

## DEAN'S MESSAGE



**Dear Alumnus,  
Greetings from IIT Bombay!  
I trust you and your family are fine and doing well.**

Life has come full circle for me as I step into the role of Dean of Alumni and Corporate Relations (Dean ACR) at IIT Bombay. As an IIT Bombay alumnus I've received these newsletters before, and as I take on my new role at the Institute, it feels wonderful to write one myself.

I began my journey with IIT Bombay as a B-Tech student (1985) in the Department of Chemical Engineering. I've always felt a deep connection with the Institute and, particularly, with IIT Bombay's campus. The legacy of IIT Bombay is rich and impressive, and becoming Dean ACR is a humbling and challenging opportunity for me. I'm grateful to IIT Bombay's

extensive and close-knit alumni community who continue to rally around their alma mater in good times and bad, and for making me feel so welcome in my new position at the Institute. I hope that our mutual connection to our alma mater brings us closer, even as we take pride in our Institute's myriad growing accomplishments.

## SPECIAL FEATURE



**Dr. Nandita Bhattacharjee – Celebrating the Woman and the Engineer**

*International Women's Day is celebrated annually all over the world on March 8. The day celebrates the achievements of women as they make strides culturally, politically, socially and economically. World Engineering Day is celebrated annually on March 4. As UNESCO says, "Engineering has always had an essential role in development and human welfare. Ensuring that future generations of engineers and scientists will be able to*

*design solutions for local and global challenges is critical."*

*For our special section celebrating both International Woman's Day and World Engineering Day, we present one of IIT Bombay's most extraordinary woman alumnus – Dr. Nandita Bhattacharjee (B.Tech, Electrical Engineering, 1972). Dr. Bhattacharjee's illustrious career in engineering began in 1972, and after 17 years in the industry she moved to academia as a Senior Lecturer, Monash University, Australia. We're honoured to speak to her as she tells us about her life at IIT Bombay and what came afterward.*

- **Dr Bhattacharjee...you became an engineer in 1972. Can you take us behind your decision to become one 50 years back?**  
**Dr. Bhattacharjee:** My passion for, and skills in, mathematics and physics drove me to pursue a career in engineering. My father and my elder brother (an IIT Kharagpur graduate) – both being engineers brought additional inspiration and impetus.
- **Can you tell us about gender diversity in the classroom back when you were a student at IIT Bombay? What were some of the more positive highlights of your student life? What were some of the challenges you faced?**  
**Dr. Bhattacharjee:** We were 4 girls in our class of 80. The wonderful group of friends in our class always made learning and interacting with one other very interesting and enjoyable. Often, while solving some difficult problems, we could discuss these with our classmates either after class or in the library.

The process of establishing good friends in this highly competitive environment can sometimes be challenging. Some teachers, who shall remain nameless, made their exam papers almost impossible to complete in the allotted time.

- **After graduating from IITB you started your career as Operations Supervisor at Emerald Electronics in 1972. You then joined BARC and, later, Tata Electric Companies as their Project Manager. Can you take us through those years working in these different organizations and your experiences on the shop floor?**

**Dr. Bhattacharjee:** Emerald Electronics gave me an opportunity to apply the knowledge acquired at IIT to design application-specific electronic circuits and translate these into a final product, which I then tested to the customer's specification. This was an end-to-end process, handled solo.

At BARC, I worked in the NDIS (Nuclear Devices and Instrumentation Section), designing electronic instrumentation to detect radiation. Being safety-related, this critical activity brought enormous tension and great satisfaction as well.

Tata Electric Companies presented me with the opportunity and challenge to design and build a large, complex (10,000-point) input/output system for an operator-training simulator for the Tata 500MW power plant. That successful exercise empowered us to bid for the design and development of large input/output systems for a variety of simulator systems, for the ONGC, aircraft training simulators, and an NTPC thermal power plant.

- **After a successful stint working in the field, what prompted your move from the shop floor to a classroom?**

**Dr. Bhattacharjee:** Having migrated to Australia with my family, I found it was quite simple to get a job, given my background in the industry and research and development, despite the poor health of the economy at the time. I was under the (mistaken) impression that teaching in a university would give me a comfortable work-life balance.

I applied successfully for an academic position at Monash University, despite never having taught before. Over the next 26 years I transitioned through a vast range of subject-fields, many emerging or unfamiliar. The unparalleled engineering background I had acquired at IIT continued to help me in my learning, teaching and research in academia.

- **What are some of the similarities and differences between working as an engineer in the field and being an academic and teaching engineering to students?**

**Dr. Bhattacharjee:** Working as a pure engineer, you generally finish work when you leave office. If you are participating in research and development, your knowledge base has to adapt constantly to your circumstances. In academia, you are teaching, guiding research students, and conducting independent research. Linking the two facets are your core knowledge base, analytical abilities and communication skills.

