IIT BOMBAY

ANNUAL REPORT
2020-21

Azadi Ka Amrit Mahotsav

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
भारतीय प्रौद्योगिकी संस्थान मुंबई
ज्ञानम् परमम् ध्येयम्

CONTENT

Director's Report

By
Prof. Subhasis Chaudhuri
Director, IIT Bombay

Indian Institute of Technology Bombay (IIT Bombay) has a rich tradition of pursuing excellence and has continually re-invented itself in terms of academic programmes and research infrastructure. Students are exposed to challenging, research-based academics and a host of sport, cultural and organizational activities on its vibrant campus. The presence of world-class research facilities, vigorous institute-industry collaborations, international exchange programmes, interdisciplinary research collaborations and industrial training opportunities help the students of IIT Bombay to excel and be ahead in the competitive professional environment.

I am pleased to state that the Institute continues to be ranked as one of the top universities of the country and among the best in the world. IIT Bombay attracts the brightest students from the country for its Bachelor's, Master's and Doctoral programmes. In the 63 years of its existence, more than 62,500 students have graduated from IIT Bombay. The alumni of the Institute have made their alma mater proud through their achievements and contributions in diverse fields and our engagements with them are steadily growing. Research is an increasing focus of activity of the Institute coupled with strong efforts to see that the fruits of the research are translated into product through licensing or through start-ups. The Institute has been able to attract outstanding faculty members from not just India but other parts of the globe also. Today, I am happy to inform you that we have 686 faculty members on roll (as on March 31, 2021), with many of them globally acknowledged for their research contributions. We have also been able to further our links with international and national peer universities, enabling us to enhance research and educational programmes at the Institute.

The 58th convocation of IIT Bombay was held on August 23, 2020 in Virtual Reality mode, keeping in view the safety measures during the pandemic. The Institute thought it best to arrange such a VR-convocation for the graduating students as it did not wish to put its students health at risk but at the same time, did not wish to deprive them of the sense of achievement and pride of passing out of India's premier engineering Institute. The personalized avatar of each graduate received the degree certificate from the personalized avatar of the Director Prof. Subhasis Chaudhuri. All medal winners received their medals from the personalized avatar of the Chief Guest Prof. Duncan Haldane, co-recipient of the 2016 Nobel Prize in Physics, and a Professor of Physics at Princeton University.

IIT Bombay continues to make forays into newer territories pertinent to undergraduate

and postgraduate education. At postgraduate level, following academic programmes have been introduced: Master of Technology in "Urban Systems", Masters of Business Administration (MBA) for Dual Degree (BTech+MBA) called Interdisciplinary Dual Degree (IDDD) Programme, Masters of Engineering Programe (MEng) Programme in "Innovation and Entrepreneurship", "Minor" degree in Health Informatics and MTech Degree in Health Informatics, Specializations for MBA in Finance/ Operations, Management/ Marketing/ Information System. At its 59th Convocation, held (in Mixed Reality Mode) on August 7, 2021, the Institute awarded 2501 degrees (including 378 PhD degrees along with undergraduate and postgraduate degrees) to its students who have completed all their degree requirements during the current academic year.

The Research and development activities at IIT Bombay kept up a brisk pace with time. During the year 2020-21, 246 R&D sponsored projects and 538 consultancy projects with a financial outlay of Rs. 297.68 crores and 68.79 crores respectively have been carried out in diverse areas of science, engineering, management and social sciences. Some of the major projects include: a) setting up of The Centre of Excellence in Oil, Gas & Energy with an objective to work together with various Public Sector Units to articulate an integrated vision for the oil and gas sector and provide key inputs for technology development and policy decisions, (b) Acquisition of state-of-the-art CryoElectron Microscopy Instrument for developing National Facility at IIT Bombay, Mumbai, (c) Hybrid Additive - Subtractive Manufacturing Technology Development, (d) Quantum Information Technologies with superconducting devices and Quantum Dots, (e) AI Powered Security Operation Product Suite for National Critical Information Infrastructure, (f) First-In-Human Clinical Trial using an indigenously developed CD-19 targeted CAR T-cells, (g) Research and Development in Jaggery Process and Product Development, (h) Smog Tower Project at Connaught Place, (i) Triglyceride Secretion from the Liver: New Questions New Mechanisms, (j) Investigation of evolutionary forces driving sympatric speciation.

The Institue's research was recognised by peers and society in the form of several awards and fellowships conferred on faculty and students. Some of the major awards and distinctions received by our faculty members include: Prof. U. K. Anandavardhanan, Department of Mathematics and Prof. Suryendu Dutta, Department of Earth Sciences, have been awarded Shanti Swarup Bhatnagar Prize for 2020, J.C. Bose Fellowship have been awarded to Prof. R Murugavel, Department of Chemistry, and Prof. Dipendra Prasad, Department of Mathematic. Also, Prof. Preeti Rao, Department of Electrical Engineering, has been awarded Abdul Kalam Technology Innovation National Fellowship.

The progress of IIT Bombay on all fronts has been creditable in the past year and I would like to acknowledge the devoted efforts of the faculty, staff and administration of the Institute towards these goals. I will now present a brief report of the Institute activities this year.

KEY FOCUS

- To instill among all the theme of excellence
- To improving its research output further and to have more social engagements to help the country benefit in socially relevant problems.

ACADEMIC PROGRAMMES

Continuous Flow Process Lab
(Polymer Chemist Lab)

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IIT Bombay continues to be a sought-after destination for undergraduate (UG) and postgraduate (PG) studies and attracts the top performers in national examinations such as GATE, CEED, UCEED, NET, JAM and JEE (ADV). Out of 37 available seats for Undergraduate Common Entrance Exam for Design (UCEED) at IIT Bombay, 17 out of top 30 rankers have joined IIT Bombay for BDes programme.

Due to COVID-19 outbreak, JEE (Advanced) 2021 has been postponed.

At the 58th Convocation, a total of 2404 which include 381* PhDs, 18* Dual Degree (MTech/ MPhil+PhD) and 27* Dual Degrees (Msc+PhD), 11 MS (by research), 6 Dual Degree (MSc+MTech), 621 MTech, 64 MDes, 20 MPhil, 110 MMgt, 225 two-year MSc, 2 five-year integrated MSc, 342 Dual Degree (BTech + MTech), 684 BTech Degrees, 10 Interdisciplinary Dual Degrees (BTech/ BS+MTech/ MSc), 20 Dual Degrees (BDes+MDes), 6 Dual Degrees (BS+MSc), 16 BS, 15 BDes, and 16 PGDIIT. In addition, 33 joint PhD degrees, in association with Monash University, were also conferred by the Vice-Chancellor and President of Monash University Prof. Margaret Gardner, on the occasion. (*including PhD degrees awarded during interim convocation). Also, one PhD degree under joint supervision with Washington University in St. Louis, USA, and two Cotutelle PhD degrees, one each [in MTech+PhD and MSc+PhD programme] in agreement with University of Wollongong, Australia and with Université du Québec à Trois-Rivières in Canada were also awarded.

With an increase in undergraduate and postgraduate intake, the student population has undergone significant changes in the last 10 years. In 2009-10, the number of on-roll UG students was 2816 (43.26%) while the number of PG students was 3693 (56.73%) (Masters – 2012, PhD – 1681). This has changed to 4004 (40.56%) and 5866 (59.43%) for UG and PG students, respectively, in 2014-15. Presently, the Institute has about 12005 students of which 5020 (41.81%) are UG and 6985 (58.18%) are PG.

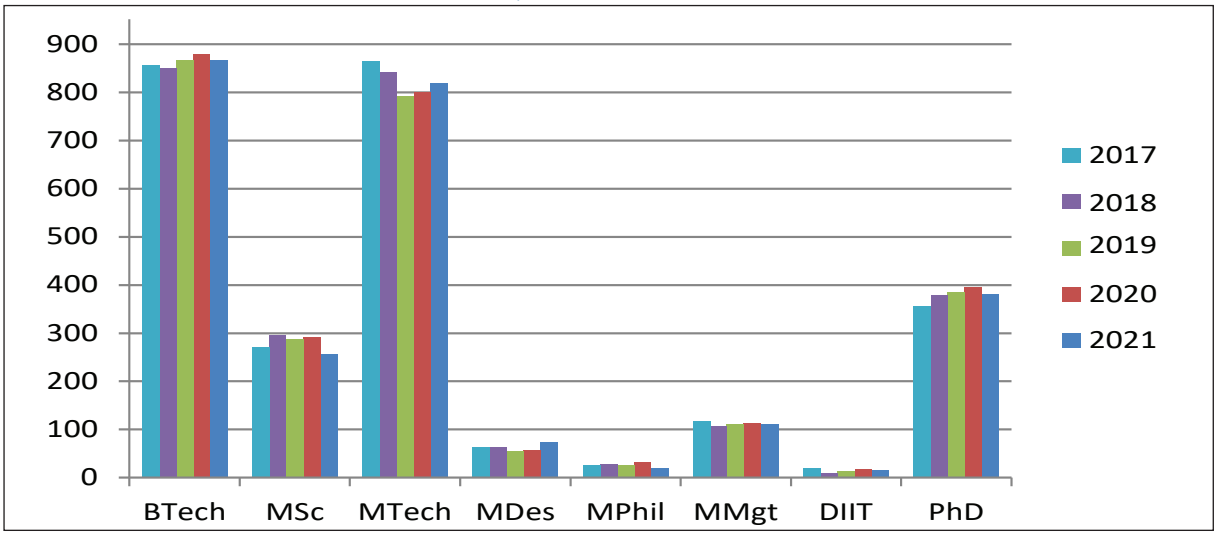
In order to continue imparting high-quality and holistic education to the much larger student population, the Institute continues to modify and evolve processes which can effectively address the

changing situations.

The PhD student strength has increased in leaps and bounds in the last 15 years. From 1056 PhD students in 2004-05, the number has gone up to 2884 in 2014-15 and currently stands at about 3534. Number of PhDs awarded in the 59th interim convocation is 141.

The number of students graduating with a PhD has also been steadily increasing. In the last 10 years, the number of PhD degrees awarded has gone up from about 180 to 381 this year. A significant fraction of these are in the engineering discipline. All students involved in research at the Institute are given an opportunity to interact with research community at the national and international level by providing funds to attend international conferences. During the academic year 2020-21, due to Covid-19, students were given reimbursement for registration fee up to Rs. 50,000 for virtual international conferences.

Degrees Awarded in last five years



Year	BTech	MSc	MTech	MDes	MPhil	MMgt	DIIT	PhD
2021	867	258	819	74	20	110	16	381
2020	880	291	800	58	32	114	17	395
2019	867	288	792	56	27	110	14	385
2018	851	297	843	63	28	106	10	379
2017	857	271	866	63	27	117	21	357
Total	**4322**	**1405**	**4120**	**314**	**134**	**557**	**78**	**1897**

SUPPORT FROM MINISTRY OF EDUCATION	
Grant in Aid Received from MoE for the FY 2020 -21 includes:	
Recurring	Rs. 62799.17 lakhs
Non Recurring	Rs. 2400.00 lakhs
Total	Rs. 65199.17 lakhs
Income :	
Student Fees	Rs. 10129.66 lakhs
Other Income	Rs. 3434.71 lakhs
Total	Rs. 13564.37 lakhs
INSTITUTIONS OF EMINENCE (IOE):	
Recurring	Rs. 6997.00 lakhs
Non Recurring	Rs. 14000.00 lakhs
Total	Rs. 20997.00 lakhs
(Above figures are subject to finalisation of Accounts and audit.)	

