

"I am delighted to welcome the new members into our organization and look forward to working with them," said EMBO Director **Ms. Maria Leptin**. *"An election to the EMBO Membership recognizes*

outstanding achievements in the life sciences. The new members will provide expertise and guidance that will help EMBO to further strengthen its initiatives".

The 64 newly-elected members reside in 21 countries: 55 new EMBO members reside in member states of the EMBC, the intergovernmental organization that funds the major EMBO Programmes and activities. Nine new EMBO associate members reside in Argentina, Australia, India, Japan, and the USA. 26 of the new EMBO members (41%) are women.

EMBO members are actively involved in the organization. They serve on EMBO Council, Committees and Advisory Editorial Boards of EMBO Press journals, evaluate applications for EMBO funding and mentor early-career scientists. Collectively, they can influence the direction of the life sciences in Europe and beyond.

New members are nominated and elected by the existing EMBO membership as it is not possible to apply to become a member. One election is held each year. The new EMBO members will be formally welcomed at the annual EMBO members' meeting during October 27–29, 2021.

Selected statistics

- * 64 life scientists have been elected to the EMBO membership, 55 EMBO Members and nine Associate Members.
- * The newly elected members reside in 21 countries.
- * 26 of the new EMBO Members (41 %) are women.

New EMBO Associate Members 2021

Yasmine Belkaid	NIAID, NIH, Bethesda, US
Hugo J. Bellen	Baylor College of Medicine, Houston, US
María Fernanda Ceriani	Fundación Instituto Leloir, IIB-BA/CONICET, Buenos Aires, AR
Mark Dawson	Peter MacCallum Cancer Centre, Melbourne, AU
Akiko Iwasaki	Yale University School of Medicine/ HHMI, New Haven, US
Roop Mallik	Indian Institute of Technology Bombay, IN
Keiko Sugimoto	RIKEN Center for Sustainable Resource Science, Yokohama, JP
Masayo Takahashi	Kobe City Eye Hospital, Kobe, JP
Leonard Zon	Children's Hospital Boston, US

IIT Bombay Innovates Way To Generate Oxygen To Help Meet Covid Crisis



Evaluation of the project at the IIT Bombay nitrogen facility in the Refrigeration and Cryogenics Lab

In view of the national emergency in India with respect to pandemic and oxygen production, **Prof. Milind Atrey**, Dean (R&D), who also specialises in Cryogenic Engineering, along with Tata Consulting Engineers Limited (TCE), took up a pilot project to evaluate the **conversion of PSA (Pressure Swing Adsorption) Nitrogen Unit to PSA oxygen unit** by fine-tuning the existing nitrogen plant setup and changing the molecular sieves from carbon to zeolite. Such nitrogen plants, which take air from the atmosphere as raw material, are available across India in various industrial plants. Therefore, each of them has the potential of being converted to an oxygen generator to tide over the current emergency.

At IIT Bombay, a PSA nitrogen plant in the Refrigeration and Cryogenics Laboratory was identified for conversion to validate the proof of concept. To undertake this study on an urgent basis, an MOU was signed between **IIT Bombay**, **Tata Consulting Engineers** and **Spantech Engineers** to finalise a SOP that may be leveraged across the country.

Spantech Engineers, Mumbai, who deal with PSA Nitrogen & Oxygen plant production, agreed to partner with IIT Bombay and TCE on this pilot project and installed the required plant components as a skid at IIT Bombay for evaluation using IIT Bombay's infrastructure at the IIT Bombay nitrogen facility in the Refrigeration and Cryogenics Lab. This setup for the experiment was developed within three days, and the initial tests have shown promising results. Oxygen production could be achieved at 3.5 atm pressure with a purity level of 93-96 %. This gaseous oxygen can be utilised for COVID-19 related needs across existing hospitals and upcoming COVID-19

specific facilities by providing a continuous supply of oxygen.

Prof. Milind Atrey acknowledges and thanks **Mr. Amit Sharma**, Managing Director, Tata Consulting Engineers, along with **Mr. Rajendra Tahiliani**, Promotor, Spantech Engineers and an alumnus of IIT Bombay (1970), **Mr. Raj Mohan**, Managing Director, Spantech Engineers and their passionate team members for their collaboration and partnership on this project.

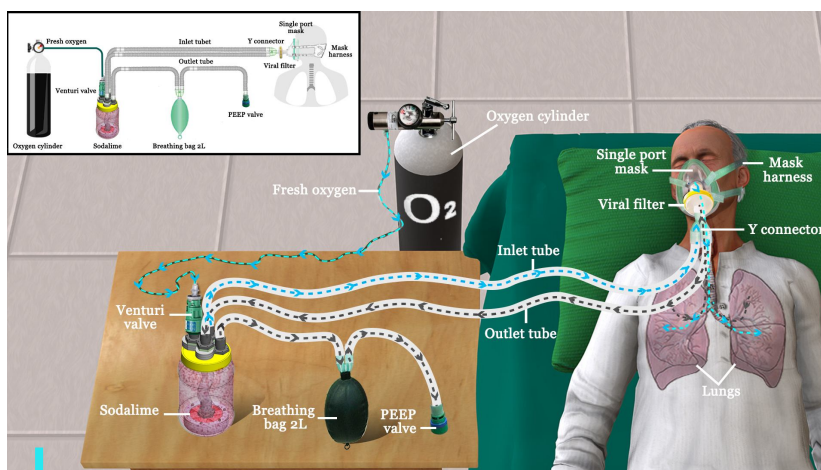
Congratulating the teams on the successful pilot in a timely manner amidst several constraints, **Mr. Amit Sharma**, Managing Director, Tata Consulting Engineers, said, *"We are delighted to partner with IIT Bombay and Spantech Engineers, and contribute towards an innovative solution for emergency oxygen generation using existing infrastructure towards helping the country tide over the current crisis. Such partnerships between industry and academia can accelerate our vision towards the Atma-Nirbhar Bharat"*.

Prof. Subhasis Chaudhuri, Director IIT Bombay, congratulated all the involved parties and said that such partnership between academia and industry is highly desirable and essential for the growth and success of our nation. He also encouraged the teams to conceptualise innovative ideas and generate indigenous Intellectual Property (IP) that can be leveraged across multiple sectors in meeting the country's needs. Prof. Chaudhuri encourages and requests various government authorities, NGOs, and private companies to contact Prof. Milind Atrey, IIT Bombay, and Tata Consulting Engineers to know more about this project and its rapid adoption across the country.

IIT Bombay Designs 'reBreather' To Reuse Exhaled Oxygen

IIT Bombay's team in the guidance of **Prof. Santosh Naronha**, Department of Chemical Engineering, demonstrated an innovative way to reuse exhaled oxygen and to enhance the lifetime of oxygen cylinder for covid patients. The 'do-it-yourself' manual was made public for all to come forward and help patients in their locality.

Several past and current students and staff members of IIT Bombay, affiliated with the Tata Centre for Technology and Design, Chemical Engineering and Nex Robotics, have come together to work on '**reBreather**', a breathing device solution to help with the current acute shortage of medical grade oxygen.



Graphic representation on the demonstration of reBreather

The team designed an easy to assemble oxygen mask which facilitates recirculation of exhaled breath by scrubbing out carbon dioxide (CO₂) and blending in fresh oxygen (O₂) to maintain a clinically desired FiO₂ (fraction of inspired O₂) level. This recirculation can significantly cut down O₂ consumption, especially for critical patients on high flow rates of 100% O₂. The prototype has been tested on healthy volunteers and has been found to be effective in its design and function.

The hardware designs have been placed in the public domain, and at this time we invite engineers, makers, and manufacturers elsewhere to quickly replicate, adopt, or even modify the current design.

More project details, and the design assets themselves, are available in the public domain at the following link: <https://github.com/TCTD-IIT-Bombay/reBreather>

IIT Bombay Incubated Company Makes Nanosniffer, An Explosive Detector



Union Education Minister Mr. Ramesh Pokhriyal 'Nishank' inaugurates the NanoSniffer

The Indian Institute of Technology Bombay and Indian Institute of Technology Delhi jointly organized an event to launch **Nanosniffer**, a high-end microsensor-based explosive trace detector (ETD), which sniffs various chemicals and has a great potential of being the key explosive detector.