Teaching students demands finding innovative ways to get students to participate continually in the learning process. While teaching, I had to keep adapting to the emerging changes in technology. My coverage of topics evolved from simple digital systems to Computer Systems; System Security & Privacy; Information and Network Security; and Cyber-security. I had to create challenging laboratory assignments to cement their theoretical knowledge via practical applications.

- **What advice would you give young girls who are interested in becoming engineers?**

**Dr. Bhattacharjee:** If you are passionate about engineering, pursue your career and there are many opportunities for women in engineering today. Your strong determination and perseverance in leaving no stone unturned to undertake and complete a task will definitely lead to success and satisfaction. Never let gender differences come in the way of pursuing a successful career in engineering. Work-life balance can be managed with patience and planning (plus having an understanding family) while pursuing a career in engineering.

I wish you all the best in the engineering career of your choice.

*We'd like to thank Dr. Bhattacharjee for speaking to us. Her two distinct careers – as an engineer and as an academic – are both awe-inspiring and exhilarating. We hope that young women (and men) are encouraged by her life's journey and follow in her footsteps. Once again, thank you Dr. Bhattacharjee.*

## **FACULTY INTERVIEW**



*Prof. Raghavan B. Sunoj, Department of Chemistry, IIT Bombay, received the prestigious Shanti Swarup Bhatnagar Award in 2019. It is an incredible accomplishment and the Institute is extremely proud of his achievement. In a recent conversation he shared with us what shaped his interest in chemistry, his vision and goals for the future, and the roles that Artificial Intelligence and Machine Learning play in the field of chemistry. Read on for more on this inspiring and visionary professor.*

1. **You received the prestigious Shanti Swarup Bhatnagar Award in 2019. Our very belated congratulations to you! What made you pursue a professional career in chemistry?**

**Prof. Sunoj:** Since my high school days I have been deeply interested in the sciences, and particularly, in chemistry. I owe a lot to St. Joseph's school (Trivandrum) for their excellent laboratory that made me curious and allowed me to discover the fun elements of chemistry. A long-term ambition of studying chemistry got solidified in those hybrid laboratory-class room settings. As I studied more about how reactions take place, why certain compounds have unique properties, and how the periodic table is as good a language as any, it became an uninterrupted and exciting journey for me in the field of chemistry.

2. **Your focus is molecular-level insights on organic reaction mechanisms and how catalysis happens. Can you explain that in layman's terms?**

**Prof. Sunoj:** Catalysis alters the speed of a reaction, and renders slower reactions to proceed faster. A catalyst typically interacts with the reactants and ensures that the latter is made to react more effectively. The participation of a catalyst in a reaction lowers the activation barrier and helps speed up the reaction. The area is of high significance to both industry and academia.

3. **Winning the Shanti Swarup Bhatnagar award was perhaps one of the key highlights of your career. Can you talk about some challenging moment(s) in your career?**

**Prof. Sunoj:** I've faced different challenges at different phases of my career at IIT Bombay. Some of them include difficulties in setting up a lab, training the first generation of PhD students, and balancing teaching and research responsibilities. But the biggest impediment, early on, was inadequate computing resources. I worked tirelessly with other colleagues in our institute to set up high performance computing facilities. Another critical challenge I faced was when the central facility was down for several months. During this period, I started to work in 'creativity under adversity' to explore statistical methods that eventually helped ramp up to the new territories in the fields of machine intelligence for chemical sciences.

Looking back, I now realise that all of these challenges allowed me to think out of the box and pursue yet another exciting interdisciplinary domain of research.

4. **Can you elaborate a little on what's been some of the more inspiring and revolutionary research that's been done in your field over the past five years?**

**Prof. Sunoj:** My group has been involved in understanding some of the most complex features of asymmetric catalysis. The molecular-level details gathered through our quantum chemical computations helped in realizing the importance of noncovalent interactions (a set of weak molecular forces) in catalysis. We have been able to design new catalysts using this knowledge, some of which has been subjected to successful experimental validation as well. Another key development is to reap the benefits of applications of machine intelligence in homogeneous catalysis. We were one of the earliest to demonstrate the potential of AI/ML in asymmetric catalysis.

5. **You've been actively involved in Artificial Intelligence (AI) and Machine Learning (ML) for the past few years. What, in your opinion, is the future of AI and ML in the field of Chemistry?**

**Prof. Sunoj:** I would respond by quoting 'predictions are hard, particularly that of the future'. Taking this into account, I would envision a dynamically evolving scenario (i.e., such predictions would need to be updated every other year) whereby AI/ML would become an integral part of chemical reaction planning. While a scientist's imagination and creativity will continue to lead our research efforts, the field is likely to witness a higher degree of confidence in 'technology-enabled' practices in their research.