IIT BOMBAY IN NATIONAL AND INTERNATIONAL RANKINGS

National Institutional Ranking Framework (NIRF)

The National Institutional Ranking Framework (NIRF) was approved by the Ministry of Education (then MHRD) and launched by then Honourable Minister of Human Resource Development Smt. Smriti Irani on 29th September 2015.

This framework outlines a methodology to rank institutions across the country. The methodology draws from the overall recommendations broad understanding arrived at by a Core Committee set up by MoE, to identify the broad parameters for ranking various universities and institutions. The parameters broadly cover "Teaching, Learning and Resources", "Research and Professional Practices", "Graduation Outcomes", "Outreach and Inclusivity" and "Perception".

IIT Bombay's Rank in NIRF

Ranking year	2017	2018	2019	2020	2021
Category					
Overall	3	3	4	4	3
Engineering	2	2	3	3	3
Management		5	10	11	10
Research					3

**Research Category in NIRF started in 2021*

**IIT Bombay participated in 'Mangement Category' separately from 2018 onwards*

Atal Ranking of Institutions on Innovation Achievements (ARIIA)

Atal Ranking of Institutions on Innovation Achievements (ARIIA) was initiated by the Ministry of Human Resource Development (MHRD), Government of India on August 30, 2018, to systematically rank all major higher educational institutions and universities in India on parameters related to "Innovation and Entrepreneurship Development" amongst students and faculties. The parameters used for consideration for ARIIA rankings include budget, facilities, awareness, entrepreneurship, commercialization, learning methods and governance.

IIT Bombay has secured second position in the Atal Rankings of Institutions on Innovation (ARIIA) 2020 under the category of Institute of National Importance, Central Universities and CFTIS. The result of ARIIA was announced by the Vice-President of India Shri M. Venkaiah Naidu on August 18, 2020 in esteemed presence of former Union Minister for HRD Shri Ramesh Pokhriyal 'Nishank' and former Union Minister of State for HRD Shri Sanjay Shamrao Dhotre.

IIT Bombay was ranked second in the ARIIA rankings last year in 2019 under the category of government –funded institutions.

QS WORLD UNIVERSITY RANKINGS®

Survey conducted by	2016-2017		2018		2019		2020		2021	
	Internati-onal	National	Internati-onal	National	Internati-onal	National	Internati-onal	National	Internati-onal	National
Quacquarelli Symonds (QS)										
QS World University Rankings	219	3	179	2	162	1	152	1	172	1
QS University Rankings - Asia	35	2	34	1	33	1	34	1	37	1
QS University Rankings - BRICS*	13	2	9	1	8	1				
QS World University Rankings by Subject**			-	-	53	1	44	1	49	1
• Art and Design			51-100	1	51-100	1	51-100	1	51-100	1
• Computer Science			51-100	1	51-100	1	51-100	1	67	1
• Civil Engineering			51-100	1	51-100	1	51-100	1	51-100	1
• Chemical Engineering			51-100	1	51-100	2	50	1	70	1
• Electrical Engineering			51-100	1	51-100	1	51-100	2	61	2
• Mechanical Engineering			51-100	1	51-100	1	51-100	1	82	2
• Minerals Engineering			-	-	38	1	41	1	41	1

** BRICS: Brazil, Russia, India, China, and South Africa; ranking not announced in 2020 & 2021*
***started in 2018*

RESEARCH AND DEVELOPMENT ACTIVITIES

Research and Development (R&D) activities at IIT Bombay kept up a brisk pace with time. Understanding the challenge posed by Covid-19 pandemic, Institute took up many R&D projects for its mitigation very early on, including seed funding many projects internally. This head start enabled IIT Bombay to come up with various technologies and innovations leading to multiple technology transfers/ licensing to many industries/ start-ups, some of which have already been commercialized.

R&D RELATED TO COVID-19

As a response to the challenges posed by the ongoing COVID-19 pandemic, the faculty at IIT Bombay developed technologies and solutions along with collaboration with hospitals and industry partners to find solutions and mitigate problems.

Researchers at the Institute worked towards developing medical devices, sterilization methods, sanitization technologies, antiviral supplements, personal protection kits, software solutions for surveillance, diagnostic approaches, and many other scientific interventions to help deal with the direct and indirect effects of the pandemic. More than 45 projects were taken up by faculty members, the efforts of which have resulted in various technologies being developed / deployed/licensed to the Industry and society.

Projects included in-situ nasal gel formulations for pre-exposure prophylaxis of COVID-19; identification of global metabolite biomarkers in COVID-19 infected patients for targeted therapy; plasma proteomic analysis to identify biomarkers and therapeutic targets; incineration device for safe disposal of masks/gloves in hospitals and quarantine centres; etc.

Along with these, technology and design for the following were developed:

- Portable / wheeled UVC based sterilization unit and germicidal cabinet
- Phytoformulations for walk-through sanitizers
- Hand rub and surface sanitizers for ensuring human safety
- Wash resistant antibacterial and antiviral coatings for masks and textiles (DURAPROT)
- Surface spray for decontamination and anti-viral action
- Biodegradable antiviral plastic like films for face shields
- CPAP helmet for mildly distressed patients
- Mechanized ambu-bag for patients with moderate respiratory difficulties
- Advanced ventilator for severely critical patients
- ICU ventilators (Vi-SWAAS)
- Anti-viral nutraceuticals and phytopharmaceuticals
- Aerosols for pneumonitis and ARDS complications of COVID-19 safe biohazard transporter
- Robotic disinfection unit
- Nanofibrous face mask impregnated with activated carbon and phytochemicals
- COVID filters to make gas-exhaust safer
- Rapid test kit for simultaneous detection of IgG and IgM antibodies for large scale screening
- Low cost contactless fast body temperature imaging device for high traffic area deployment (Thermomudra)
- Thermal camera for body temperature screening
- Tracking and predicting spread of COVID-19 and identifying clusters using GIS and data analysis
- Air purifier for elimination of air borne virus
- iWrist: Electronically lockable remote health monitoring and tracking device in pandemic
- Methods and systems for determining viruses in biological samples using single round based pooling

Products for immediate societal use like low-cost PPE solutions including masks, face shields, aerosol box for hospitals, washable coverall suits, urination attachment for coverall suit, temperature controller for overall suit etc. were developed/ deployed.

IT solutions were developed and fine-tuned to specific requests. The CORONTINE app developed for quarantine adherence and tracking/ tracing asymptotic carriers was adopted in Odisha and Meghalaya; and partly used by Brihanmumbai Municipal Corporation (BMC), Mumbai. The app was integrated with IoT for monitoring vital parameters used in healthcare applications. User-friendly, customized information access with humans-in-the-loop (World Wide Help) was developed and made operational at the IIT Bombay Hospital and KEM Hospital.

An algorithmic protocol for pooled RT-PCR testing of samples for COVID-19 (tapestry pooling) was developed and validated using clinical samples at various hospitals in Mumbai, Kerala, Bengaluru etc. A web and android app were also developed by integrating this pooling technique to analyse the test results.

A CoviDialysis portal was built to facilitate rapid assignment of patients to alternate dialysis centres as a consequence of being tested COVID positive. This was adopted by MCGM (Municipal Corporation of Greater Mumbai) and nephrologists in Delhi and Bengaluru for effective hemodialysis patient management.

Lokacart, an e-commerce software platform, was developed to directly connect the sellers and consumers to reduce the waiting period for the purchase of essential items.
Many technologies developed for COVID-19 pandemic mitigation were licensed to Industries.

In financial year (FY) 2020-21, IIT Bombay received external funding of Rs. 285.83 crores for R&D related activities. This included funding from government agencies, industries and others, both within and outside India.

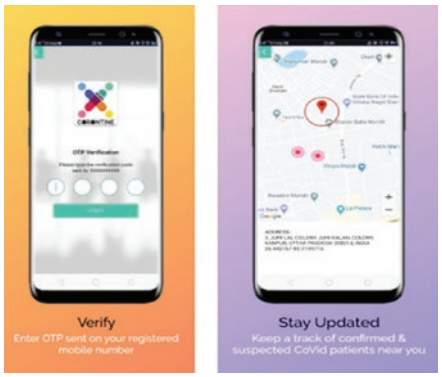
UV based sterilization products


Vi-SWAAS: ICU Ventilator

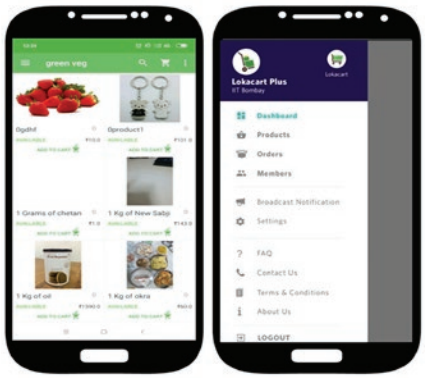

CPAP Helmet

Antiviral nutraceuticals and phytopharmaceuticals


Development of PPE solutions



CORONTINE app for contact tracing



Lokacart: a retail platform

In FY 20-21, IIT Bombay received external funding of Rs. 285.83 Crores for R&D related activities. This included funding from government agencies, industries and others, both within and outside India.

Research and Development Activities in 2020-21

Office of Dean (R&D) continued to engage and facilitate research and development initiatives at IIT Bombay by administering R&D projects, facilitating industry interactions, managing intellectual property and licensing activities, reviewing and finalizing R&D related agreements and contracts, supporting high end research infrastructure and disseminating R&D related information in various fora, amongst other roles. Many new R&D projects and related activities were undertaken in FY 20-21.

EXTERNAL GRANTS FOR R&D

IIT Bombay received funds to the tune of Rs. 285.83 Crores in FY 20-21 from external agencies. This includes funds for new as well as ongoing projects as indicated in Table 1.

Table 1: Funds received for R&D in 2020-21

Project Type	Funds received (Rs. in crores)
Sponsored Projects	232.29
Consultancy Projects	48.16
Royalty	1.95
Equipment usage	3.43
Total	**285.83**

This year, funds received were majorly from government agencies with a sizeable contribution from industries (both Indian and foreign) as well as trusts, societies etc. Percentage contribution of different types of funding agencies is shown in Figure 1.