On April 9, 2021, the Hon'ble Union Education Minister **Mr. Ramesh Pokhriyal 'Nishank'** inaugurated the NanoSniffer developed by NanoSniff Technologies, a SINE-IIT Bombay incubated company. The program was streamed live on various social media channels.

The NanoSniffer will help to detect a wide range of military, commercial and homemade explosives threats. It helps to detect explosives in less than 10 seconds. The NanoSniffer is a '**Made in India**' product that aims to reduce India's dependency on imported explosive trace detector devices. It has successfully passed Pune-based DRDO's High Energy Materials Research Laboratory (HEMRL) testing.

The spearhead of NanoSniff Technologies is **Prof. Ramgopal Rao**, currently the Director of IIT Delhi, and a few of his colleagues. SINE at IIT Bombay has incubated over 150 tech companies over the last 15 years.

IIT Bombay Researchers Develop Explosive Detector

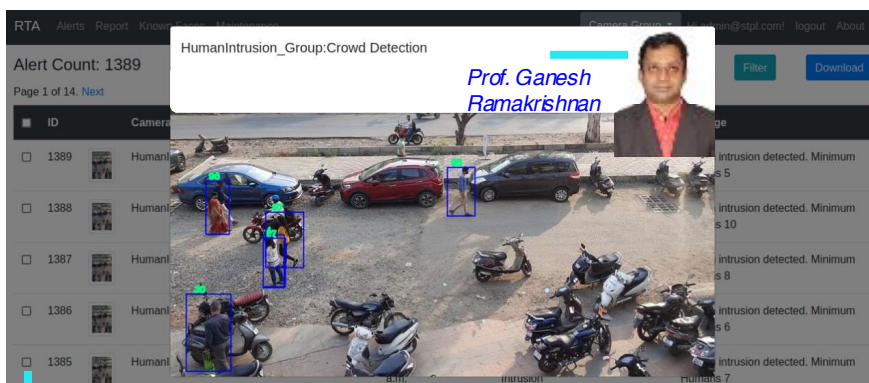


Travancore Devaswom Board in Sabarimala purchased explosive detectors

A team of researchers from IIT Bombay has developed a state-of-art hand-held explosive detector, '**Beaglez**'. The team is lead by **Prof. Anil Kumar** from Department of Chemistry. The explosive detector, Beaglez, has been developed with the help of a collaboration between the **National Center of Excellence in Technology (NCETIS)** at IIT Bombay and **Bigtec Labs**, Bengaluru. Beaglez can be used for screening people, buildings, terrorist hotspots and post-blast search.

A few pieces of these developed explosive detectors were bought by the Travancore Devaswom Board in Sabarimala. According to the researchers, the explosive detector will play a catalytic role towards the '**Make-in-India**' and '**AtmaNirbhar Bharat**' initiatives.

IIT Bombay's Researchers Develop Surakshavyuh - Video Analytics AI Platform



A state-of-the-art Video Analytics AI platform – Surakshavyuh

A team of researchers led by **Prof. Ganesh Ramakrishnan**, Department of Computer Science and Engineering, has developed a state-of-the-art **video analytics AI platform – Surakshavyuh**. The developed platform is part of the industry collaboration between the **National Center of Excellence in Technology (NCETIS)** at IIT Bombay and their industrial partner **SrivisifAI Technologies Pvt.**

'Surakshavyuh' has been installed at Naval Dockyard Visakhapatnam and has also been deployed at several other locations. The solution has also been effectively used on the IIT Bombay campus during the COVID-19 pandemic for contact tracing, physical distancing, etc.

Surakshavyuh will play a catalytic role towards the '**Make-in-India**' initiatives.

Low-cost Sensors For Detection Of SARS-CoV-2 Nucleic Acids In Wastewater

A project on low-cost sensors for the detection of SARS-CoV-2 nucleic acids in wastewater was started at IIT Bombay in May 2020. The project was led by **Prof. Siddharth Tallur**, Department of Electrical Engineering (EE), and **Prof. Kiran Kondabagil**, Department of Biosciences and Bioengineering (BSBE) at IIT Bombay, in collaboration with the University of Strathclyde.

The sensor can be used with portable PCR equipment to detect the SARS-CoV-2 virus, without the need for expensive chemicals and lab infrastructure needed for real-time quantitative PCR tests. The sensor was tested with wastewater collected from a sewage treatment plant in Mumbai spiked with SARS-Cov-2 RNA.

The biosensor uses printed circuit board electrodes to detect fragments of SARS-CoV-2 nucleic acid combined with methylene blue – a readily available salt used as a medication and dye – which is added to the sample to produce a measurable electrochemical signal. The sensor was able to detect the genetic material at concentrations as low as 10 picograms per microlitre. The electrodes are

reusable, easy to clean, do not undergo any changes that affect their capabilities, and have a long shelf-life.

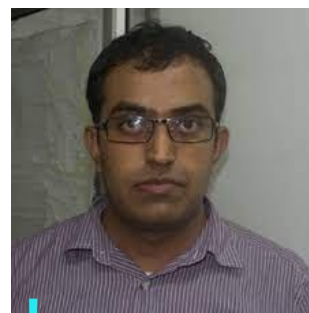
This work could be used to enable widespread monitoring of COVID-19 prevalence in low- and middle-income countries.

The technique of this project is published in the journal *Sensors and Actuators B: Chemical*.

Link to publication (access restricted by publisher): <https://doi.org/10.1016/j.snb.2021.130169>



Prof. Siddharth Tallur



Prof. Kiran Kondabagil

IIT Bombay Inaugurates Newly Commissioned 3D-Coordinate Measuring Machine



Inauguration of the newly commissioned Mitutoyo high precision 3D-Coordinate Measuring Machine at Machine Tools Lab, IIT Bombay

IIT Bombay Director **Prof. Subhasis Chaudhuri** inaugurated the newly commissioned Mitutoyo high precision **3D-Coordinate Measuring Machine (3D CNC CMM)** with advanced probing systems in the Machine Tools Lab, IIT Bombay on April 1, 2021. The facility has been supported by Mitutoyo as part of their Memorandum of Understanding (MoU) with IIT Bombay.

This MoU was specifically executed to extend Mitutoyo's commitment in supporting IIT Bombay's arm for aerospace research, the '**National Centre for Aerospace Innovation & Research (NCAIR)**'. NCAIR focuses on carrying out innovative translational research to boost the global competitiveness of the Indian aerospace industry.

This state-of-art facility will help micro, small and medium enterprises (MSMEs) involved in aerospace manufacturing to enhance their manufacturing quality and innovate new products while ensuring adherence to strict international aerospace standards.

IIT Bombay's Alumni Makes Alma Mater Proud

The conversational messaging startup, **Gupshup** has raised \$100 million in funding from Tiger Global Management, growing its valuation by ten-folds to \$1.4 billion and making it the tenth startup to join the unicorn club this year.

Gupshup is a smart messaging platform that helps companies reach out to their consumers. It was the first company that WhatsApp Business tied up with globally as an enterprise messaging partner. Gupshup was founded by **Mr. Beerud Sheth** and **Mr. Rakesh Mathur**, serial entrepreneurs and IIT Bombay alumni. Beerud has led the company for over a decade. Beerud was also the co-founder for Elance which went public on Nasdaq in 2019 as Upwork.

Gupshup has a remarkably interesting story to share - a story of grit and evolution. Started in 2004 and incubated at Society for Innovation and Entrepreneurship (SINE) at IIT Bombay, the company did raise funding in the initial 5 years of existence with a dry period of almost a decade. During this period, the company focused on building a strong topline and bottom-line so as to eventually go public. They also experimented with their product offerings 3-4 times during this period before finally hitting the growth story.