6. **It's been over a year since the outbreak of the global pandemic. What are some of the challenges facing the research community? Have there been any opportunities that've arisen from the ongoing pandemic?**

**Prof. Sunoj:** As with any other domain of our lives, the pandemic-induced challenges were hard on the research community. The impact was so massive that I prefer to avoid thoughts about it. Most of our research and teaching is moving to new digital modes, but I'm still sceptical about their effectiveness. After a good number of online experiments with scientific lectures where I wasn't able to see my audience (or my students) – I was unexcited and dissatisfied, now I decline invitations to give talks in the online mode.

7. **Students often find it difficult to manage their time between conducting research, publishing papers and pursuing their degrees. Can you give them some tips on how to manage their time and find the right balance, without burning out?**

**Prof. Sunoj:** Discovering that they have problems is key to figuring out what balance is right for them. Straightjacket models appear suitable to everyone, but that's because the primary assumption that all are similar to one another. Customized suggestions are likely to work better. Try to imbibe the fun element in your work and continue to toy with it, so that you enjoy the journey more than its outcome. If it requires you to put in more time, you'll do it automatically without ever realizing that time flew by very fast.

8. **Where do you see IIT Bombay, especially the Chemistry department at IIT Bombay, five years from now?**

**Prof. Sunoj:** The chemistry department at the Institute has been on a progressive trajectory for the last few decades and will continue to remain so in the predictable future. I am confident that both our Institute and department will flourish in its research and teaching endeavours.

9. **Finally – a fun question. How would you describe your experience at IIT Bombay in just three words?**

**Prof. Sunoj:** It's been a **satisfying** experience, both in my role as a teacher and a researcher, in an Institute with a **progressive** outlook and one that promotes a well-meaning and **encouraging** ecosystem.

*Prof. Sunoj's accomplishments as an academic and researcher are truly inspirational. We hope that his journey in the field of chemistry inspires young minds in our country to pursue their own paths in the field. We wish him the very best for the future.*

**CORPORATE COLLAB**



Skilling India in Electronics

## **IIT Bombay collaborates with the Electronics Sector Skills Council of India (ESSCI)**

IIT Bombay signed an MOU with ESSCI to promote courses in Vocational Skills in Electronics. IITB and ESSCI will establish a Centre of Excellence for Printed Circuit Board (PCB) design and manufacturing on campus.

The two organizations will collaborate on the following activities:

1. Set up a modern PCB manufacturing and design machine facility at the Wadhvani Electronics lab at IIT Bombay.
2. ESSCI will conduct programs for faculty development, youth skill development, training for competition globally, and other areas of mutual interest.
3. Infrastructure upgradation of the Wadhvani Electronics lab and conducting IoT system development activities at IIT Bombay to support advanced vocational skills through ESSCI's industrial partner support.
4. Running short term and long-term joint certification courses in Vocational Skills in the 9 sub-sectors of the ESDM landscape viz. Semiconductor and Components, Industrial Automation, E-Mobility, EMS, PCB Design and Manufacturing, Consumer Electronics and IT Hardware, Communication and Broadcasting, Security and Surveillance, and Solar and LED.

The MoU will help IIT Bombay become ESSCI's knowledge partner and also create content for short-term and long-term training.



## **IIT Bombay Collaborates with Partex Capital**

IIT Bombay and Partex Capital (a German company), have entered into a collaboration to leverage faculty expertise in diverse fields to find new and innovative solutions through research and development. This MOU will also encourage student participation through domain-centric applications.

The activities to be undertaken under the collaboration are:

1. Fostering talent by providing undergraduate, graduate and doctoral level fellowships for dual degrees (B.Tech. + M.Tech.), M.Tech, B.Tech and PhD Students
2. Conducting R&D projects in healthcare, life sciences and other areas.
3. Supporting new ideas and Startups in the digital healthcare sector.

he joint venture hopes to inspire and motivate students and faculty members to pursue advanced research. The Institute will also groom and support talented members who are already actively engaged in R&D and wish to pursue entrepreneurial endeavours within the healthcare ecosystem.

## **IN COVERSATION WITH**



### **Meet The Man Behind IIT Bombay Alumni Association (IITBAA), Mr. Kirat Patel – Making the impossible possible**

*Our Institute takes immense pride in its alumni community and applauds their efforts as they give back to their alma mater. Mr. Kirat Patel (B. Tech, Mechanical Engineering, 1975) is one such alumnus. Here, he takes us on a journey of his time at IIT Bombay as a student, and then as an alumnus, who was instrumental in setting up the IIT Bombay Alumni Association (IITBAA).*

- **Mr. Patel...thank you for your time. To begin with – can you tell us more about your time as a student at IIT Bombay? What are your some of your most cherished memories of the Institute?**

**Kirat Patel:** I enjoyed the academic aspect of my life on campus. But becoming an engineer was not my choice, so the extra-curricular activities I pursued at the Institute is what I cherish the most. My days as the editor of Technik magazine, directing theatrical plays, being part of the organising committee of the first two Mood Indigos etc. helped me carve my career path. I am what I am today because of my association in the early days with the non-academic aspect of IIT Bombay. It was the Institute's culture that fostered my entrepreneurial passion, allowed me to explore different horizons, and supported me in all of my ventures. Life back then was poles apart from the current digital era. In my opinion, lack of amenities and resources (that are freely available today) helped us form lifelong friendships and allowed us to stay connected with the campus community.