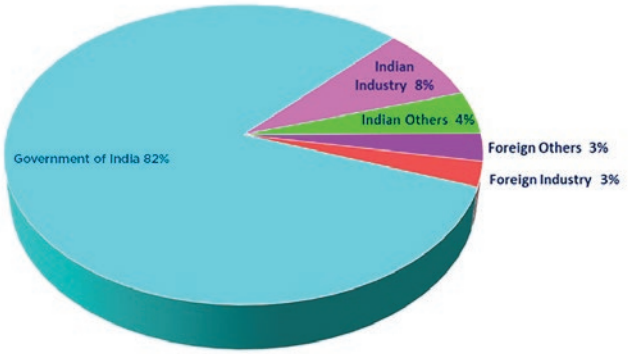


Figure 1: *Types of funding agencies and percentage contribution for Sponsored Projects*

R&D projects both as short duration consultancy projects and longer duration sponsored research projects were initiated (Table 2)

Table 2: Information on new projects sanctioned during last three years

FY	Sponsored Projects		Consultancy Projects*	
	Number	Sanctioned outlay (Rs. in crores)	Number	Projects outlay (Rs. in crores)
2020-21	246	297.68	538	68.79
2019-20	345	251.00	705	79.80
2018-19	388	214.60	745	104.16
*: includes GST for Indian party/ clients				

Sanctioned outlay for sponsored projects during FY 2020-21 showed a vast range from few lakhs rupees to Rs. 85 crores. Distribution of outlay across the spectrum is shown in the Figure 2.

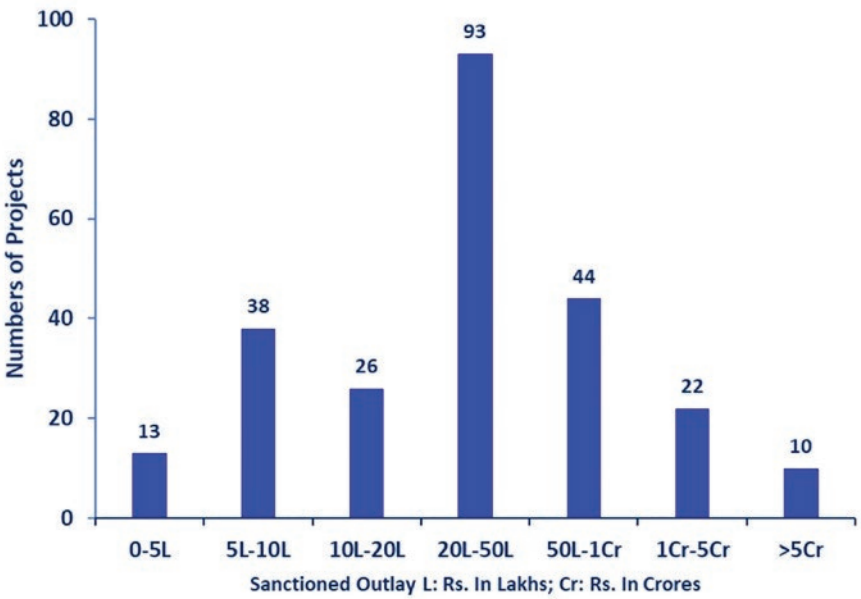


Figure 2: *Distribution of sponsored projects-sanctioned outlay ranges*

In FY 2020-21, IIT Bombay initiated 246 R&D projects with sanctioned outlay of Rs.297.68 crores. These span various domains of research in science and engineering – both applied and basic as well as humanities, social sciences and management studies. Some highlights are given below:

The Centre of Excellence in Oil, Gas and Energy was set up with an aim to work together with various Public Sector Units (PSUs) to articulate an integrated vision for the oil and gas sector and provide key inputs for technology development and policy decisions. The Centre envisages two-way interactions, facilitating innovation and new ideas and mechanisms for identifying and implementing relevant short-term and medium-term projects in the areas of refinery operations, LNG storage and transportation, energy benchmarking, pinch analysis, process integration, advanced process and equipment design, waste recovery etc.

IIT Bombay initiated a project on **First-In-Human Clinical Trial** using an indigenously developed CD-19 targeted CAR T-cells which involves validation and optimization of cGMP grade clinical manufacturing of CAR-T cells and conducting Phase I/ II clinical trial with the indigenous EF1 lentiviral scFv-41BB-CD3 CAR in relapsed/ refractory b-ALL paediatric patients.

In line with upgrading research infrastructure to promote state-of-the-art research and development, a **high-end cryo-EM facility set up at IIT Bombay** with support from Department of Science and Technology. This facility will serve to further the frontiers and bring out important therapeutic advancements. Several institutes such as TIFR, ACTREC, BARC, NIRRH and CBS have joined hands for procurement of this high-end facility to be housed at IIT Bombay.

IIT Bombay has been at the forefront of doing socially-relevant research. This year, we have initiated a multi-institutional project with a broad objective of taking the traditional sector of **Jaggery Process and Product Development** to a level where each stakeholder – from farmer to consumer – benefits. This project will cover various R&D aspects of jaggery processing, applications and market. IIT Bombay is also part of pilot studies to assess the effectiveness of medium scale **air pollution mitigation technology** in the Delhi outdoor environment. Under a new project on **Application of Technologies On Child And Maternal Health**, Institute proposes to deploy a Child and Maternal Health Monitoring (CMHM) kit, which will be easy-to-use monitoring tool for the rural health care workers, Aanganwadi workers and to be primarily used in Geospatial mapping of child malnutrition and pregnancy care at selected sites in Maharashtra (Mumbai) and North East States viz. Meghalaya and Arunachal Pradesh.

IIT Bombay continued to be involved in various online course related programs. We are actively participating in SWAYAM Prabha which is a collection of DTH channels that transmit educational lectures. This is a project funded by the National Mission on Education through ICT, an initiative of the Ministry of Education (MOE). This year IIT Bombay contributed 500 hours of lecture videos. Another such program where IIT Bombay is associated is Jigyasa Virtual Labs funded by CSIR under its Jigyasa outreach initiative which aims to create and deploy interactive science content for schools.

The Ministry of Education, Government of India has introduced **Scheme for Transformational Research in Sciences (STARS)** for promoting translational, India-centric research in Sciences. With the key objective of supporting socially-relevant research, six thrust areas have been identified: Physics, Chemistry, Biological Sciences, Data Sciences, Mathematics and Earth Sciences. Two new projects were initiated this year along with four projects that were initiated last year. In addition, the Government of India continued to sanction more projects under the schemes called **IMPacting Research INnovation and Technology (IMPRINT) and Uchhatar Avishkar Yojana (UAY)** focussing research to solve major engineering and technology challenges in selective domains including the manufacturing industry needed by the country. One new project has been initiated under the IMPRINT-II scheme and two new projects have been initiated under UAY-II this year.

Some major sponsored projects initiated:

- **Centre of Excellence in Oil, Gas and Energy**
  Funding Agencies:
  Indian Oil Corporation Limited, Oil and Natural Gas Corporation Limited, Bharat Petroleum Corporation Limited, Hindustan Petroleum Corporation Limited, GAIL (India) Limited, Oil India Limited, Engineers Indian Limited
  Sanctioned outlay: Rs. 85 crores over 5 years

- **Acquisition of state-of-the-art Cryo-Electron Microscopy Instrument for developing National Facility at IIT Bombay, Mumbai**
  Funding Agency: Science and Engineering Research Board
  Sanctioned outlay: Rs. 28.60 crores over 5 years

- **Hybrid Additive - Subtractive Manufacturing Technology Development**
  Funding Agencies: Ministry of Education, Ministry of Space, Phillips Machine Tools India Pvt. Ltd., Bharat Forge Limited, Mastercam India Pvt. Ltd.
  Sanctioned amount: Rs. 11.71 crores (including in-kind consideration) over 3 years

- **Quantum Information Technologies with superconducting devices and Quantum Dots**
  Funding Agency: Department of Science and Technology
  Sanctioned outlay: Rs. 10.31 crores over 3 years

- **AI Powered Security Operation Product Suite for National Critical Information Infrastructure**
  Funding Agency: National Security Council Secretariat
  Sanctioned Outlay: Rs. 10 crores over 3 years

- **First-In-Human Clinical Trial using an indigenously developed CD-19 targeted CAR T-cells**
  Funding Agency: Biotechnology Industry Research Assistance Council
  Sanctioned Outlay: Rs. 6.53 crores over 2.5 years

- **Research and Development in Jaggery Process and Product Development**
  Funding Agency: Rajiv Gandhi Science and Technology Commission
  Sanctioned Outlay: Rs. 5.98 crores over 3 years

- **Smog Tower Project at Connaught Place**
  Funding Agency: Delhi Pollution Control Committee
  Sanctioned Outlay: Rs. 5.83 crores over 2 years 10 months

- **Triglyceride Secretion from the Liver: New Questions New Mechanisms**
  Funding Agency: DBT/ Wellcome Trust India
  Sanctioned Outlay: Rs. 4.49 crores over 5 years

- **Investigation of evolutionary forces driving sympatric speciation**
  Funding Agency: DBT/ Wellcome Trust India
  Sanctioned Outlay: Rs. 3.59 crores over 5 years

Consultancy activities were taken up for different governments, public sectors and industries, both Indian and international. The types of consultancy provided included expert advice, retainership, product/ process/ software development, analysis, evaluation, product design and limited testing.

Some typical/ representative consultancy projects initiated during this year:

- Advanced deep learning techniques
- Bioprinting course curation
- CFD modelling and experimental investigations
- Chilling systems
- Hybrid solar-wind energy system technology
- Medical image computing
- NMR studies and characterization of pharmaceutical products
- Proof checking of structural designs
- Software fault tolerance assessment
- Structural audits
- UV sanitization
- Water distribution and improvement program

Internal Funding for R&D

The Institute provided internal funding for supporting various initiatives to promote faculty research and student activities. Funds to the tune of **Rs. 10 crores** were sanctioned as seed grant and augmented seed grant for initiation of research for new faculty members. Figure 3 indicates percentage distribution of internal funds for various activities.

In total, Institute released funds to the tune of Rs. 26 crores for activities which included the following:

- seed grant for initiation of research for new faculty
- seed grant for R&D related to COVID-19 mitigation
- augmenting seed grants for procuring high-end research equipment
- maintenance of central and national research facilities
- awards and recognition to faculty recipients of Research Publication Award, Impactful Research Award, Research Dissemination Award and Early Research Achiever Award
- facilitating grants to faculty members for filing patents, research publications and/ or international travel
- leverage grants and bridge grants
- fellowships for PhD student
- student research/ competition/ event: projects such as Mars Rover, Team Shunya, Hyper-loop, IIT Bombay ROCKET team, Student Design Competition - 2019 (American Society of Me-chanical Engineers).