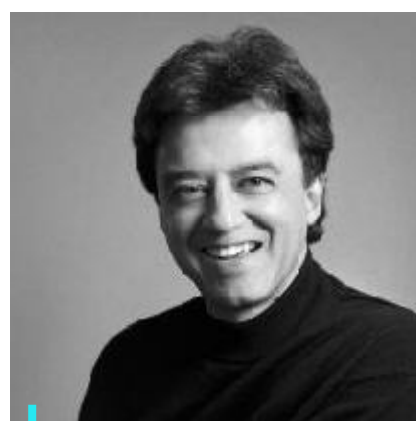
With Gupshup's entry into the unicorn list, it has been a moment of celebration across the academia incubation ecosystem since Gupshup is the first company from the academia incubation ecosystem to enter the unicorn start-up club.

"Gupshup is one the early startups incubated at SINE in 2004 and is perhaps the first unicorn from any academic linked incubator in the country. Such stories also enhance the confidence of other startups spun out of academic institutions," said Mr. Poyini Bhatt, CEO, SINE IIT Bombay. Prof. Subhasis Chaudhuri, Director, IIT Bombay shared, "One of the first batch incubatees turning into a unicorn is a highly inspirational story for the current and future incubatees of SINE. We expect a greater number of our alumni and faculty members to get motivated to join the spirit of entrepreneurship. SINE was set up with the vision to leverage the research output of the Institute to feed into a highly entrepreneurial ecosystem to be developed in the campus in parallel. We are happy to see the dream coming into fruition, but still have miles to go".

The Institute looks forward to more examples like Gupshup to come up from the academia ecosystem.



Mr. Beerud Sheth



Mr. Rakesh Mathur

Lecture On 'Building A Space Telescope'

To commemorate its Foundation Day celebrations, the Indian National Academy of Engineering (INAE)'s Mumbai Chapter organized a lecture on **'Building a Space Telescope'** by **Prof. Varun Bhalerao**, Department of Physics, IIT Bombay on April 23, 2021. The lecture was coordinated by **Prof. A.K. Suresh**, FNAE, Co-Chair, INAE Mumbai Chapter and Professor of Chemical Engineering, IIT Bombay.

Prof. Bhalerao spoke about space telescopes, the need to go outside the atmosphere and the wonderful glimpses they provide of the cosmos. Building on his experience working on a NASA mission and an ISRO mission, he also mentioned some interesting anecdotes that were seen when working with these highly complex instruments.

During his interaction, he also focused on discussing how one builds an instrument for a space environment, precautions to be taken, the advantages of going to space and different challenges.

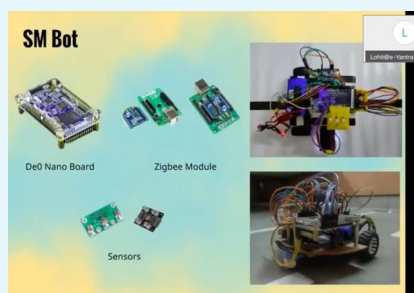


Prof. Varun Bhalerao

e-Yantra Robotics Competition Receives Overwhelming Response



Screengrab of live streaming e-Yantra event with Prof. Kavi Arya



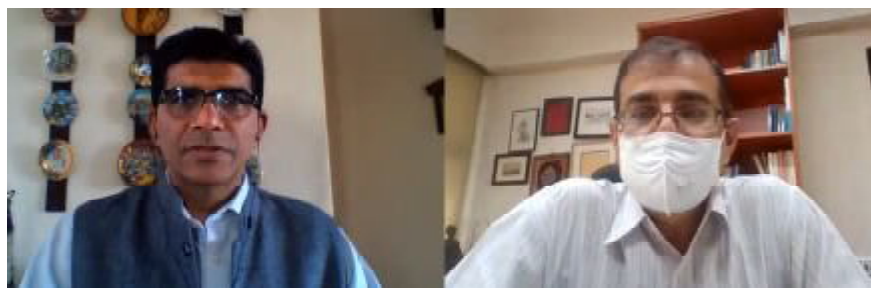
IIT Bombay's e-Yantra, a project under the Ministry of Education (MoE), organized an online event of 'e-Yantra Robotics Competition (eYRC 2020-21)' during March 30 - April 3, 2021 under the guidance of **Prof. Kavi Arya**. Over 10,000 student teams collaborated and participated online.

International students from Namibia, Nepal, Bhutan, Bangladesh and some Southeast Asian countries too, registered for the competition this year. During the grand finale of eYRC, students showcased their project ongoing for seven months to the IIT Bombay faculty jury. The five-day event was live-streamed on YouTube.

Ansyz Announces MTech Fellowship Awards at IIT Bombay

Scholarships to support women and students from underprivileged backgrounds

Ansyz, (NASDAQ: ANSS), the global leader and innovator of engineering simulation software, today announced its partnership with the Indian Institute of Technology Bombay (IIT Bombay) to fund M. Tech. students undertaking projects in socially relevant domains. This CSR



initiative of Ansyz is set to accelerate groundbreaking research in socially relevant forms of technology including the enhancement of education, healthcare, helping the cause of the environment and other socially relevant aspects addressed directly or indirectly by the use of technology. These scholarships are particularly aimed to benefit meritorious students who are from underprivileged backgrounds or are women students.

Starting from the academic year 2021-22, Ansyz will sponsor the two-year program for M. Tech. students each year for three years. Selected students undertaking M. Tech. at IIT Bombay will benefit from this scholarship.

Speaking about the initiative, **Mr. Rafiq Somani**, Area Vice President - India and South Asia Pacific, Ansyz, said, "Ansys has a long-standing association with IITs and we have always believed and been committed to the combined power of technology and education. The future of any industry undoubtedly depends on technology and that is why research is crucial. With these Fellowship Awards, we, at Ansyz, hope to provide these great minds of India, a much needed fast-track to technology research that focusses on healthcare, education and the environment. We are eagerly looking forward to the outcomes of the research that will surely provide some radical solutions in these socially relevant domains".

Dr. Suhas Joshi, Professor and Dean, Alumni and Corporate Relations, IIT Bombay, said, "IIT Bombay has made serious efforts towards promoting diversity in its student body over the last few years. After the Ph.D. fellowships instituted by Ansyz in 2019, we are delighted to once again collaborate to support our M. Tech. students who come from underprivileged backgrounds or are women. Much like the change impacted by the Ph.D. fellowships, these fellowships will change the lives of deserving students as well. We are hopeful of developing an even deeper relationship with Ansyz and work to give back to society in bigger and better ways".

Ansys' Fellowship Awards for the M. Tech. students come after a similar research fellowship was established in 2019 by Ansyz at IIT Bombay to benefit PhD students. With an aim to accelerate education, healthcare, environmental sustainability, conservation of resources and technology research with an underlying social impact, these fellowships would be awarded to women students or students from underprivileged backgrounds.

Institute Organizes Various Activities To Eliminate Single-Use Plastic



NSS Unit organizes awareness session among the students to stop the use of single-use plastic

With an aim to promote and spread awareness about **'Elimination of Single-Use Plastic'**, IIT Bombay organized various activities, competitions, hackathons amongst students. The Institute has sought to take up collective efforts to eliminate single-use plastic on its campus.

An essay writing competition was held for the students on the topic **'Elimination of Single-Use Plastic'**. A total of 38 entries were received through email. In order to achieve the objective, the **NSS IIT Bombay** had conducted various activities including awareness sessions for **'Reduction of single-use plastic'** and **'Reuse of single-use plastic'**.

The volunteers of NSS IIT Bombay conducted a weekly session at several schools since January 2021 to spread awareness among the students to stop the use of single-use plastic along with several other sustainable practices and teaching students to make paper bags out of waste newspapers as a replacement for the plastic bags. They also conducted a **Bottle Plantations Workshop** on January 31, 2021, wherein they taught children to reuse the soft drink bottles by planting saplings in them, thus reusing up to 300 plastic bottles.

The **National Cadet Corps (NCC) IIT Bombay** held a webinar on **'Need for the elimination of single-use plastic'** on April 9, 2021. The aspects related to the legal and policy-making framework were also presented and discussed. The webinar saw the active participation of cadets and a resolution for minimal use of such plastics was established in unison. During the webinar, it was

agreed that a wider structure was needed to tackle this problem to enable future leaders to make better decisions. The need to take responsibility and spread awareness in various capacities was emphasized through this webinar.