- **What made you stay connected to IITB's campus despite graduating a long while back?**

**Kirat:** Well, I was disconnected for the initial 25 years after my graduation. But during our silver jubilee reunion, I got involved in planning the event and realized that the campus had changed. Things were falling apart and I was unable to reconcile with the fragile images of the infrastructure on campus and decided to act on it. I connected with my batchmates and we tried to collect funds for the reunion, but in the process, we realised how difficult it was to organise such events. That's when my friend Narayan Sundaresan and I realised the need for a formal alumni organisation, and with the help of more alumni friends, the IIT Bombay Alumni Association (IITBAA) came to be within a year. The first election of IITBAA took place in August 2002. Just FYI – IITB's class of 75' founded the IIT Bombay Heritage Foundation (IITBHF) five years before IITBAA was set up and IITBHF is equally instrumental in the Institute's growth.

- **Can you tell us more about those initial days as you helped set up IITBAA?**

**Kirat:** As I mentioned earlier, the primary purpose was to smoothen the process of organising events and managing the funds that we collected for the Institute appropriately. Apart from that, IITBHF was also actively seeking help to develop the Institute, and our organization helped substantially. Let me share an interesting anecdote from back then. Prof. Narayan Murthy was attending the US roadshow in 1999 (or maybe 2000) and gave me my first assignment. He asked me to prepare a presentation that he wished to show alumni members in the US. I worked on the presentation with Raj Mashruwala and Nandan Nilkeni and we realised that IITB had raised about Rs. 2 Cr.in donations over the past twenty years. I set a target of Rs.20 Cr for 5 years in the presentation. Nandan said, "Set a target of Rs.100 Cr for the next five years and aim high." and I'm happy to report that after 22 years, we have raised around Rs. 500 Cr from donations.

- **IIT Bombay has traditionally enjoyed a great deal of engagement and financial support from its alumni and donors. As the founder of the Alumni Association – how did this very successful synergy between the Institute and the Alumni Association come about?**

**Kirat:** From what I remember, it was a series of starts and stops in the beginning. Our journey consisted of two steps forward and one step back. Over the years I've worked with 6 alumni teams or what's now known as the Dean ACR office. Though the titles have changed, the primary goal to connect with alumni members and encourage them to donate remains intact. While it's been a rollercoaster ride, it's still been immensely fruitful and, personally, gratifying. The alumni community has continued to come together to fulfil the various needs of its student community and work towards the overall development of the Institute. Today, IIT Bombay is among the best institutes in the country and we – the alumni community – are extremely proud to belong to this Institute.

- **What role – if any – do you think donors play in the evolving of the Institute, especially when it comes to the Institute's teaching and research missions?**

**Kirat:** The donors support the Institute by helping finance the upgrading of existing and setting up of new infrastructure on campus. We also support them with their research requirements and providing financial support for economically challenged students. While the alumni community continues to support their alma mater, the Institute needs them on an ongoing basis and more donors need to come forward and support the Institute.



My hope for the future is that donors will go beyond just providing monetary support to actively working to bridge the gap between academia and industry. While I'm happy to note that the Dean ACR office has taken some concrete measures to bridge this gap, I think more can be done.

- **How did you feel when you received the Distinguished Service award?**

**Kirat:** Well, it was a long back but I do feel grateful for receiving the Distinguished Service Award.

- **What motivated you to be a part of the Hostel 8 reconstruction campaign?**

**Kirat:** Ah! That's an interesting story. Awhile back, during one of our annual social gatherings, Prof. Subhasis Chaudhuri, Prof. Suhas Joshi and Prof. Mazumdar informed me about the fragile condition of Hostel 8. At the time I promised to pay for my personal room's refurbishment. Two years later, Prof. Suhas Joshi invited me to discuss the entire hostel's redevelopment. My friend Narayan Sundaresan and I decided to give this a whirl. From funding a room, then a wing, then a hostel, and, finally, a three-hostel complex, our target for the redevelopment for Hostel 7, 8 and 21 is Rs. 135-150 Cr.! It's a massive undertaking and something that's never been done before but we have a history of managing to do the impossible. I am more than hopeful that we will be able to rebuild the hostels.

- **What advice would you give to current students at IIT Bombay? What should they expect/be prepared for after graduation?**

**Kirat:** I would say IIT students must enjoy their time on campus and optimise all the facilities available to them both inside and outside their academic fields. And after graduation, STAY IN TOUCH.

- **Can you tell us how best IIT Bombay's alumni members can give back to their alma mater?**

**Kirat:** There is no best way to give back to the Institute. Your time, your money, it's all valuable and necessary. Please do the best you can.