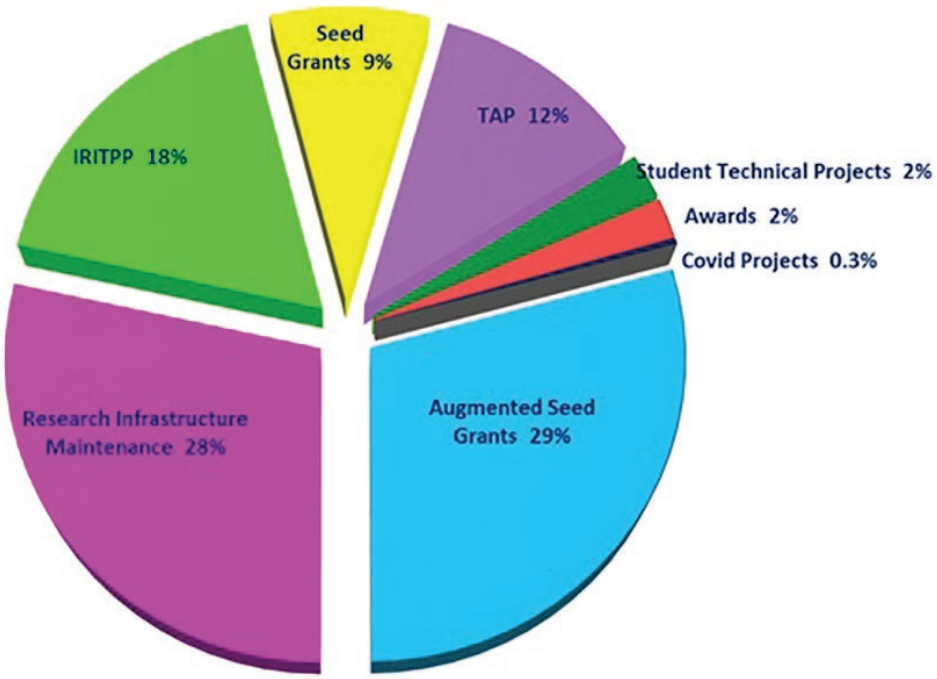


Figure 3: *Percentage distribution of Institute funding related to R&D activities*

IIT Bombay – Industry Interactions for R&D

Institute continued its efforts to enhance interaction with its industry collaborators. Around 225 Indian and international industries approached IIT Bombay for partnership through collaborative R&D projects and consultancy services. Interactions with these industries were managed seamlessly by facilitating exploratory meetings and technical discussions with faculty members (in virtual mode) in areas of mutual interest. More than 50 e-meetings were coordinated by IRCC during this period.

- TATA Consulting Engineers (TCE)
- Affine Analytics
- Hero MotoCorp
- Umeandus
- Zoeti
- Larson & Toubro (L&T)
- Thermax
- Sony
- B Medical Systems
- Tvarit GmbH
- Endress+Hauser
- V-Guard
- Dell
- Good Food Institute (GFI)
- Luker Electric Technologies
- Honeywell
- Bajaj Auto
- Shell
- Baker Hughes
- Torrent Pharma
- High Court of Kerala
- Volkswagen
- Voltas
- Indian Railways
- Cipla
- Hitachi
- PowerGrid Corporation
- Amazon
- Crompton Greaves
- Ordnance Development Centre
- Whirlpool
- Total
- Flipkart
- Emcure Pharmaceuticals
- Siemens Gamesa
- JSW Steel
- Quidich
- Indian Air Force
- Bharat Petroleum Corporation Limited (BPCL)
- Mercedes Benz
- Puri Crawford
- Kirloskar Oil Engines
- Hindustan Petroleum Corporation Limited (HPCL)
- Huawei Technologies
- Qualitrol
- Teleysia Networks
- Vehant Technologies
- Life Essentials (Blessings Advertising)
- Indian Farmers Fertiliser Cooperative Ltd (IFFCO)
- Vikram Enterprises
- Bectochem Loedige Process Technologies
- GAIL Limited
- Punaha Battery Renescance
- ReNew Power
- VAS Spectrometers
- Plasma Metal Processing
- Cairn Oil & Gas
- Geological Survey of India
- Gandhi Automation
- Pallava Technologies
- Agilent Technologies
- IDrive Software India
- World Wide Technology
- Sladjana Sales Corporation
- Agami Engineering Consultants
- Stamp IT Robotai & Solutions
- Gujarat State Fertilizers and Chemicals
- Monash Institute of Railway Technology

- Eastern Aromatics
- SBI General Insurance Company
- Army Technology Board
- B N Industries
- Sys3E Technologies
- R Square Industries
- Fluidtherm Technology
- Vapi Green Enviro Ltd.
- MRK Healthcare
- Bharat Heavy Electricals Limited (BHEL)

In line with the AatmaNirbhar Bharat Abhiyan initiated by the Government of India, the Office of Dean (R&D) proactively approached industries to make them aware of the various modes of collaboration available at the Institute to foster industry-academia partnership towards indigenous technology development in focused verticals of mutual interest. Exploratory meetings with multiple Industries were initiated across various domains and discussions are currently ongoing.

R&D-related Agreements and Contracts

More than 100 agreements were finalized and signed during the year including those for research collaboration, setting up consortia/ centres of excellence, licensing, non-disclosure agreements, IP transfer, student sponsorships, endowment, material transfers etc. with industries, organizations, universities and government, both national and international.

Augmentation of Research Infrastructure

In order to create and upgrade infrastructure for enabling R&D, the Institute has been establishing state-of-the-art equipment through a process of review and recommendation by the Research Infrastructure Funding Committee (RIFC). Under this initiative, during the year, the Institute has approved procurement of the following major state-of-the-art equipments/ facilities worth Rs. 50 crores (approx):

- Raman Spectrometer
- Field Sweep-NMR
- Polymer processing facility
- Electrical Capacitance Volume Tomography (ECVT)
- Integrated Infra-red based nanoscale Atomic Force Microscope
- Cubic Immersive Virtual Reality System
- DC/ AC/ RF testing facility upgradation
- High Temperature Confocal Laser Scanning Microscope
- Scanning Electron Microscope(SEM)
- Analytical Ultracentrifuge Facility
- High-pressure temperature-controlled direct shear and triaxial system
- Power Device Characterization System
- Multiphase Relative Permeability-Porosity Test Rig and related accessories
- Advanced Chemical Characterisation Laboratory
- Carbonaceous Aerosol Speciation System (CASS)
- Particle Size Analyzer
- Thermal Conductivity/ Diffusivity Measurement Apparatus
- Constant-rate-strain (CRS) Thermal Consolidation Apparatus
- Electron beam lithography facility

In addition to this, a bridging fund of approx. Rs. 12 crores was approved for setting up a National Facility (Cryo-EM) in the Institute.

Intellectual Property Management and Licensing Activities:

IIT Bombay has seen an exponential growth in the number of intellectual property rights (IPR) applications this year as against the past few years. This rise in numbers is due to filing of IPR applications for COVID-19 related technologies as well as significant increase in registration of trademarks and designs. Increase in trademark registrations could be considered as indicator of licensing possibilities of various innovative technologies at IIT Bombay.

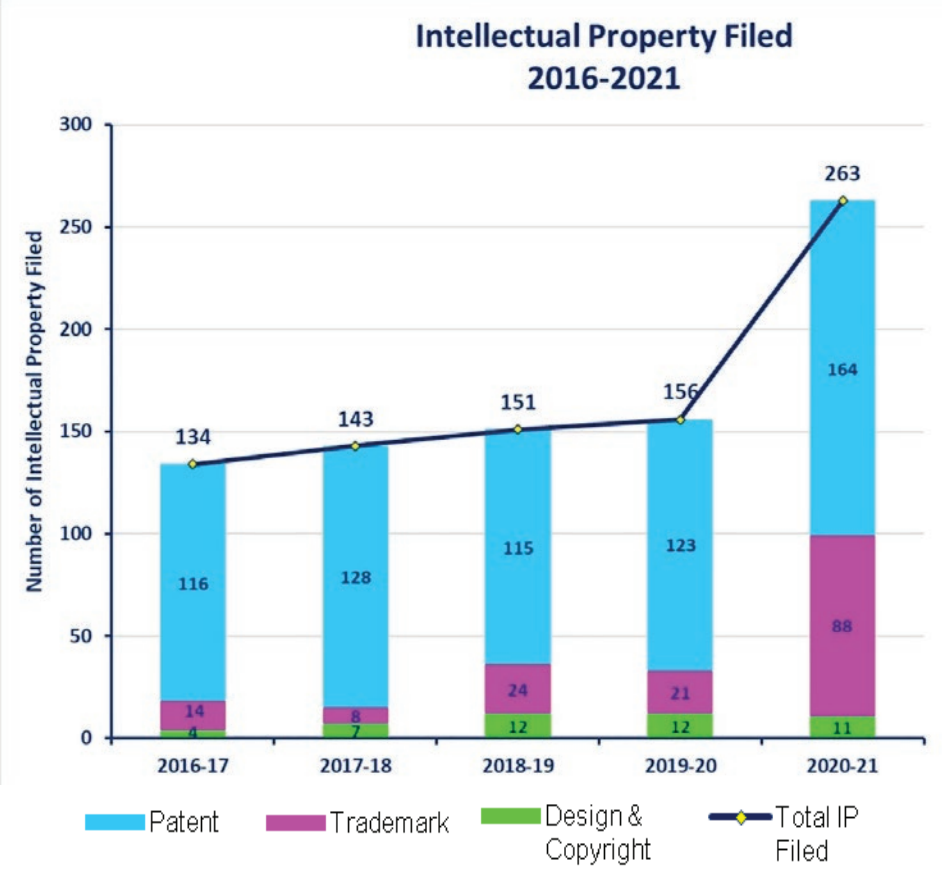


Figure 4: *Year-on-year growth in number of intellectual property applications filed*

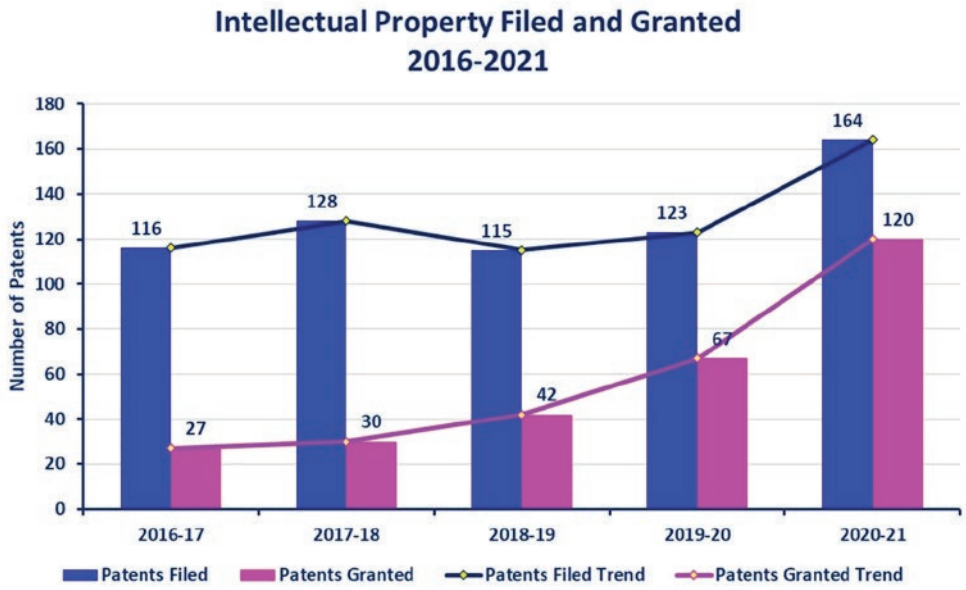


Figure 5: *Year-on-year growth in number of patents filed and granted*

c) Intellectual Property (IP) Protection Activities

During FY 2020-21, 263 intellectual property (patent, trademark, design and copyright) applications were filed. List of all Indian and international IPR filings and grants are given in Table 3.