On April 13, 2021, NCC IIT Bombay had organized another interactive webinar on the use of plastic along with poster making and drawing competition for cadets of IIT, DY Patil University, Doshi Vakil College, Campus School and Kendriya Vidyalaya. The event also included a debate on the use of plastic, to discuss the issue and come up with a solution for the optimal use of plastic, eliminating the widespread pollution caused by its unjust use.

The Entrepreneurship Cell (E-Cell) team of IIT Bombay conducted an online session on May 2, 2021 on the topic **'The Burden Of Plastic Pollution'**. The session gave insight on how experts are dealing with this problem of plastic in industry. The guest speakers for the session were **Ms. Wilma Rodrigues**, CEO and Founder of Saahas Zero Waste Foundation and **Mr. Arun Murugesh**, Technical head at Saahas Zero Waste Foundation.

During the session, Ms. Rodrigues enlightened on the scale of plastic pollution and consequences of the excessive use of plastic in brief and Mr. Murugesh gave a brief about the technical aspects about the scale of the problem, options to reduce use of plastic, regulations and implementation policies and shared responsibilities of the stakeholders.

IIT Bombay Professor Promotes Awareness Of Climate Change For A Better Tomorrow

Poster of 'Energy and Climate - Keep UPP' programme

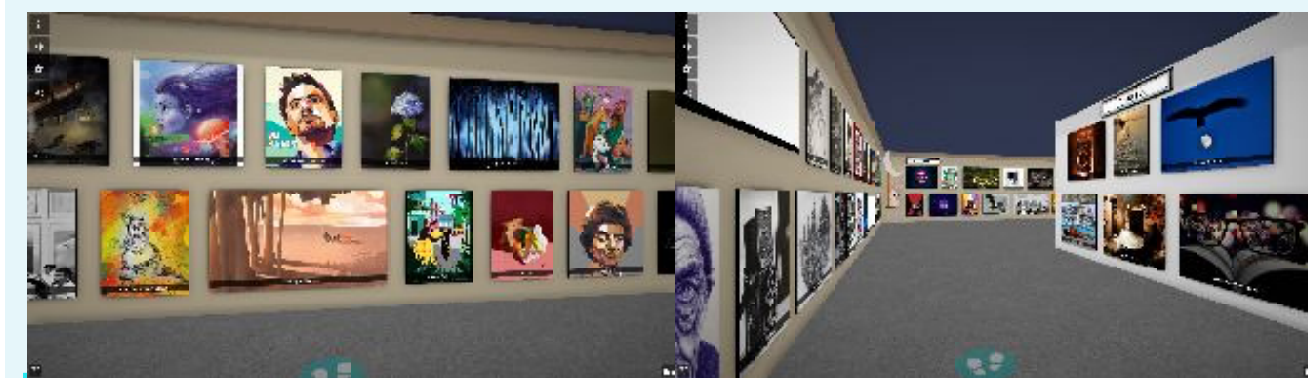
Prof. Chetan Singh Solanki, Department of Energy Science and Engineering and Founder of the Energy Swaraj Foundation, launched the '**Energy and Climate - Keep UPP (Understand, Pledge & Progress)**' programme with the tagline 'million pledges for billion hopes' on Earth Day. The programme was launched on April 22, 2021, under the aegis of '**Bharat Ka Amrut Mahotsav**'.

The aim of the programme is to make people understand the gravity of the climate change situation and make the people pledge to reduce their electricity

consumption. The programme is in partnership with the **All India Council for Technical Education (AICTE)**, the **National Institute of Solar Energy (NISE)**, **Earth Day Network**, and **Teenspire Global**.

Individuals through programme members or without any affiliation to an organization can become trained volunteers for this programme. It is expected that 40,000 volunteers will be trained under this programme to make 1,000,000 pledges in 2021-22.

IIT Bombay's Annual Photography And Art Exhibition Goes Virtual



The virtual art gallery displays various fine arts and photographs

Kaladarshan, the annual photography and fine arts exhibition of IIT Bombay, was organized virtually during April 10-11, 2021. Artworks and photographs were displayed on a Virtual 3D platform, where one could move around using their mouse and keyboard.

The facade of the exhibition had the same look as that of the convocation hall, and the exhibits were displayed inside the 3D hall under various categories like dry medium, wet medium, digital medium for artworks and monochrome, architecture, landscapes for photographs.

The theme for this year's art exhibition was '**Space - A Voyage in the Void**'. To depict the theme in the final exhibition, students also made 3D models of space related elements like an astronaut, UFO and rockets which were put all around the 3D exhibition.

Kaladarshan is the flagship event of the Fine Arts and Photography clubs, Rang and Pixels. Being conducted since 2004, it has evolved into a platform for the entire IIT Bombay artist community to showcase their talent. Every year, the exhibition is set up in the convocation foyer with an exquisite display of artworks and photographs.

Team Shunya Secures Second Prize In Solar Decathlon 2021



Team Shunya's virtual group photo

IIT Bombay's **Team Shunya** won second prize in the 2021 edition of the **Solar Decathlon**. The challenge was organized by the U.S Department of Energy.

Project Daksh which means 'efficient', delivers a sustainable design to redefine the artist village, a site in Belapur in Navi Mumbai. The project addressed the pain points of the residents, preserving the individuality and community living setup of the place, as it had been in the eyes of the celebrated architect **Charles Correa**.

The team came up with a cluster-level design that can be scaled up and cost-effectively set up in areas of similar geographical features. Their project incorporates a self-designed automation system and app, cluster level HVAC system with radiant panels, creating a net positive energy cluster efficient by all standards.

The presentation, creativity and smooth writing won them the **Best Graphic Designer Award** for the best virtual background for the project.



Project Daksh, a cluster-level design that can be scaled up and set up cost-effectively

IIT Bombay Secures 2nd Position At The Inter IIT Tech Meet



The Indian Institute of Technology Bombay secured the first runner-up position at the 9th edition of the Inter IIT Tech Meet. **Aryan Agal**, **Manthan Dhisale**, and General Secretary of Technical Affairs, **Anirudh Mittal**, led the IIT Bombay contingent.

IIT Bombay Contingent - **Bombay 76**, comprising some of the brightest minds of the Institute, bagged 3 gold medals, 2 silver medals, and 4 bronze medals.

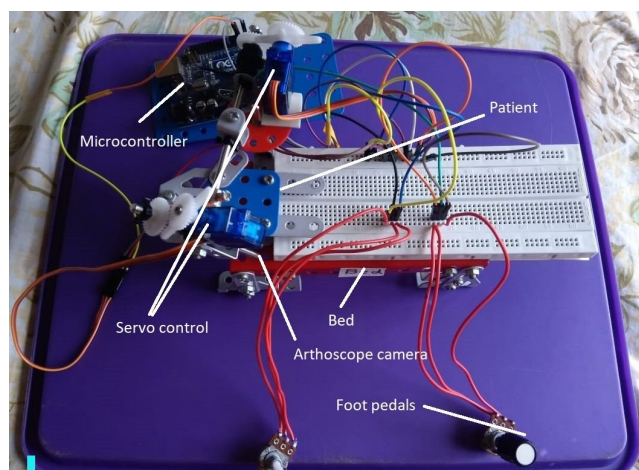
Virtual Hackathon Sees 22 Innovative Ideas On Healthcare Solutions

Around 100 doctors and engineers teamed up for **eMEDHA (Medical Device Hackathon)** organized by IIT Bombay between May 08 - 16, 2021. Each team was led by a doctor, supported by engineers with mechanical, electronics, software and other backgrounds.

Within a week, each team generated new solution concepts and fabricated proof-of-concept (POC), mentored by medical and engineering experts. Many teams had members scattered across different towns, yet they managed to bond and collaborate using virtual platforms like Zoom. The proof-of-concept was fabricated using readily available materials in their households or markets nearby.

The grand finale of the hackathon witnessed 22 teams presenting their POCs to a jury panel and 25 expert reviewers. These included novel concepts to remove air from intravenous lines, chemotherapy drug delivery, drug dispensing and adherence for TB patients and avoiding injection needle injury to caregivers. Some teams worked on diagnosis and monitoring devices for sleep apnea, retinopathy, bruxism (teeth grinding) and arterial blood gas analysis.