*We'd like to thank Mr. Kirat Patel for taking the time out of his very busy schedule to speak with us. Whether it was setting up IITBAA almost two decades back or working on the very ambitious reconstruction of hostels 7, 8 & 21 today – Mr. Patel continues to work tirelessly to give back to his alma mater. His dedication towards bettering his alma mater is an inspirational journey for all of us. Once again, thank you, Mr. Patel.*

## ALUMNI INITIATIVE



### **Institute alumnus Arpit Mathur donates generously towards C-MInDS**

Mr. Arpit Mathur, an IIT Bombay alumnus (B. Tech & M.Tech, Computer Science, 2006) and currently the Sub Portfolio Manager at Exoduspoint Capital, is one of the Founding Donors of The Centre for Machine Intelligence and Data Science (C-MInDS). The 'Founding Donors' are alumni members who contribute to the funding requirements of IIT Bombay's strategic initiatives.

Mr. Mathur has also instituted the 'Renuka Mathur Endowed Scholarship' for girl students at IIT Bombay in his mother's memory.

Overall, Mr. Mathur has committed to contributing over \$1 million (please check if the donor is comfortable to quote the figure) to the Institute, towards C-MInDS and the scholarship. Mr. Mathur believes that India needs to be at the forefront of key advances made in the domain of Artificial Intelligence & Machine Learning and that IIT Bombay is leading that effort by setting up C-MInDS.



## **IIT Bombay alumnus Mr. Raj Nair donates generously to set up BSL3 GMP Lab**

IIT Bombay signed a Memorandum of Understanding (MoU) with its Distinguished Alumnus Raj Nair (BTech, Metallurgical and Material Science Engineering, 1971) and IIT Bombay Alumni Association (IITBAA) for the construction of a sophisticated Biosafety Level 3 (BSL3) Good Manufacturing Practice (GMP) Lab at the Department

of Biosciences and Bioengineering.

The proposed facility located at the BSBE department will facilitate breakthrough translational research from the laboratory stage to the market by manufacturing materials required for human clinical trials. This facility will be used by researchers in BSBE and other departments on campus to manufacture nanomaterials, tissue-engineered grafts, CAR-T constructs, drug nanoparticles, etc. The GMP lab will help shorten the timeframe from the lab stage to getting life-saving solutions to the market.



## **State-of-the-art Classroom and Lab facilities inaugurated at IIT Bombay**

Dr. Hemant Kanakia, an IIT Bombay alumnus (B. Tech, Electrical Engineering, 1975) and founder of Maker Bhavan Foundation, inaugurated the Collaborative Classroom (CC) and Experiential Learning Laboratory (ELL) at the

Department of Electrical Engineering (EE) at IIT Bombay. These facilities will help instructors design and execute active and hands-on learning exercises, which help improve learning outcomes for students.

The CC will facilitate active learning of the courses in the EE Department and has a capacity of 60 students. The ELL will facilitate hands-on learning and has a capacity of 50 students. The Institute's collaboration with Maker Bhavan reflects IIT Bombay's continued mission of providing state-of-the-art facilities to its students to augment their learning and growth.

## **INNOVATIVE PRODUCT AND TECHNOLOGY**



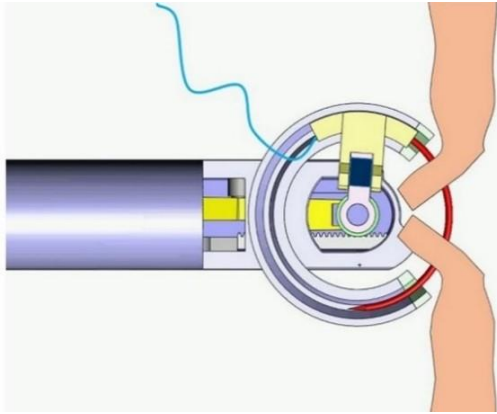
### **Biomedical Engineering and Technology Innovation Centre (BETIC)**

Medical devices are critical for healthcare. Local and indigenous development of novel, suitable, reliable, and affordable medical devices change lives and impact the world around us, even as they create new jobs.

Since its inception in 2014 at IIT Bombay, the Biomedical Engineering and Technology Innovation Centre (BETIC) has built an ecosystem which is essential to develop local medical devices by connecting the key stakeholders in the medical and healthcare industry – government, academia, medical community, industry, investors and facilitators. Over the past few years, the team has met with several hundred doctors, identified over 400 unmet needs, created 200 novel concepts, and filed 50 patents. They've also developed 20 devices, incubated 15 start-ups, licensed five items to industry, and launched a few products directly into the marketplace.

The following start-up that BETIC supports reflect its core vision – which is to create global success stories of indigenous medical devices by providing the necessary guidance and reinforcement needed to med-tech innovators.