Table 3: Patents and other IPR applications filed and granted during 2020-21

IP type	Applications filed (No.)	Granted (No.)
Indian Patent	141	110
PCT	04	NA
US Patent	17	08
Other foreign patent	02	02
Trademark	88	20
Design	10	04
Copyright	01	01

Areas of IP filings:
Anti-microbial and antiviral compositions, Battery storage system, Biochemistry for therapeutic treatment, Biomarkers, Biomaterials, Biomedical devices, Chemistry, Composites, Converters, Construction, Drug delivery systems, Green synthesis, Membranes, Microfluidics, Nano medicines, Neutraceuticals, Point of care devices, Polymer technology, Proteomics, Semiconductors, Sensors, Waste management etc.

As in the previous year, pro-active efforts were taken to assess the possibility of intellectual property in the work of MTech/ Dual degree student to file for possible protection. 904 abstracts were reviewed. Out of these, 10 were short-listed for a possible filing of patent applications which is underway.

A new initiative was undertaken to proactively conduct outbound prospecting for technologies protected/ filed for protection by the Institute. A write-up with salient features were prepared for over 60 technologies, for which more than 200 industries were identified and contacted for exploring potential licensing opportunities. Interest was received from around 20 industries for different technologies. Meetings were held with them and based on signing of NDAs with these industries; discussions are ongoing regarding possible collaboration/ licensing.

Licensing Activities in FY 2020-21

Support to Entrepreneurship

Rights to seven technologies/ Intellectual Property developed in the Institute were given to researchers for incubation/ entrepreneurship activity in the IIT Bombay's incubator (SINE)/ elsewhere during the year. The start-ups created for translating the technologies include:

- CARIMO Technology Services Pvt. Ltd.
- Algorithmic Biologics Pvt. Ltd.
- Airth Research Pvt. Ltd.
- Deccan Crest Engineering Pvt. Ltd.
- Revotech Industries Pvt. Ltd.
- Zeal Pvt. Ltd.
- Picovie LLP

Technology Transfers related to COVID-19 Mitigation

During the lockdown due to SARS CoV2 pandemic, IIT Bombay licensed technologies related to COVID-19 mitigation and other technologies were transferred to various industries and companies. These include:

- Wash resistant antibacterial coating for textiles and Wash resistant antiviral coating for textiles (Duraprot)

- UV Sterilization Units: Portable UV Sterilization Unit, Germicidal UV cabinet, Wheeled Sterilization Unit
- Ecorsani compositions: Surface disinfectant, Aerosol sanitizer and Hand rub sanitizer
- Lokacart - Farm-to-Fork information technology tool
- ICU ventilator
- Cloth Mask Design
- Self-disinfecting hydrophobic coating (Duraprot Plus)
- An improved method of Pooled testing
- Nutraceutical compositions for antiviral, anti-oxidant and anti-inflammatory effects (PICOVRID)

Late Prof. Rinti Banerjee and her team, Department of Biosciences and Bioengineering, developed technologies related to antibacterial and antiviral coating on textiles (called 'DURAPROT') and 'Self-disinfecting hydrophobic coating' (called 'DURAPROT PLUS') for which patent applications were filed.

The DURAPROT technology was licensed to eight companies for manufacturing masks and resulted in successful commercialization. The **Duraprot Plus technology** was licensed to **four companies** and the products were made available in the market.

Late Prof. Rinti Banerjee and her team, Department of Biosciences and Bioengineering, developed a technology on 'Phytoformulations for sanitizers' (called **ECORSANI**). The technology relates to biodegradable, safe, GRAS-approved compositions, which can be used as antibacterial and antiviral sanitisers. These are safe for human contact and are free from harmful chemicals or alcohol. On direct application, they have inactivated coronavirus samples.

Three types of compositions for applications as surface disinfectant, aerosol sanitizer and hand rub sanitizer were developed and licensed to a company and successfully commercialized. The products were made **available in market and also on various online platforms.**

DURAPROT products commercialized by industry

Social Initiatives

Considering the COVID-19 pandemic situations and increase in requirement of masks across India, a few Self-Help Groups (SHG), State Rural Livelihood Mission (SRLM), social-oriented firms and women entrepreneurs approached IIT Bombay to get access to Duraprot technology of antibacterial coating and antiviral coating of masks. As a part of social initiative, IIT Bombay licensed the Duraprot technology at nominal royalty to likes of Shilpgram Mahila Producer Company Limited and Shilpy Digital Media and Jagran Pehel, firms known to work with various SHGs and SRLMs. The Bill and Melinda Gates Foundation played a pivotal role in connecting IIT Bombay with Shilpgram Mahila Producer Company Limited.

In addition, women entrepreneur-based Shilpy Digital Media working for empowerment of socially-backward women through SHGs started successful manufacturing of masks using both Duraprot and Duraprot Plus technology.

Other Technologies licensing to user industries

- Hindi WordNet dataset
- Video analytics software
- Rotating contacting disks based biogas scrubber
- A stance controlled knee-ankle foot orthosis
- Process for manufacturing free flowing jaggery
- Automated needle holder and suturing device
- Collapsible roof for light vehicles
- 4G LTE MCX server
- Ultrasonic water meter with automatic meter reading
- A clean air delivery and sanitization device
- A method and a device for reclaiming green waste foundry sand

Modified policy framework for IIT Bombay researcher to be associated with a startup:

With an aim to promote entrepreneurship by IIT Bombay researchers and allow alternate modes of consulting for faculty, a proposal was approved by the IIT Bombay's Board of Governors, for a modified framework for starting a company and related matters. This allows any IIT Bombay researcher to be associated with a startup in the core technology domain and hold equity. In return, the Institute will charge a small fee to the startup company calculated in terms of a percentage of the equity holding times the turnover of the company for a fixed period. This policy would apply to startups within the IIT Bombay incubator and outside. The same model would apply to a faculty taking up an advisory consulting activity for a startup for which (s)he receives equity in return. The implementation is underway.

In parallel, the Institute received a mandate from the Ministry of Education (MoE) to set up a startup policy in higher education institutions (HEIs) within the framework of the National Innovation and Startup Policy (NISP). As per the mandate, IIT Bombay nominated Professor-In-Charge of the Society for Innovation and Entrepreneurship (SINE) to interface between the Institute and MoE. In addition, the Director also constituted a committee to deliberate on the NISP guidelines and draft an updated startup policy in line with the NISP framework. The activities were initiated in this regard during the year.

IIT Bombay Awards for R&D related activities:

This year, the various R&D research awards such as Research Publication Awards, Research Dissemination Awards and Early Research Achiever Awards were conferred on the faculty recipients based on a call for nominations and selection by a Director appointed committee. The recipients of the various awards were:

IIT Bombay Research Publication Awards 2019

- Prof. Maheswaran Shanmugam, Department of Chemistry
- Prof. Nutan Limaye, Department of Computer Science and Engineering
- Prof. Rajneesh Bharadwaj, Department of Mechanical Engineering
- Prof. Soumyo Mukherji, Department of Biosciences and Bioengineering and Prof. Suparna Mukherji, Department of Environmental Science and Engineering
- Prof. Subhankar Karmakar, Department of Environmental Science and Engineering

IIT Bombay Research Dissemination Awards 2019

- Prof. Hetu C. Sheth, Department of Earth Sciences
- Prof. Parinda Vasa, Department of Physics
- Prof. Raghavan B. Sunoj, Department of Chemistry

IIT Bombay Early Research Achiever Award 2019

- Prof. Pradip P. Kalbar, Centre for Urban Science and Engineering
- Prof. Shobhna Kapoor, Department of Chemistry
- Prof. Varun Bhalerao, Department of Physics

Prof. Krithi Ramamritham Award for Creative Research

- Prof. Jayakrishnan Nair, Department of Electrical Engineering in recognition of his significant research contributions in the area of Uncertainty management in the smart, renewable-rich power grid
- Prof. Varun Bhalerao, Department of Physics in recognition of his significant research contributions in the area of 'Electromagnetic counterparts to gravitational wave sources'.

These awards were conferred to the recipients on the occasion of National Education Day (Rashtriya Shiksha Diwas) by the Director of IIT Bombay Prof. Subhasis Chaudhuri at a virtual function, in the presence of Mr. Ramesh Pokhriyal 'Nishank', former Minister of Education, Government of India, on November 10, 2020. The Minister inaugurated the National Education Day programme (online). Dr. K. Kasturirangan, Former Chairman, ISRO and Chairman of the committee for drafting the New Education Policy, was the Guest of Honour for the occasion.

A workshop on National Education Policy 2020 was held on November 10, 2020 on occasion of National Education Day by IIT Bombay. The workshop included talks by Prof. B. N. Jagatap, Department of Physics, IIT Bombay; Dr. Jaitirth 'Jerry' Rao, entrepreneur, Founder of VBHC and HFFC and Prof. Dhruba J. Saikia, Tata Institute of Fundamental Research (TIFR), ex-VC, Cotton College State University.

Mr. Ramesh Pokhriyal 'Nishank', former Hon'ble Minister of Education, addressing the audience during National Education Day celebrations

Also, rewards for Research Excellence in Pure and Applied Sciences were given to the following faculty members:

Prof. Raghavan B. Sunoj, Department of Chemistry receiving
Prof. S.C. Bhattacharya Award for Excellence in Research in Pure Sciences 2019

Prof. H.H. Mathur Award for Excellence in Research in Applied Sciences 2019 was awarded to Prof. Pushpak Bhattacharyya, Department of Computer Science and Engineering

Award recognition included cash awards, research grants and arranging Institute-wide dissemination through lectures.

Other R&D and IP Awards:

Clarivate South and South East Asia Innovation Award 2020:

IIT Bombay was selected as a winner of the Clarivate South and South East Asia Innovation Award 2020 in Academic Institutions category. This award recognised IIT Bombay among the top academic innovators in India.

India International Science Festival – IISF 2020

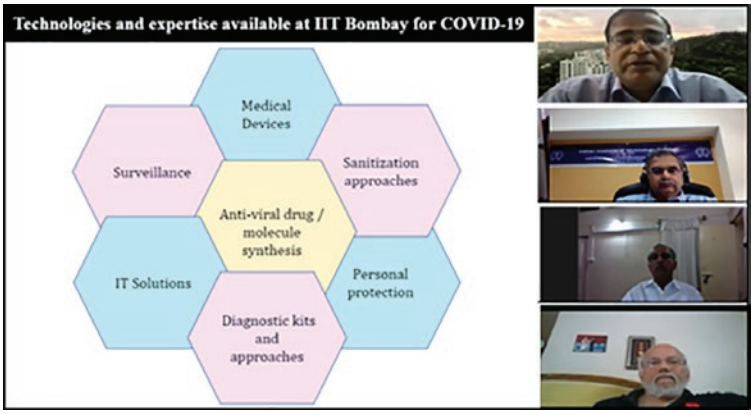
IIT Bombay participated in the 6th edition of the India International Science Festival, IISF 2020, jointly organised by the Ministry of Science & Technology, Ministry of Earth Sciences and Ministry of Health & Family Welfare in association with Vijnana Bharati (VIBHA). The theme for IISF 2020 was 'Science for Self-Reliant India and Global Welfare'. The event was held in a virtual format during December 22-25, 2020.