Several teams worked on innovations to improve surgeries, such as tumour margin guide, patient positioning, rotator cuff repair, vitrectomy and virtual dissection table. A few teams worked on solutions for laparoscopy surgery, including camera holder, camera movement and haptic feedback.



Arthroscopy camera holder proof-of-concept



Concept design to prevent needle stick injury

The grand finale was inaugurated by **Prof. Amit Agrawal**, Dean of International Relations, IIT Bombay, well-known for his work in microfluidics, on May 16. He highlighted the importance of indigenous development of medical devices with the right combination of functionality, reliability and manufacturability. Jury members included **Prof. Parag Bhargava**, a biomaterials expert, **Dr. U. Chandrasekhar**, a 3D printing expert from Wipro3D, **Mr. Chirag Tanna**, Director of patenting firm Ink Idee, and several eminent doctors who had posed clinical problems that were taken up by the participants.

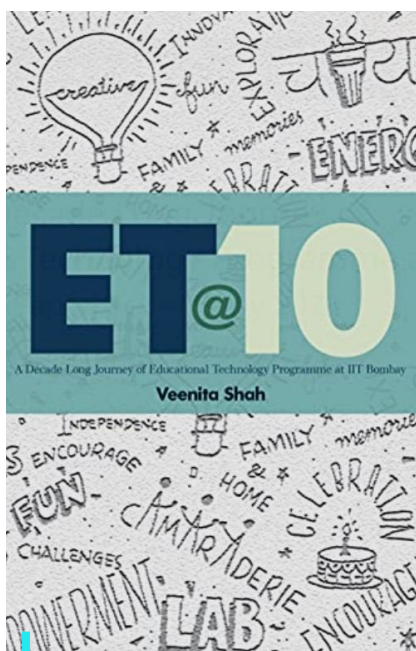
The best teams won awards sponsored by Autodesk India to develop advanced prototypes. Most of the participants found the experience to be highly enriching and rewarding. Akash Gupta, a

chemical engineer from Gwalior said, *"We had team members dropping in and out through the week, managing their work schedules."* They include Aishwarya from PGIMER Chandigarh, Srusti from COE Bhubaneswar and Rohit from SAMEER Mumbai guided by **Dr. Shankargouda** from SDM Dharwad and Prabhat from IIT Bombay. When their idea for a reusable instrument for vitrectomy (removal of eye fluid) won an award, Aishwarya exclaimed, *"Today after years we jumped on bed after winning."*

Pradnya Gharpure from VNIT Nagpur teamed up with Dr. Jaiprakash, AFMC Pune, Akanksha from Nashik and Sneha from APCOER Pune. Mentored by Dr. Unnati from Mumbai, they came up with an award-winning idea for continuous monitoring of arterial blood gas. Pradnya said, *"eMEDHA was an awesome experience and has fueled our passion to keep working towards innovative and impactful healthcare solutions"*. Another award-winning idea was '**Rotasyringe**' to prevent needle stick injury and cross-contamination in health workers, by Madhavi from SCEC Pharmacy College Pune, Harish from CSIR-CSIO Chandigarh, Amulya from Crofting Tech Hubli and Sampada from RTMNU Nagpur.

The hackathon was organized by **Biomedical Engineering and Technology Innovation Centre (BETIC)**, a network of 13 engineering and medical institutes supported by the **S&T Commission**, Mumbai and the **Ministry of Science & Technology**, New Delhi. Medical devices developed at these centres over the last five years have been licensed to 16 startup companies and several other industry partners. Some of them, such as smart stethoscopes, diabetic foot screeners, hybrid plaster splints and prosthetic legs, have already benefited several thousand patients, most of them in rural areas.

'ET@10' – Celebrates A Decade Of Journey



Cover photo of the book

Educational Technology (EdTech) is an interdisciplinary field, which requires collaboration with researchers from varied disciplines, to develop technology-enabled processes and tools towards addressing educational needs and challenges.

IIT Bombay is one of the few premier institutes in the country with a strong programme in EdTech, working its way into research, innovation and outreach programmes since 2010 to enhance teaching and learning. EdTech at IIT Bombay, which primarily started as a well-acknowledged Ph.D. programme, also grew into supporting a strong M. Tech. degree program in Fall 2019. Through the quality of knowledge and exit competencies imparted to students, the programme aspires to meet the needs of qualified EdTech experts in academic institutions and industry.

As the programme completed its gratified 10-year journey at IIT Bombay in the year 2020, a book titled '**ET@10**' has been published by the Educational Technology Programme. The book is authored by **Ms. Veenita Shah**, Research Scientist at programme of ET, who studied the program ethnography as seen through the eyes of a newcomer. It is a unique attempt to feature the culture, practices, conducts, processes and learnings and reflections of a distinctive team that works towards achieving collective goals. Without delving into the technical concepts of EdTech, the book presents the vibrant professional lives of the team in this nascent programme at IIT Bombay.

With humorous cartoons, anecdotes, quotes and abstract diagrams, the author has tried to make it an interesting and authentic read for students, research community or anyone who wants to investigate strategies employed towards effective team building and a pragmatic approach to working. In today's virtual world, where the idea of collaboration and teamwork seems like a distant dream, the book makes it look feasible and sustainable, connecting through its experiences with the group. Quoted as an insightful and enjoyable read, by a well-acknowledged author **Mr. Srinath Perur**, the book provides a set of compelling and detailed answers to some pertinent questions which are important to the enterprise of institution building.

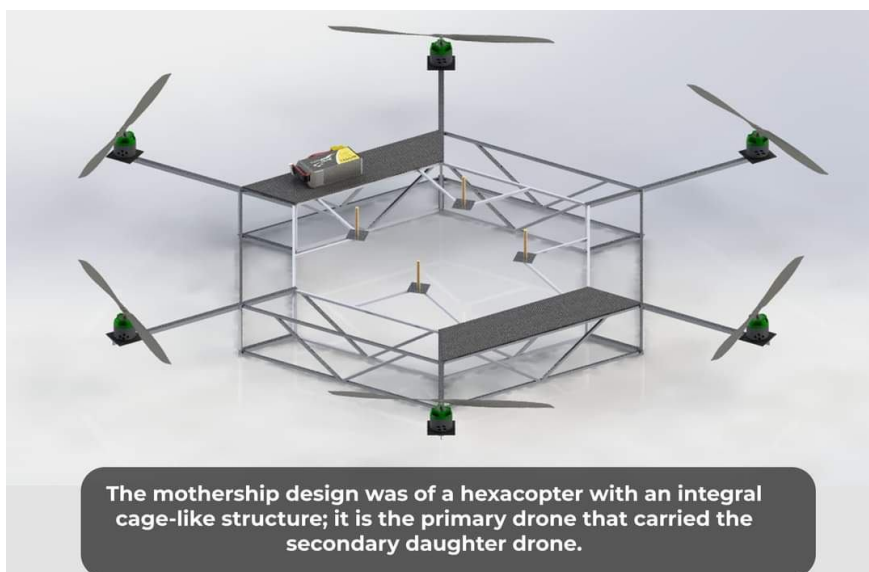
Team AeRoVe Wins International Aerial Robotics Competition

Team AeRoVe from the Unmesh Mashruwala Innovation Cell (UMIC), IIT Bombay, won first prize globally at the **International Aerial Robotics Competition (IARC) - Simulation Challenge 2020**.

The primary purpose of the IARC is to move state-of-the-art aerial robotics forward through the creation of significant and useful mission challenges that are considered "impossible" at the time that they are proposed. Teams from some of the top colleges in the world also participated in the challenge. The AeRoVe team completed the

entire mission in a simulation environment, with a real-time link submitted to the organizers for evaluation.

The team from UMIC was established keeping the IARC competition in vision and as one of its primary goals. The team has adapted to the increasingly demanding challenges posed by the competition every season.



The mothership design was of a hexacopter with an integral cage-like structure; it is the primary drone that carried the secondary daughter drone.