## **AUTOMATIC SUTURING DEVICE**

**Inventors' name: Dr. Rupesh Ghyar, Prof. B. Ravi, Dr. Hemant Bhansali**

**Indian Patent Filing: 1051/MUM/2015 and PCT/IN2016/77.**

**Technology/ Product: A Low-cost automatic suturing device using standard needles.**

Automated suturing devices have greatly simplified the process of suturing during surgery and medical operations and allow less-experienced surgeons to perform suturing and tying knots safely and efficiently.

While a few of these instruments are available in the market, these products are extremely expensive and cumbersome to use. These devices also require special needles that are difficult to obtain.

The need of the hour is for 'low-cost automatic suturing devices using standard needles'.

The team at BETIC devised a mechanism comprising of a circular groove, wherein a standard needle along with its thread can be placed. Using a needle holder block, the needle is held tight and pushed into the tissue. Once the holder releases the grip on the needle, it returns to its starting position, when it grips the needle tip and pulls it along the circular groove. The holder is then connected to a handle through a cam-and-gear mechanism which allows it to move correctly.

The suturing device at BETIC has undergone several iterations and each time the team has enhanced and improved the device from its previous version. In its latest iteration, the device comprises of about 40 different components.

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## **TECH NUGGEST**



### **IIT Bombay conducts research on security required to make city skywalks user-friendly**

A research paper, jointly conducted by IIT Bombay and the National Institute of Technology (NIT), Hamirpur, found that only 20% of the citizens use skywalks outside some of the major railway stations in Mumbai. The paper studied pedestrian traffic and usage of six specific skywalks in the city and cited lack of security, maintenance and

accessibility to these skywalks as prime reasons why they're not user-friendly.

This research paper was jointly written by Gopal Patil, professor, and Samarth Bhatia, research assistant, from the Civil Engineering Department at IIT Bombay, along with Sunil Sharma, assistant professor, and Aniruddha Chopadekar, research assistant, from the Department of Civil Engineering, National Institute of Technology (NIT), Hamirpur.



### **IIT Bombay Scientist Invents Autonomous, Self-Repairing, Tech for High-Grade Products**

Prof. Ramesh Kumar Singh from the Mechanical Engineering Department of IIT Bombay devised a method to repair and restore high-value components like moulds, turbine blades, and other aerospace units. This completely autonomous technology requires minimal human intervention, unlike existing repair techniques like welding and thermal spraying, that are dependent on the skill of the person operating them.

The technology, developed with the assistance of the Government of India, uses a laser for 'process control' to scan defective components, after which a 'deposition path' is determined based on 'certain algorithms.'

The laser-directed energy deposition (LDED) technique will be used to deposit the material, followed by finishing and automated inspection of the restored product.

## **NEWS FROM IIT BOMBAY**



### **IIT Bombay Establishes National Centre of Excellence in Carbon Capture and Utilization**

IIT Bombay established the National Centre of Excellence in Carbon Capture and Utilization (NCoE-CCU), in collaboration with the Department of Science and Technology (DST), Ministry of Science and Technology. It is the country's first such centre funded by the Government of India.

The NCoE will be nodal for state-of-the-art research and application-oriented initiatives in the field of CCU. The cross-disciplinary training through the NCoE will inculcate a deeper understanding of the issues and develop a problem-oriented approach in the next-generation researchers through outreach and capacity-building programmes.

The Centre's primary focus of research will involve understanding the role of CO<sub>2</sub> in the global climate, as well as mitigation strategies of CO<sub>2</sub> emitted from the industrial and energy sector, ranging from advances in capture technologies to subsequent utilization of captured CO<sub>2</sub>. Priority case studies, experimental investigation and simulation in different aspects of CCU, and decision-making tools for process optimisation and policy development, will be an essential part of the Centre's activities.

## **INSTITUTE HIGHLIGHTS**



## IIT Bombay holds Interim session of the 60th Convocation Ceremony

IIT Bombay awarded degrees to 261 students during the Interim session of its 60th convocation ceremony. A total of 284 degrees which include 189 Ph.D., 20 Dual Degrees [10 (M-tech + Ph.D.) and 10 (MSc + Ph.D.)] were awarded to 209 students. In addition, 95 degrees including 29 B-Tech, two BDes, one Bachelor of Science, 10 M-Tech, two Masters of Design, two M. Phil, six MSc, five MS by Research, seven Post Graduate Diploma of IIT, six Dual Degree (B-Tech + M-Tech) and five (E-MBA) degrees were awarded to 68 students.

The function was presided over by Chief Guest and Padma Bhushan awardee, Dr. Krishna M. Ella, Chairman and Managing Director of Bharat Biotech and inventor of Covaxin.

This interim session was the first offline event held on campus since lockdown two years ago and was attended in-person by degree recipients, guests and invitees.