The event was inaugurated by Dr. Harsh Vardhan, former Union Minister for Health & Family Welfare, Science & Technology and Earth Sciences. The inaugural address was delivered by Prime Minister Narendra Modi. The 'Mega Science, Technology & Industry Expo' as part of the IISF 2020, highlighted over 400 institutions from scientific and industry fields. The Expo was open 24x7 and showcased Indian science in various fields before the global audience.

IIT Bombay exhibited posters giving a glimpse of R&D activities at the Institute, academic programmes, industry interactions, technology transfers and licensing of IIT Bombay IP, R&D towards the mitigation of COVID-19 etc., in addition to several posters on key technologies developed in the Institute. Videos on various departments, centres and technologies of IIT Bombay were also showcased. Brochures like 'R&D Highlights', 'Partner with Us', 'Innovations licensed to Industry', 'Glimpses of Research' and 'Research Facilities' were exhibited to the visitors for information dissemination. Visitors could interact with IIT Bombay staff live via online video teleconferencing, audio conferencing and messaging modes. The IIT Bombay stall was well-received and attracted a good response, with more than 170 visitors.

Webinar on COVID-19 R&D Efforts at IIT Bombay

A half-day webinar was organized by the Office of Dean (R&D) on August 1, 2020, where the researchers at IIT Bombay involved in the COVID-19 mitigation efforts spoke about the progress made. The webinar showcased some of the promising technologies developed at the Institute, ranging from medical devices, sanitization techniques, antiviral drug/ molecule synthesis, personal protection, surveillance, and IT solutions. Talks were presented by faculty members, entrepreneurs from start-ups incubated at SINE, and industry personnel.



The webinar was attended by over a hundred people, including students, scientists, industry personnel, medical professionals and government officials.

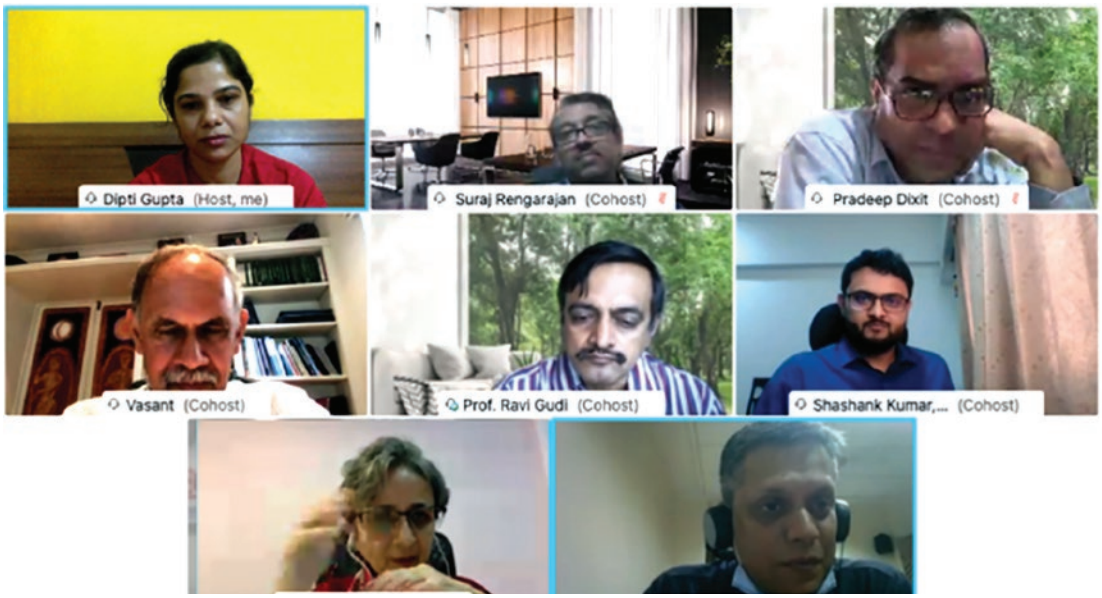
IIT Bombay Sensor Workshop: Sensing the World

A two-day virtual workshop on sensors was organized by the office of the Dean (R&D) during March 5-6, 2021 to foster interdisciplinary collaboration between faculty, researchers, students across departments and Industry personnel working in varied aspects of sensors and systems spanning from sensor's design, materials, theories, fabrication and developing real-time applications using sensor interfacing, software, algorithm, data analysis etc.

The event was headlined by keynote addresses of Prof. Navakanta Bhat, Dean - Division of Interdisciplinary Sciences, Indian Institute of Science Bangalore on 'Biochemical Sensor Systems'; Prof. Ramgopal Rao, Director, IIT Delhi on 'Sensor Solutions for Affordable IoT Solutions in the Developing World' and Mr. Nilesh Desai, Director, ISRO on 'Space-based Remote Sensors and Associated Technologies'. The speakers for this two-day workshop came from different disciplines of academics, research and industry both from India and across the globe.

Panel discussions on 'Translating Sensor Research into Products in India' and 'Sensing the Future of Ubiquitous Sensing' were held to understand the key trends and future technologies in sensor development and current/ future market trends. Various topics pertinent to developing frontier technologies and how to gauge niche markets were discussed. Panellists having a broad spectrum of experience from academia, industry and R&D organizations were involved in these deliberations.

Panel Discussion: Sensing the Future of Ubiquitous Sensing



Panel Discussion: Translating Sensor Research into Products in India

The workshop was a success and provided a platform for cross-fertilization of ideas, collaboration across departments and outreach to the industry. All the sessions were attended by more than 150 participants.

Award Lectures at IIT Bombay

The recipients of various prestigious awards gave online talks (details given below) on their research works to the IIT Bombay academic community:

- **Talk by Shanti Swarup Bhatnagar Prize for Science and Technology 2020 winners (held on October 29, 2020):**

  Prof. U. K. Anandavardhanan, Department of Mathematics, spoke on "Distinguished Representations"

  Prof. Suryendu Dutta, Department of Earth Sciences spoke on "Evolution of Plant Terpenoids on a Rafting Continent"

- **Talk by Prof. S.C. Bhattacharya Award for Excellence in Pure Sciences 2019 winner (on March 16, 2021):**
  Prof. Raghavan B. Sunoj, Department of Chemistry, spoke on "Public Image of Chemist and Chemist's Image of Public - The Changing Paradigms"

- **Talk by Prof. H.H. Mathur Award for Excellence in Applied Sciences 2019 winner (on March 16, 2021):**
  Prof. Pushpak Bhattacharyya, Department of Computer Science and Engineering, spoke on "Looking at Language through Lens of Computation"

- **Talk by IRCC Research Publication Award winners (held during October 28-29, 2020):**
  Prof. Maheswaran Shanmugam, Department of Chemistry, spoke on "How to Exploit the Diamagnetic Ions to Improve the Magnetization Relaxation Dynamics of Dy(III) ions?"

  Prof. Nutan Limaye, Department of Computer Science and Engineering, spoke on "Algebraic computations and lower bounds"

  Prof. Subhankar Karmakar, Department of Environmental Science and Engineering, spoke on "Precipitation extremes and urban flood management"

  Prof. Rajneesh Bharadwaj, Department of Mechanical Engineering, spoke on "Evaporation of a colloidal suspension droplet"

  Prof. Soumyo Mukherji, Department of Biosciences and Bioengineering and Prof. Suparna Mukherji, Department of Environmental Science and Engineering, spoke on "Silver versus Silver"

- **Talk by IRCC Research Dissemination Award winners (held during October 28-29, 2020)**
  Prof. Parinda Vasa, Department of Physics, spoke on "Light-matter interactions in metal-semiconductor hybrid nanostructures"

  Prof. Raghavan B. Sunoj, Department of Chemistry, spoke on "Stories on Cooperativity in (a) Catalysis and (b) between the Guide and Good Graduate Students"

  Prof. Hetu C. Sheth, Department of Earth Sciences, spoke on "Volcanoes of India, past and present"

- **Talk by IRCC Early Research Achiever Award winners (held during October 28-29, 2020):**
  Prof. Pradip P. Kalbar, Centre for Urban Science and Engineering, spoke on "Alternate Design and Operational Strategies for Improving Water Supply Systems in India"

  Prof. Shobhna Kapoor, Department of Chemistry, spoke on "Mycobacterium

Tuberculosis Glycolipids Disorganize Host Cell Membranes and Rewire Membrane-Associated Functions During Infection"

- **Talk by Early Research Achiever Award and Prof. Krithi Ramamritham Award for Creative Research winner (held during October 28-29, 2020):**
  Prof. Varun Bhalerao, Department of Physics, spoke on "Building astronomical instruments: an engineering foray into astrophysics"

- **Talk by Prof. Krithi Ramamritham Award for Creative Research winner (held during October 28-29, 2020):**
  Prof. Jayakrishnan Nair, Department of Electrical Engineering, spoke on "Uncertainty management in the smart, renewable- rich power grid"

Media outreach for R&D

The recipients of various prestigious awards gave online talks (details given below) on their research. IRCC realizes the need to communicate its R&D efforts with wider society. Towards this, IRCC has collaborated with Gubbi Labs to bring out 41 easily accessible stories conveying IIT Bombay's achievements. These articles have been released in English, Hindi and Marathi. Many of these articles have been picked up by mainstream and online media and disseminated further (screenshots below).


Hindustan Times

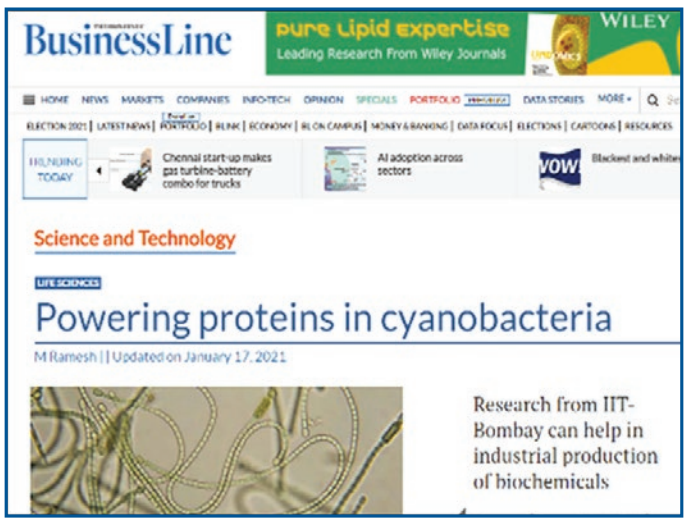
MUMBAI NEWS

IIT-Bombay researchers' artificial intelligence model to identify malaria parasites

The artificial intelligence (AI)-based models can be used for the diagnosis and prognosis of the two species of malaria parasite based on the changing trend of proteins in human blood

By Priyanka Sahoo, Mumbai

UPDATED ON JAN 03, 2021 04:44 AM IST


BusinessLine

pure Lipid expertise

Leading Research From Wiley Journals

WILEY

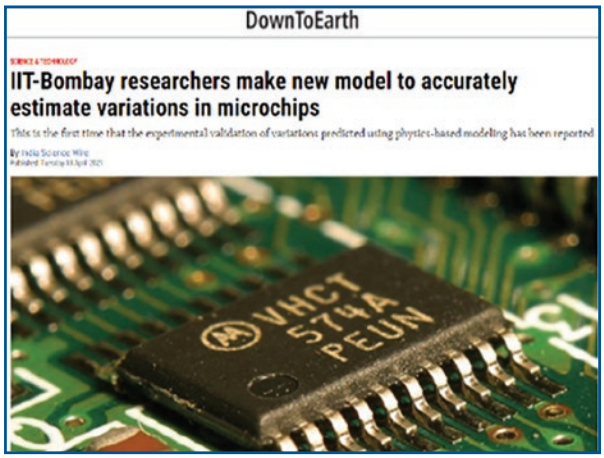
Science and Technology

LIFE SCIENCES

Powering proteins in cyanobacteria

M Ramesh | | Updated on January 17, 2021

Research from IIT-Bombay can help in industrial production of biochemicals



Session on Intellectual Property for Students

IRCC conducted an online session for first year MSc Biotechnology students on February 8, 2021. The session touched upon topics like need for prior art search, types of prior art, how to review prior art, patentability assessment, infringement assessment, landscape analysis etc. The session also included demonstration on prior art search on Questel-Orbit database for conducting different types of studies. Methods for optimal utilisation of database features combined with effective techniques for retrieving relevant prior art were discussed.