Virtual Student Research Showcase On Energy Day 2021



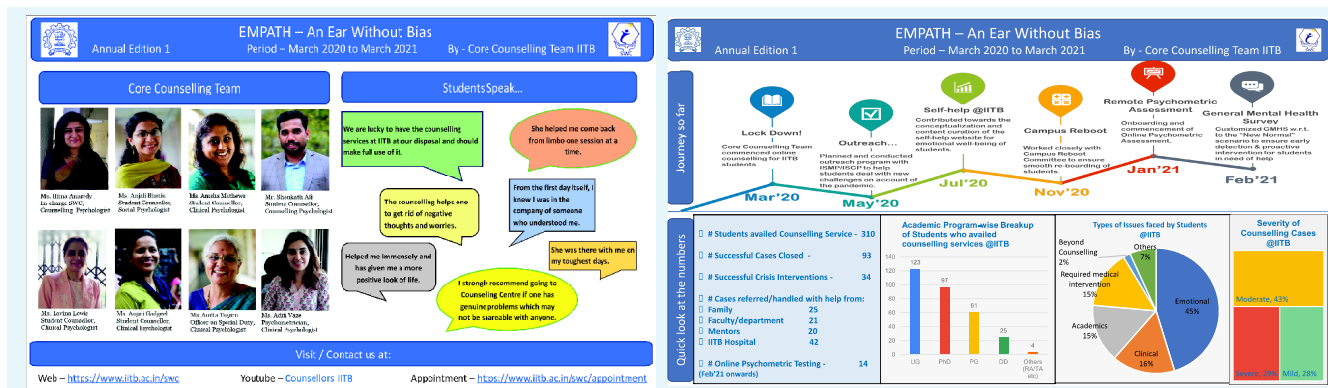
Students interact with industry stakeholders

To conduct an industry-student interactive event that showcases student research to the industry, the Department of Energy Science and Engineering at IIT Bombay under guidance of **Prof. Sagar Mitra** organized **Energy Day** on May 15, 2021. It is an annual event that provides a platform for energy sector stakeholders to learn and explore the state-of-the-art research and development (R&D) related to energy systems undertaken by the Institute's department.

The event was organised via online mode due to the pandemic. Around 150 industry representatives were present along with 100 students and faculty members from the department. **Mr. Anil Sardana**, MD and CEO of Adani Transmission Ltd., and **Prof. Subhasis Chaudhuri**, Director, IIT Bombay were the chief guests of the event.

Research and MTP presentations started with industry guest speeches in respective channels. Four parallel channels were set according to different themes. After the presentations were over, everyone joined the common channel for an interaction session with the department alumni.

Student Wellness Centre Initiates Counselling To Deal With COVID-19 Second Wave



The Core Counselling Team (CCT) of the **Student Wellness Centre (SWC)**, IIT Bombay conducted **one-on-one counselling** for students who are facing various personal and academic concerns. With the second wave of the pandemic adding to the stress, the CCT undertook several measures to deal with the pandemic situation. Their Youtube channel was launched with the purpose of sharing video resources for the special challenges posed by the COVID-19 pandemic. Some of the topics covered on the channel include adapting to the new normal, common mental health myths, to name a few.

A Lockdown-special edition of **The Empath**, the **SWC's counselling bulletin**, was released with information about the activities undertaken by the team during the period March 2020-March 2021. These activities included online/ telephonic counselling during the lockdown and self-help resources.

The **General Mental Health Survey**, which the SWC has been conducting for the last three years for undergraduate students, rolled out its customised version for the lockdown-related new challenges. The data for the first-year students having been collected and analysed, the counsellors will soon be reaching out to the vulnerable students for early intervention.

SWC has been coordinating with ISMP, ISCP and other student bodies for greater student outreach during this period, leading to content development for pandemic-specific concerns.

During the examinations, the CCT counsellors were available on a **24 X 7 telephonic helpline** to help students tide over the added stress of exams combined with the escalating pandemic conditions.

Research in focus

IIT Bombay Researchers Unravel The Anomalies In Uranium

Researchers have explained how the electronic properties and atomic vibrations of uranium are linked.

An electronic instability destabilizes the lattice, triggering charge-density-wave and inducing Kohn anomaly.

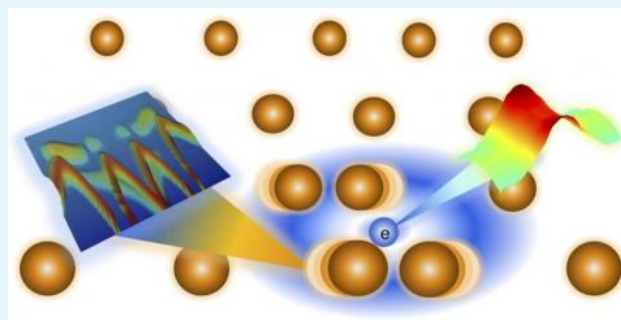
Uranium is a naturally occurring radioactive element, whose nucleus decays into other elements. It emits what scientists call the “alpha particle”, the nucleus of a helium atom. Scientists have successfully designed methods for using its radioactivity to create nuclear power, which has the potential to solve the world’s energy demands. However, the electronic and thermal properties of uranium are not very well understood. An example of electronic properties includes understanding how the element behaves like a superconductor at temperatures close to the absolute zero temperature, or -273°C.

Researchers often use a technique called the “Fourier transform”, named after its inventor Joseph Fourier, to simplify studying properties of systems. For example, while tracing how a physical quantity changes with time, they study it in frequency, which is called the “Fourier space” of time. Similarly, the Fourier transform of any physical quantity existing in space is how it varies with momentum, the Fourier space of length. When scientists look at the implications of quantum mechanics in the Fourier transform of the atomic vibrations of some solids, an anomaly known as the “Kohn anomaly” emerges. It is an aberration or problem in the solid’s mathematical description in the Fourier space. The variation of the energy in the “momentum space” affects how solids behave as its atoms carry out small vibrations around their average positions.

“Phonons” are the quanta of the vibrational modes of solids, which interact with the electrons of the solid. Strong interactions between phonons and electrons lead to the Kohn anomaly. A study by researchers from the Indian Institute of Technology Bombay (IIT Bombay) and the Bhabha Atomic Research Centre (BARC), Mumbai, has explained why uranium exhibits multiple Kohn anomalies. Their study, funded by the Industrial Research and Consultancy Centre of IIT Bombay, the Department of Atomic Energy, and the Ministry of Human Resource Development (now Ministry of Education), Government of India, was published in the journal Physical Review Letters.

Article Written by: Gubbi Labs

Image Credits: Aditya Prasad Roy, Department of Mechanical Engineering, IIT Bombay, an author of the study



The researchers re-analyzed the data from inelastic neutron scattering experiments on the uranium carried out in 1979. These experiments probed uranium’s atomic vibrations in the Fourier space, which they were aiming to use to understand its heat dissipation under an extreme nuclear environment. However, on re-analysis, they discovered Kohn anomalies in multiple atomic vibrations. These anomalies were theoretically proposed to exist in one-dimensional systems, but their observation in three-dimensional materials was rare.

To understand this peculiar observation, the researchers carried out extensive computer simulations using the laws of quantum mechanics to study how the electrons and phonons interact in the material, and what effect the interaction has on the data in the Fourier space. “*The simulations were computationally intensive, and we had to use supercomputing facilities located at IIT Bombay and BARC, on which the simulations ran for ten days each,*” says **Aditya Prasad Roy** of IIT Bombay, first-author of the study.

“*The anomaly is the strongest manifestation of electron-phonon interaction,*” explains **Prof. Dipanshu Bansal** of IIT Bombay, one of the authors of the study. Superconductors also exhibit such strong interactions between electrons and phonons. The explanation of the Kohn anomaly in uranium is a step towards understanding its superconductive behavior at near absolute zero temperatures. “*Our work resolves the five-decade-old mystery of this important nuclear material,*” asserts **Prof. Bansal**. Currently, the researchers are investigating the same anomaly in other uranium and thorium-based nuclear materials.