## New Centre of Ageing and Neurodegenerative Diseases at the Institute

IIT Bombay signed a Memorandum of Understanding (MOU) with its distinguished alumnus Mr. Sharad Sanghi (B-Tech., Electrical Engineering, 1989) for the setting up of a Centre of Ageing and Neurodegenerative Diseases at the Institute. This contribution is Mr. Sanghi's tribute to his late mother, Mrs. Sunita Sanghi.

Neurodegenerative diseases are increasingly becoming a challenge to senior citizens and threaten their quality of life in their golden years. The onset of such ailments is also extremely traumatic for the affected person, as well as their loved ones. The setting up of the Centre will ensure that neurodegenerative disorders in the elderly are detected and treated in a timely manner for better outcomes.

## e-Mobility Workshop

IIT Bombay hosted an all-day virtual workshop on e-Mobility on February 19, 2022. The workshop was the third in a series of annual workshops facilitated by the Industrial Research and Consultancy Centre (IRCC) at IIT Bombay. The first workshop held in 2020 focused on Machine Intelligence and Data Science, while the second one held in 2021 was centred around Sensors.

The topic for this year's workshop was in the core area of Electrical Vehicles, a subject that is of significant emerging interest. The workshop covered a wide range of topics including advancements in Power Drive Train, Smart Charging Infrastructure, Sustainable Battery Technology, Hydrogen-based Mobility, Environmental Impact, E-Transportation Planning, New Vehicle Design and Mechanics.

### The plenary speakers at the event were:

- Mr. Bhavish Aggarwal, an IIT Bombay alumnus (B.Tech, CSE, IIT Bombay, 2008) and Co-Founder and CEO, OLA
- Dr. Pawan Kumar Goenka, Chairperson designate for INSPACe, Dept. of Space, Government of India and Ex- MD & CEO, Mahindra and Mahindra Limited

– Mr. Sunjay Kapur, Chairman at Sona Comstar, President, ACMA and Co-Chairman, CII Manufacturing Council

**Panelists at the event included:**

- Dr. Anuradda Ganesh, Adjunct Professor at IIT Bombay and Chief Technical Advisor and Director, Cummins
- Dr. Jiten Apte, CEO and co-Founder, igrenEnergi Inc. and igrenEnergi Services Pvt. Ltd.,
- Nishant Arya, Vice Chairman, JBM Groupnad
- Asheesh Joshi, Director (E), Ministry of Petroleum and Natural Gas (MoPNG)

Prof. Subhasis Chaudhuri, Director, IIT Bombay gave the welcome address. Other technical keynote addresses were given by Dr. Mahesh Krishnamurthy, Professor of ECE & Academic Director of the Ed Kaplan Family Institute for Innovation and Tech Entrepreneurship, Illinois Tech (iit.edu) and Prof. Raghu Murtugudde, Visiting Professor at IIT Bombay and Research Professor, UMD.

The event had an e-footfall of about 1380, with participation from various stakeholders including OEMs, vehicle manufacturers, policy makers, testing agencies, entrepreneurs, students, faculty members and alumni of IITB.

## SUCCESS STORIES



### **IIT Bombay Student Brings Cellular Connectivity to the Mountains**

*Students from IIT Bombay are well known for their entrepreneurial spirit and leaving behind a tangible impact on the world around them.*

*Tejasvi Chauhan, a PhD student from IIT Bombay's Department of Civil Engineering, ushered in cellular service to one of the most remote villages in Himachal Pradesh, and in the process, left his indelible mark on the*

*mountains. Let's get to know him better.*

- **Hello, Tejasvi – before we talk about your project, can you quickly tell us about your academic background at IIT Bombay? What degree are you pursuing?**

Tejasvi: I am pursuing a PhD from the Department of Civil Engineering, IIT Bombay, with the support of the Prime Minister's Research Fellowship (PMRF). In 2017, I joined this university as a master's student and later changed to a dual degree (MTech + PhD).

- **Many congratulations on your project (something so timely and essential) which is implementing cellular connectivity in the remote mountain village of Baag in Himachal Pradesh. What compelled you to bring connectivity to Baag?**

Tejasvi: Like everyone else, I moved back to my village during the pandemic. During that uncertain period in my life, I found myself wanting to do something productive with my free time. I decided to teach some children in my home town but I soon realized that despite living in a small village the teaching had to be done remotely. It was only then I realized the challenges of living in a rural area in India. There is a clear digital divide in our country and I experienced it first-hand when I could teach only a handful of students at a time. And even that was possible only once or twice a week. The digital divide not just affected the education sector in rural areas but healthcare services were equally affected in these remote locations. All this made me understand that inaccessibility to digital connections can impact lives at a grassroot level.