Brochures

In addition, brochures titled **'R&D Highlights'** reporting some of the outcomes of R&D efforts undertaken at the Institute and **'Partner with Us',** highlighting the interactions with industry and the possible modes of collaboration, were disseminated.

Focussed Initiatives on Ethics and Safety

Institute Ethics Committee (IEC)

During the year 2020-21, Institute Ethics Committee reviewed 54 proposals. 42 proposals were approved in expedited, full board or exempt

mode depending on nature of proposals. In light of the directive of Ministry of Health and Family Welfare mandating the IEC to register with the Department of Health Research, preparation of documents for the registration requirement is in process.

Institutional Review Board (IRB)

The Institute has been working since 2018 towards setting up the Institutional Review Board (IRB) in view of an increasing number and varied nature of research proposals received for ethics clearance. Correspondingly, in May 2020, the Director constituted the IRB with Prof. Virendra Sethi, Environmental Science and Engineering Department as Chair Person and Prof. D. Parthasarathy, Department of Humanities and Social Sciences, as co-Chair. The Committee consists of members from various academic units of the Institute and two external members. The IRB will look into research proposals dealing with social and behavioural studies that are not related to health and bio-medical arenas and do not intend to engage in human interventions.

A portal for submission of proposals and guidelines of IRB was created under the "Drona" webpage. The IRB met several times to discuss and finalize the norms and guidelines for approval of proposals received. It also designed forms and protocols for proposal submission, scrutiny and approval. In this FY, IRB reviewed 24 proposals, approved 22 proposals and forwarded 2 proposals to IEC.

Safety

A Fire and Safety Section Policy Formation and Monitoring Committee was constituted in September 2020 with Associate Dean-1 (Infrastructure Planning and Support) as its Convener. The Committee was constituted to establish operational practices and develop broad policy guidelines for the proposed Fire and Safety Section (FSS) under the Dean (Infrastructure Planning and Support) Office. This section will maintain the existing systems and also install new systems for fire and general safety needs. The FSS will also train the incoming students and enhance the safety practices to be adopted in laboratories. The Institute Bio-safety Committee (IBSC) reviewed 21 proposals during the year. Fourteen proposals were approved by the committee. Three full-board meetings and four core committee meetings were conducted during this period.

Online Processes

Online interface of R&D activities continued to make it more user-friendly and few of the activities automated in this year are as follows:

- Setting up Query Management portal to enable faculty, project staff, students to raise project specific queries to concerned dealing staff at IRCC related to different sections like Administration I, Administration II and Accounts section
- Setting up industry portal on Drona which captures
  - details/ progress of interaction between industry and IRCC. Requests can be forwarded to multiple faculty members, HODs of many departments at the same time. Captures feedbacks/ interests expressed by faculty members. Report is provided to IRCC Technical Section to capture details as per required search criteria
  - Mapping of industry request with Consultancy Cost Estimate and Sponsored Project proposal
- Creating international conference online module on Drona to capture students/ projects staff/ PDFs travel related requests
- Developing complete online module for maintenance of Project Staff Salary Register on Drona. This module includes below mentioned details:

- Project Staff's salary related details including auto updating project code, project codes (In case of supported projects), extension date, salary, HRA/ Out-of-campus allowance fields, automatic calculations for the each data in allowances and deductions sections.
- Project Staff Salary Register Details: This interface will show the particular financial year data for the particular employee
- Consolidated monthly report

- Setting up of online telephone directory to view phone numbers of related PI/ Co-PI/ IRCC staff and connected with IIT Bombay telephone directory
- Modifying Drona's consultancy cost estimate online form to capture ethical clearance criteria in consultancy module
- Implementing online user registration facility for the following central facilities: Advanced Mechanical Testing Facility (AMTF), Bio Safety Level-2 Laboratory at the Department of Bioscience and Bioengineering, Nano-Indenter central facility, X-ray Diffractometer Facility at MEMS
- Developing online program to send an automated Research Internship Certificate to all interns
- Extending Drona system to Institute for RIFC proposals
- Developing dashboard on Drona to view details for the all categories such as sponsored projects, consultancy projects and project staff details
- Improving IRCC muster and linking with leave applications
- Creating online module for uploading IT details of all project staff members
- Updating module for IRCC support to before pre-synopsis, after pre-synopsis and mid-term support to students to include complete IRCC internal approval chain in Drona
- Refining Drona online system by creating filters to allow only eligible faculty types access to Drona system
- Updating existing online honorarium request form by restricting payment of honorarium to Institute's permanent, temporary, project staff, students and others (not part of IIT Bombay) on Drona
- Setting up new module for acceptance of SOP for project code creation and closure of project maintained in SAP by dealing staff followed by supervisor's review and submission on Drona
- Enabling facility to send soft copy of No Dues along with a formal acceptance letter by email to project staff
- Generating automated email notifications to faculty members and IRCC technical team at each step of finalizing a research write-up, till write-up gets finalized
- Implementing new project staff designation and salary rules in project staff requisition request

Project Manpower

Number of Project staff/ fellow working in various projects as on March 31, 2021 is 1094. Among them, 328 joined during the FY 2020-21.

OUTREACH PROGRAMMES

The Continuing Education and Quality Improvement Programme (CE & QIP) office at IIT Bombay has been actively reaching out to working professionals from both academia and industry to serve the competency development and training requirements. A large number of working professionals from industry as well as faculty and students have participated and acquired knowledge from short and long-term certificate courses during 2020-21.

Many of the Institute's CEP courses for the industry are well established worldwide and continue to attract large participation, both from within as well as from abroad. The courses on "Human Computer Interaction", "Executive Programme in Management", "Leadership Development Program", "Data Analytics", "Python Programming" and "Digital Marketing" have all been appreciated by the industry. In-house courses have been offered to companies such as Michelin India, L&T, BEL Academy, Tata group of companies and many others. Starting from last year the CE&QIP office has been actively promoting the online mode for conducting CEP courses, such that the activities can continue uninterrupted during situations like the COVID-19 pandemic.

In terms of the overall performance of CE&QIP during 2020-21, a total of 51 CEP courses were conducted with about 945 participants from across disciplines as well as industries, organizations and institutions, with a revenue of around Rs. 5.50 crore.

During June 2020 and March 2021, seven courses with two EdTech partners, namely Eruditus and UpGrad were launched. These courses were offered in online mode for 5-6 months' duration each and having 60-70 hours of course content. About 60-110 participants enrolled in these courses. The CE&QIP office has received an approval to try a few more courses with other reputed EdTech partners until October 2021. The same is in the planning phase. Simultaneously, the CEP office is also working on a business plan for the next five years, whereby a significant improvement in revenue streams is expected by leveraging "async" –online delivery and the resources of EdTech partners.

Under the QIP category, six PhD students from AICTE-approved engineering colleges were admitted. In addition, 12 teachers were inducted into PhD programme under the advance admission scheme who would be joining the Institute for the regular programme from July 2021. Further, one short-term course (STC) was conducted for college teachers under sponsorship from AICTE and a total of eight participants from various engineering institutions/ colleges attended the course.

FACULTY ACHIEVEMENTS AND RECOGNITIONS

During the year, 22 faculty members (15 Assistant Professor Grade I, one Associate Professor and one Professor) on regular basis and five on Assistant Professor Grade II joined the Institute. The number of full-time faculty members on the roll of the Institute has risen to 686 comprising 359 Professors, 01 Professor (Contract), 180 Associate Professors, 170 Assistant Professors (Grade-I) and 13 Assistant Professors (Grade-II). In addition, there are 62 adjunct faculty members and 343 post doctoral fellows on the roll. Around 12 faculty members retired – nine of whom were re-employed and two resigned during the year.

The Institute provided financial assistance to 16 faculty members for participating in international conferences through virtual mode. Due to the pandemic, faculty members could not travel abroad for attending international conferences using external funding.

Apart from educational and research pursuits, the faculty of the Institute meet national and global obligations in diverse ways. Many of them have accepted membership of various national committees and editorship of journals. They also review manuscripts for publications. IIT Bombay is proud that our efforts have received recognition in the form of many awards and distinctions, some of which are listed below:

Prof. U. K. Anandavardhanan, Department of Mathematics, has been awarded Shanti Swarup Bhatnagar Prize for 2020 in 'Mathematical Sciences' category.

Prof. Suryendu Dutta, Department of Earth Sciences, has been awarded Shanti Swarup Bhatnagar Prize for 2020 in 'Earth, Atmosphere, Ocean, and Planetary Sciences' category.

Prof. Vivek Agarwal, Department of Electrical Engineering, has been elected as Fellow of Indian National Science Academy (FNA), New Delhi.

Prof. M. Ravikanth, Department of Chemistry, has been elected as Fellow of Indian National Science Academy (FNA), New Delhi.

Prof. Souvik Mahapatra, Department of Electrical Engineering, has been elected as Fellow of Indian National Science Academy (FNA), New Delhi.

Prof. Amit Agrawal, Department of Mechanical Engineering, has been elected as a Fellow of Indian Academy of Sciences (FASc), Bangalore.

Prof. Neela Nataraj, Department of Mathematics, has been elected as a Fellow of Indian Academy of Sciences (FASc), Bangalore.

Late Prof. Rinti Banerjee, Department of Biosciences and Bioengineering, had been elected as Fellow of the National Academy of Sciences, India (FNASc).

Prof. Samir Maji, Department of Biosciences and Bioengineering, has been elected as Fellow of the National Academy of Sciences, India (FNASc).

Prof. Maryam Shojaei Baghini, Department of Electrical Engineering, has been elected as Fellow of INAE (FNAE) from November 2020.

Prof. Anil Kulkarni, Department of Electrical Engineering, has been elected as Fellow of INAE (FNAE) from November 2020.

Prof. Soumyo Mukherji, Department of Bioscience and Bioengineering, has been elected as a Fellow of the Indian National Academy of Engineering (FNAE).

Prof. R Murugavel, Department of Chemistry, has been conferred the prestigious J. C. Bose fellowship from Science and Engineering Research Board (SERB), New Delhi.