Link to published work:

Quasi-one-dimensional Fermi surface nesting and hidden nesting enable anomalies multiple Kohn anomalies in α -Uranium

Students News

IIT Bombay Team Receives EERI SDC Award 2021

A team of 11 B.Tech. students from the Department of Civil Engineering, IIT Bombay has received **EERI SDC 2021 Award**. The Earthquake Engineering Research Institute, USA conducts Seismic Design Competition (SDC). The team participated in the competition under the mentorship of Prof. Meera Raghunandan. A total of 37 teams from 10 different countries participated. Among the 7 awards in the SDC, the IIT Bombay team received the "Charles Richter Award for the Spirit of the Competition". This is the first time that an Indian team has bagged the EERI SDC award.

Undergraduate SDC Team of IIT Bombay: **Mohamed Fasil** (Captain - 4th Year), **Ritik Dhalwani** (4th year), **Dipika Rathod** (3rd year), **B Priyanka** (3rd year), **Bhawna Kumari** (3rd year), **Chetan Kumar** (2nd year), **Kaligandla Chandana Sahitya** (2nd year),

Saurabh Kumar Mahra (2nd year), **Nikhila** (2nd year), **Yaswanth Babu Gaddipati** (2nd year), **Mitali Badwe** (2nd year).

Graduate Student Mentors of IIT Bombay: **Satwik Pankaj Kumar Rayjada** (Ph.D. Student), **Radhika Pajgade** (Ph.D. Student), **Kaustav Sengupta** (Ph.D. Student), **Raj Kabrawala** (M. Tech. Student), **Aditya Sharma** (M.Tech. Student), **Mohit Tak** (M.Tech. Student), **Sudhir Pratap Singh Jodha** (M. Tech. Student).

Additional assistance for the competition was provided by other students including **Chaidul Chaudhuri** (Ph.D. Student, Geotechnical deliverable), **Mani N** (Ph.D. Student, Structural deliverable), **Satyam Singh** (Ph.D. Student, Structural deliverable), **Ashutosh Patel** (2nd Year B.Tech, Presentation and Poster).

IIT Bombay Commences Enhancement Of One Of Its Oldest Student Hostels



The Indian Institute of Technology Bombay which is consistently ranked as one of India's leading universities is pleased to announce the groundbreaking for enhancement of Hostel Number 5 (H-5).

The Institute was founded in 1958 in Powai, Mumbai. Since its establishment, it has physically expanded its infrastructure manifold. Over the next few months, the alumni of H-5 will build enhancements that will improve the quality of life in the hostel.

The project is a joint initiative between the Institute and IIT

Bombay Alumni Association. It has been made possible by a robust fund-raising exercise by the H-5 alumni of the Institute across batches. The eldest donor alumnus is from the Class of 1964 and the youngest from the Class of 2019. The project execution team is also entirely comprised of alumni from H-5.

The groundbreaking was done on June 21 by the Director Prof. Subhasis Chaudhuri and several H5 alumni including **Mr. Dhananjay Saheba**, **Mr. Suhas Mehta**, **Mr. Ajit Jawle**, **Mr. Nandkumar Nemade**, **Mr. Nitin Doshi**, **Mr. Raja Deshpande**, and IITB Alumni Association Chairman **Mr. Girish Nayak**.

The project is led by Mr. Dhananjay Saheba, a 1977 alumnus from Electrical Engineering Department at IIT Bombay. Speaking about the initiative, Mr. Saheba said, *"Hostel life played a critical role in our education and development. It's where we formed some of the deepest and most meaningful friendships of our lives. We have come together from around the world and across batches to do something meaningful for the future generations of our hostel mates. The support extended to us by the Institute has been exemplary"*.

Prof. Subhasis Chaudhuri, Director, IIT Bombay said, *"It is my privilege and great pleasure to have launched a truly-pioneering project to build enhancements at Hostel Number 5 (H-5). Current H-5 students have expressed keen interest in these enhancements, as they will significantly improve the quality of hostel life. The infrastructure enhancement will go a long way to further the well-being of the brightest young minds in the country. It is true to the Institute's mission to create an ambience in which new ideas, research and scholarship flourish and from which the leaders and innovators of tomorrow emerge"*.

Alumnus News



Prof. Madhavan Mukund from the Department of Computer Science and Engineering (CSE), a 1986 batch alumnus, has become the Director of the prestigious Chennai Mathematical Institute.

Prof. Madhavan Mukund



Prof. Geeta J. Narlikar

IIT Bombay alumna **Prof. Geeta J. Narlikar**, University of California San Francisco, has been elected to the National Academy of Sciences, in honor of her contributions to epigenetic regulation and genome organization.



IIT Bombay alumnae **Prof. Kavita Ramanan** and **Prof. Sharada Srinivasan**, have been elected to the prestigious American Academy of Arts and Sciences.

Prof. Sharada Srinivasan



Prof. Kavita Ramanan

Institute Colloquium / Lectures



Prof. Pankaj Jalote, Distinguished Professor and Founding Director at Indraprastha Institute of Information Technology (IIIT) New Delhi, delivered an Institute lecture titled *"Building Research Universities"* on April 15, 2021

Awards and Distinctions

Prof. Sudesh Balan's film 'Saakshatkaaram' bagged two awards at the 14th Edition of SIGNS film festival organized by Kerala Region of Federation of Film Societies of India. Prof. Balan is from IDC School of Design

Prof. Chandra M. Volla, Department of Chemistry, has been selected to receive the A. V. Rama Rao (AVRA) Young Scientist Award for the year 2020 in recognition of his contributions to research in Chemistry. This award was presented to him during the National Technology Day celebrations at CSIR-Indian Institute of Chemical Technology on May 11, 2021

Prof. Nandita Madhavan, Department of Chemistry, has been invited to join the Editorial Advisory Board of the Journal of *Physical Organic Chemistry* (Wiley)

Prof. Suryakant Waghmore, Department of Humanities and Social Sciences (HSS), has been selected to receive the New India Foundation Fellowship for the year 2021.

He is awarded this fellowship to work on his book tentatively titled "Is a Post-Caste City Possible? Examining Caste Erasure in Ahmedabad and Mumbai"

Prof. Pradeep Dixit, Department of Mechanical Engineering, has been invited to serve as an

Associate Editor of *Microsystem Technologies* by Springer Publications for a period 3 years

Prof. Anurag Garg, Department of Environmental Science and Engineering, has been invited to join as an Associate Editor on the Editorial board of *Frontiers in Sustainability Journal* (Sustainable Chemical Process Design Section)

Prof. Sahana Murthy, Interdisciplinary Programme in Educational Technology (ET), has been elected to the Board of Directors of International Society for Learning Sciences for a six year term 2021-2027

Prof. Nina Sabnani, IDC School of Design, has been selected to receive 'The Legend of Indian Animation Award' for the year 2021

Prof. K. Ramasubramanian, Department of Humanities and Social Sciences, has been invited to give a distinguished lecture at the International Congress of Mathematicians (ICM) 2022

Prof. Debasattam Pal, Department of Electrical Engineering, has been invited to join the Editorial Board of the Journal- *Mathematics of Control, Signals and Systems*

Prof. Parinda Vasa, Department of Physics, has been invited to join the Editorial Board of *Journal of Optics* (Institute of Physics Publishing, UK) as a member for two years

Prof. Kantimay Das Gupta, Department of Physics, has been invited to join the Editorial Board of "Superconductor Science and Technology", a journal published by IOP

Prof. Bhaskaran Muralidharan, Department of Electrical Engineering, has been invited to join the Editorial Board of *Nanoelectronics* as a review editor. He will also be a co-topic editor in the field of "superconductivity in topological materials" edition

Prof. S. Bhargava, Shailesh J. Mehta School of Management (SJMSOM), has been invited to join the panel of Associate Editors of *IIMB Management Review* (Elsevier)

Prof. Abhijit Majumder, Department of Chemical Engineering, has been elected as the Executive Committee member of Global Young Academy (GYA) for 2021-22

Prof. Shobhna Kapoor, Department of Chemistry, has been awarded DBT/Wellcome Trust India Alliance Intermediate Fellowship starting from January 2022

Prof. Shobhna Kapoor, Department of Chemistry, has been nominated to serve as the National Co-Chair (India) for the International Chemical Biology Society (ICBS) for three years. She will be chairing the ICBS Membership, outreach and Services Committee.