- **The road to success is not easy to navigate and we're sure you faced many difficulties while pursuing your project. Can you elaborate on some of the challenges you faced during this period, and how you overcame them?**



Tejasvi: Honestly, I was very naive when faced with lack of digital connectivity in my village and acted like any other local citizen. Initially, I ran around like a headless chicken and looked for answers everywhere. I met our local MLA who had no solution for our problem. I then tweeted about our challenges to several network providers such as BSNL, Airtel and Reliance Jio but that turned out to be a futile exercise as well. I even thought of purchasing network repeaters but soon realized that it's illegal to use these devices (if not provided by the network provider) and they're also very expensive.

Later, I came across a few research papers by Prof. Rajkumar Pant from the Department of Aerospace Engineering at IIT Bombay which explained the concept of remote communication during disaster management. I immediately contacted him and Prof. Pant was very helpful. He also introduced me to an IITB alumnus, Sagar Sharma (B. Tech, EE, 2016), who currently works with the Indian Semiconductor Mission. Sagar guided me during those difficult times and recommended that I address the issue directly with the Minister of Telecommunications. I then drafted a letter that was signed by our local Panchayat Pradhan (elected representative of gram panchayat), the Member of the local Legislative Assembly, and the Member of Parliament (MP) which we sent to the Minister of Telecommunications. Within a few months, a government of India officer from the telecom ministry visited our village and assessed the situation. He suggested that we apply for the Universal Service Obligation Fund provided by the Government of India which is used for these types of challenges faced by rural areas across the country.

- **How did you plan the entire project? Considering these are pandemic times with many restrictions, were you able to implement your project in its entirety within the proposed timeline?**  
Tejasvi: Although I did not plan a specific timeline, the aim was to finish the project as soon as possible. I initiated the project during the first wave of COVID-19, specifically in July 2020, and the telecom tower commenced transmitting signals in our village on January 1, 2022. Most of the challenges we faced occurred during the initial phase. After the official visit from the ministry, we had to wait patiently for construction workers to build the tower. As our town encountered logistical issues, geographical challenges, and extreme weather conditions, it took a long time to build the tower when compared to other towns.
- **How did IIT Bombay's ecosystem support your project?**  
Tejasvi: IIT Bombay's ecosystem showed me the importance of networking and gave me the courage to reach out to people I would never have imagined doing so. Honestly, I would've never thought of writing to the Hon'ble Minister of Telecommunications if not for Prof. Rajkumar Pant and Sagar's guidance and encouragement. They constantly motivated me and made sure I did not lose hope. Throughout this project, IIT Bombay made me realize the importance of never giving up.
- **It takes a village to raise a child, and these types of critical projects also need enormous aid and support. What (if any) kind of assistance did you receive from the local government and the residents of Baag?**  
Tejasvi: The residents did offer to help but because of logistical reasons I only interacted with local leaders while drafting the letter and, luckily, that proved to be enough.
- **What was your family's reaction to your project?**  
Tejasvi: Everyone is really thrilled. Also, my family helped me a lot in executing the project. My father accompanied me to all of my meetings with politicians to get the letter signed. I would say it is a collective achievement for our entire family. My grandparents experienced their first-ever video call from their home in January 2022 and it's a moment I will always cherish.
- **You chose a project that has tangibly impacted society. What would you say to your peers as they look to make a difference to the world around them?**  
Tejasvi: The IIT Bombay ecosystem empowers its students to solve many problems facing us. We can definitely transform our country if each of us solves at least one key issue faced by rural India.
- **What's next for you, Tejasvi? What are your hopes, aspirations and plans for the future?**



**Tejasvi:** In the near future, I hope to join one of the IITs as an Assistant Professor, where I can help resolve issues and cultivate multiple problem-solvers for our country.

*We'd like to thank Tejasvi Chauhan for sharing his ingenious journey with us. Tejasvi is a true inspiration to all students – both at IIT Bombay and elsewhere. He is proof that no matter the odds – a strong work ethic and can-do attitude can yield life-changing outcomes. We hope that his journey will inspire other young students to never give up and doggedly pursue the path of excellence.*

## UPCOMING EVENTS



### **Foundation Day 2022**

IIT Bombay will celebrate its 63rd Annual Foundation Day on Thursday, March 10, 2022. The function will be presided over by Chief Guest and Padma Vibhushan awardee, Dr. Anil Kakodkar, Director of the Bhabha Atomic Research Centre, Trombay, 1996–2000 and Chairman, Board of Governors of the Indian Institute of Technology, Bombay, 2006–2015.

- **Day & Date:** Thursday, March 10, 2022
- **Time:** 04:00 pm to 06:30 pm
- **Venue:** IIT Bombay, Powai



### **FinTech Summit**

IIT Bombay's Alumni Association will hold its second virtual FinTech Summit on March 11 and 12 (comprising two half-day sessions), where prominent speakers and panellists will share their views and opinions, and also discuss and debate where India is headed over the next decade and what it needs to accomplish in order to become the next global FinTech destination.

- **Day & Date:** Friday, 11th March 2022 to Saturday, 12th March 2022
- **Time:** 05:30 pm - 01:00 pm
- **Venue:** YouTube