Notification

Prof. M. Ravikanth, has been appointed as the Head, Department of Chemistry w.e.f. May 6, 2021

Prof. Neela Nataraj, Department of Mathematics has been appointed as the Dean (Faculty Affairs) w.e.f. May 10, 2021

Prof. Pushpak Bhattacharyya, Department of Computer Science and Engineering, has been appointed as Professor-in-charge, IITB-Monash Research Academy w.e.f. May 27, 2021

Mr. Vijay Kowe, Senior Assistant Registrar, Academic Section has been appointed as Estate Office Administrator w.e.f. May 31, 2021

Prof. Suneet Singh, has been appointed as the Head, Department of Energy Science and Engineering w.e.f. June 18, 2021

Prof. Avinash Mahajan, Department of Physics has been appointed as the Dean (Academic Programmes) w.e.f. June 30, 2021

Paper Presentation/ Paper Published

Prof. Rajakishore Nath, Department of Humanities and Social Sciences, IIT Bombay and **Dr. Mamata Manjari Panda**, Sukinda College, Odisha, published a paper titled, *'Rediscovering Wittgenstein's Idea on the Nature of Mental Phenomena,' Philosophical Readings*, 2021, 13 (2), pp. 134-146, DOI: 10.5281/zenodo.469447

Prof. Rajakishore Nath, Department of Humanities and Social Sciences, presented a paper titled, *'Artificial Intelligence, Dataism, and Ethics'* in the ICSSR sponsored National webinar on Artificial Intelligence: Boon or Bane at Centre for Culture and Development, Vadodra, on March 20, 2021

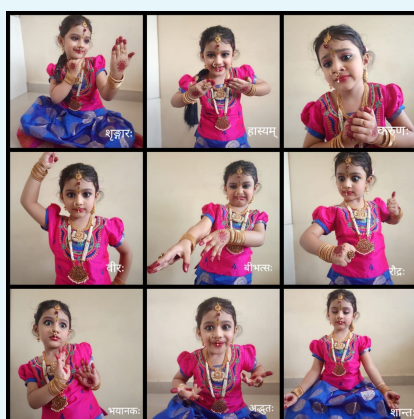
Prof. Debabrata Maiti and his research group in the Department of Chemistry, IIT Bombay's article has been published in the prestigious Science Journal (<https://science.sciencemag.org/content/372/6543/eabd5992>) on May 14, 2021, which portrays the recent progress in meta- and para-selective aryl functionalization methods (DOI: 10.1126/science.abd5992)

Prof. Rakesh Mote, Department of Mechanical Engineering and his team (**Bhaveskumar Kamaliya**, **Vivek Garg**, **Amelia C. Y. Liu**, **Yu (Emily) Chen**, **Mohammed Aslam**, **Jing Fu**)'s work on "Hierarchical Structures: Tailoring Surface Self-Organization for Nanoscale Polygonal Morphology on Germanium (Adv. Mater. 21/2021)" has been featured on May 26, 2021, as a Frontispiece of Advanced Materials in Wiley

Online Library <https://onlinelibrary.wiley.com/doi/10.1002/adma.202170164>

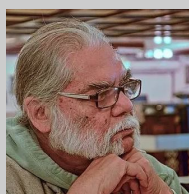
"Nanoscale polygons are fundamental building blocks toward hierarchical and 3D nanostructures for multifunctional nanodevices. In article number 2008668, Mohammed Aslam, Jing Fu, Rakesh G. Mote, and co-workers demonstrate a single-step process to manipulate the morphology of circular nanoholes via ion-beam irradiation. Through nanoscale control over the self-organization process dynamics on the surface of Ge, they realize highly periodic and protruding polygons."

Student Makes KG School Proud



KG School student **Pranamyaa Bhat** won the first prize in Group A, Zonal level, in Bhagavad-Geeta chanting – online Inter-school competition 2020 conducted by Chinmaya Mission, Mumbai. Pranamyaa won prizes in an International Bharatanatyam-Navarasa competition where she was selected as one of the best 10 out of 35 participants from different countries conducted in March 2021. She also won second position in the sub-junior category in this competition.

Obituary:



Prof. Dinesh Mohan, a faculty at IIT Delhi and a Distinguished Alumnus of IIT Bombay, passed away on May 21, 2021, in New Delhi. Prof. Mohan was an expert in transportation engineering. He completed his B. Tech in Mechanical Engineering from IIT Bombay in 1967 and was awarded the distinguished alumnus award in 2002. Prof. Mohan is known for his work in areas of advancing motorcycle helmet design, pedestrian and bicyclist safety and road safety research.



Prof. Vijaya Punekar, one of the founding faculty members of the Department of Humanities and Social Sciences, passed away on May 26, 2021. Prof. Punekar was 90 years old. She was well known for her academic contribution to sociology in areas related to industrial sociology and regional migration and assimilation.

Appointments

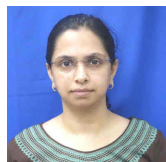
Prof. Srinivasan Ramakrishnan, has been appointed as an Assistant Professor in the Department of Chemistry w.e.f. April 22, 2021



Prof. Biswabandan Panda, has been appointed as Assistant Professor (Grade I) in the Department of Computer Science and Engineering w.e.f. May 03, 2021



Prof. Tanushree Choudhury has been appointed as Assistant Professor (Grade I) in the Department of Metallurgical Engineering and Materials Science w.e.f. May 13, 2021



Prof. Vidhya Soundararajan has been appointed as Assistant Professor (Grade I) in the Department of Humanities and Social Sciences w.e.f. May 18, 2021



Prof. Nitesh P. Yelve, has been appointed as Assistant Professor (Grade I) in the Department of Mechanical Engineering w.e.f. June 22, 2021



Prof. Rahul Sapkal, has been appointed as Assistant Professor (Grade I) in the Centre for Policy Studies w.e.f. June 25, 2021



Prof. Pinom Ering, has been appointed as an Assistant Professor (Grade II) in the Department of Civil Engineering w.e.f. June 28, 2021



Retirements on May 31, 2021

Prof. Pushpa Trivedi, Department of Humanities and Social Sciences, retired after 30 years of service



Mr. D. K. Sawalkar, Joint Registrar of Estate Office, retired after 30 years of service



Mr. Pramod Bhatade, Jr. Technical Superintendent, Electrical Maintenance Division, retired after 37 years of service



Mr. Venkoba Poojari, Sr. Multi-skilled Assistant, Registrar's Office, retired after 38 years of service



Mr. Gopal M. Parmar, Sr. Multi-skilled Assistant, HR-1 (HRM-2) Unit, retired 39 years of service



Mr. Baburao Pol, Multi-skilled Assistant, Electrical Maintenance Division, retired after 27 years of service



Mr. T.D. Harishchandra, Sr. Cook, Centralized Hostel Management System, retired after 26 years of service



Ms. Ujjawala Kamble, Sr. Cook, Centralized Hostel Management System, retired after 27 years of service



Mr. A.A. Devassy, Multi-skilled Assistant, Centralized Hostel Management System, retired after 19 years of service



Retirements on June 30, 2021

Mr. Ashok Sawant, Sr. Administrative Assistant, Academic Section, retired after 39 years of service



Mr. Krishna Dhumal, Security Guard C, Security Section, retired after 28 years of service



Mr. Diwan Singh Bist, Sr. Cook, Centralized Hostel Management System, retired after 40 years of service



CEP courses scheduled during July 2021				
Duration	Days	Course Title	Course Coordinator	Department
In House Programmes :				
1-7-2021	6 days	Missile Aerodynamics, Propulsion, Guidance and Control	Prof. Rajkumar Pant	Aerospace Engineering
GIAN Courses :				
5-7-2021	3 days	Multiscale Materials Informatics, Discovery and Design	Prof. Alankar Alankar	Mechanical Engineering

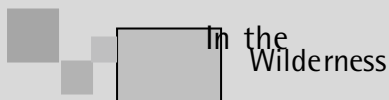


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