Prof. Dipendra Prasad, Department of Mathematics, has been conferred the prestigious J. C. Bose fellowship from Science and Engineering Research Board (SERB), New Delhi.

Prof. Swatantra Pratap Singh, Environmental Science and Engineering Department, has been selected for INAE Young Engineer Award 2020.

Prof. Shobhna Kapoor, Department of Chemistry, has been selected to receive 'INSA Medal for Young Scientists" for the year 2020.

Prof. Prabhakar Naraga, Department of Earth Sciences, has been selected to receive 'INSA Medal for Young Scientists" for the year 2020.

Prof. Shobhna Kapoor, Department of Chemistry, has been selected to receive the Science and Engineering Research Board (SERB) Women Excellence Award-2021. This award is given to support the basic research in the frontier areas of science and engineering.

Prof. Dipti Gupta, Department of Metallurgical Engineering and Materials Science, has been selected to receive the SERB-POWER (Promoting Opportunities for Women in Exploratory Research) Fellowship.

Prof. Neela Nataraj, Department of Mathematics, has been selected to receive the SERB-POWER (Promoting Opportunities for Women in Exploratory Research) Fellowship.

Prof. Archana Pai, Department of Physics, has been selected to receive the SERB-POWER (Promoting Opportunities for Women in Exploratory Research) Fellowship

Prof. Debasis Chakraborty, Department of Aerospace Engineering, has been elected as a Fellow of West Bengal Academy of Science and Technology (WAST).

Prof. Subhananda Chakrabarti, Department of Electrical Engineering, has been admitted as a Fellow of SPIE (The International Society for Optics and Photonics), USA.

Prof. Santosh Gharpure, Department of Chemistry, has been invited to become a 'Fellow of the Royal Society of Chemistry' *through their Leaders in the Field Scheme.*

Prof. Preeti Rao, Department of Electrical Engineering, has been selected to receive the Abdul Kalam Technology Innovation National Fellowship for a period of 3 years starting from October 1, 2020.

Prof. Sanjeeva Srivastava, Department of Biosciences and Bioengineering, has been elected as a Fellow of Royal Society of Biology (FRSB) and Fellow of Royal Society of Chemistry (FRSC).

Prof. Sudarshan Kumar, Department of Aerospace Engineering, has been elected as a Fellow of the International Society for Energy, Environment and Sustainability.

Prof. Saurabh Lodha, Department of Electrical Engineering, has received the Young Career Award in Nano Science & Technology for 2020 instituted by the Department of Science and Technology (DST), Government of India.

Prof. Ruchi Anand, Department of Chemistry, received Chemical Research Society of India (CRSI) bronze medal.

A film "*Saakshatkaaram*" by **Prof. Sudesh Balan**, IDC School of Design and his team bagged two awards at the 14th Edition of SIGNS film festival organized by Kerala Region of Federation of Film Societies of India.

Prof. Nagamani Jaya Balila, Department of Metallurgical Engineering and Material Sciences,

has received "Acta Materialia and Scripta Materialia" Outstanding Reviewer Award for 2019.

Prof. Subimal Ghosh, Department of Civil Engineering, has been selected to receive American Geophysical Union (AGU) DL Memorial Medal 2020.

Prof. Subimal Ghosh, Department of Civil Engineering, has been awarded the Cray's Dr. A. P. J. Abdul Kalam High-Performance Computing Award 2020 in the area of R&D in HPC applications.

Prof. Sridhar Iyer, Interdisciplinary Programme in Education Technology, has received the ACM Indian Outstanding Contribution to Computing Education (OCCE) Award for the year 2020.

The research work of **Prof. Pradip Kalbar**, Centre for Urban Science and Engineering, published along with his collaborator Prof. Monio Neiro (Aalborg University, Denmark), has received the 2nd prize in PRISMA (Performance and Policy Research in Sustainability Measurement and Assessment) awards which are given for ground breaking research sustainability assessment and policy.

Prof. Tarun Kant, Department of Civil Engineering, has been selected to receive the VASVIK Award for 2020 in the area of Mechanical & Structural Science and Technology.

Prof. Vinish Kathuria, Shailesh J. Mehta School of Management, has been selected to receive the Outstanding Reviewer Award by Emerald Publisher for their *"International Journal of Developing Issues"* for the year 2020.

Prof. Dulal Panda, Department of Biosciences and Bioengineering, has received "The Sun Pharma Research Award-Pharmaceutical Sciences" for the year 2020.

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

Prof. Dipti Gupta, Department of Metallurgical Engineering and Material Sciences and **Prof. Parag Tandaiya**, Department of Mechanical Engineering, have been recognized as "Outstanding Reviewers of the Year 2019" Award from "*Flexible and Printed Electronics*" and "*Modelling and Simulation in Materials Science and Engineering*", *respectively.*

Prof. N. N. Viswanathan, Department of Metallurgical Engineering and Materials Science, has been selected to receive the Indian Institute of Metals Educator Award for the year 2020.

Prof. Milind Atrey, Department of Mechanical Engineering, has been elected as the President of "Indian Cryogenics Council (ICC)" for 3 years.

Prof. Ruchi Anand, Department of Chemistry, has been invited to deliver A.V. Rama Rao Foundation lecture on Chemistry by President, JNCASR, Bengaluru.

Prof. Amrita Bhattacharya, Department of Metallurgical Engineering and Materials Science, has been elected as a member of the National Academy of Sciences, India.

Prof. Arnab Dutta, Department of Chemistry, has been selected as Associate of the Indian Academy of Science (IASc).

Prof. Amol A. Gokhale, Department of Mechanical Engineering, has been appointed as the President of the Indian Institute of Metals for one year with effect from August 1, 2020.

Prof. Santosh J. Gharpure, Department of Chemistry, has been selected as a member of India-UK Innovation and Sustainability Chemistry Consortium (ISCC) formed by scientists from India and UK and approved by the British High Commission.

Prof. Ravindra Gudi, Department of Chemical Engineering, has been elected as a council member

of the International Federation of Automatic Control (IFAC) for the triennium 2020-23.

Prof. Karuna Jain, Shailesh J. Mehta School of Management, continues as the President of the Production and Operations Management Society (POMS) India chapter in 2020 and 2021.

Prof. Devang V. Khakhar, Department of Chemical Engineering, has been elected as Vice President of the Indian National Science Academy (INSA) Council.

Prof. Nina Sabnani, IDC School of Design, has been elected to the Board of International Association of Women in Radio and TV (IAWRT).

Prof. Amber Shrivastava, Department of Mechanical Engineering, has been appointed as the Joint Hon. Secretary of the Indian Institute of Metals for one year with effect from August 1, 2020.

Prof. Chetan Singh Solanki, Department of Energy Science and Engineering, has been appointed as Brand Ambassador of Solar Energy for Madhya Pradesh till 2023.

Prof. R. B. Sunoj, Department of Chemistry, has been invited to join the IUPAC-Organic and Bimolecular Chemistry (Division III) as a member of the subcommittee on *Structural and Mechanistic Organic Chemistry*.

Prof. K. G. Suresh, Department of Physics, has been elevated to the grade of Senior Member of IEEE this year.

Prof. Ruchi Anand, Department of Chemistry, has been invited to join the International Advisory Board of *Asian Journal of Organic Chemistry*, published by Wiley-VCH.

Prof. Avik Bhattacharya, Centre of Studies in Resources Engineering, has been invited to join the Editorial Board of the *Journal of Remote Sensing*.

Prof. Pushpak Bhattacharyya, Department of Computer Science and Engineering, has been inducted as one of the Editorial Board members of *Journal of Natural Language Engineering (JNLE)*, published by Cambridge University Press.

Prof. Rajarshi Chakrabarti, Department of Chemistry, has been invited to serve as an Associate Editor of the International Journal of *Chemical Kinetics* for 3 years, starting from June 2020.

Prof. E. Chandrasekhar, Department of Earth Sciences, has been invited to join the Editorial board of *Arabian Journal of Geosciences* as an Associate Editor.

Prof. Suryanarayana Doolla, Department of Energy Science and Engineering, has been appointed as Editor of the *IEEE Journal of Emerging and Selected Topics in Power Electronics (JESTPE)* starting from September 1, 2020.

Prof. Harsha Hutridurga, Department of Mathematics, has been invited to join the Editorial Board of the Royal Society Journal Proceedings of *the Royal Society A: Mathematical, Physical and Engineering Sciences*.

Prof. Arun Iyer, Department of Humanities and Social Sciences, has been appointed as Associate Editor of the Journal of the *British Society for Phenomenology* published by Taylor and Francis.

Prof. V. Jothiprakash, Department of Civil Engineering, has been appointed as an Associate Editor of *Journal of Applied Water Engineering and Research, IAHR Journal and* Associate Editor of Journal of *Hydrologic Engineering*, published by American Society of Civil Engineering (ASCE).

Prof. Pradip Kalbar, Centre for Urban Science and Engineering, has been invited to join as one of the Editors for the Journal of *Water Reuse and Desalination*, an International Water Association's (IWA) publication.

Prof. Vivek Kant, IDC School of Design, has been appointed as an Associate Editor of the Journal *Ergonomics in Design* and the editorial board of the Journal *Human-Intelligent Systems Integration* published by Springer.

Prof. Nand Kishore, Department of Chemistry, has been appointed as the Editor of the Journal of *Chemical Thermodynamics (an Elsevier Journal).*

Prof. Kiran Kondabagil, Department of Biosciences and Bioengineering, has been invited to join the Mary Ann Liebert Journal *PHAGE: Therapy, Applications and Research* as an Associate Editor.

Prof. Suvarn S. Kulkarni, Department of Chemistry, has been appointed as Guest Editor of a special collection on *Carbohydrate Chemistry*, to be published jointly by *European Journal of Organic Chemistry and ChemCatChem.*

Prof. Sudarshan Kumar, Department of Aerospace Engineering, has been nominated as one of the members of the Editorial Board of "Defence Science Journal", a peer-reviewed primary research journal in the field of Engineering and Defence Technologies.

Prof. Arpita Mondal, Department of Civil Engineering, has been invited to join as an Associate Editor in the *International Journal Regional Environmental Change (REEC), Springer.*

Prof. Neela Nataraj, Department of Mathematics, has been invited to become an Associate Editor of *ESAIM: Mathematical Modeling and Numerical Analysis (ESAIM: M2AN).*

Prof. Rajakishore Nath, Department of Humanities and Social Science, has been invited to join as Associate Editor of AI and Society: *Journal of Knowledge, Culture and Communication.*

Prof. Kasturi Saha, Department of Electrical Engineering, has been invited to join the Editorial Board of Quantum Optics as Review Editor for *Frontiers in Photonics.*

Prof. Amit Sethi, Department of Electrical Engineering, has been invited to join the Editorial Board of Cancer Imaging and Image-directed Interventions as Review Editor for *Frontiers in Oncology.*

Prof. Hetu Sheth, Department of Earth Sciences, has been invited to become a member of the Editorial Board of *Geosciences* (published by MDPI, Switzerland) and Editorial Advisory Board of *Journal of Petrology* (published by Oxford University Press, UK).

Prof. Shobha Shukla, Department of Metallurgical Engineering and Materials Science, has been invited to become a member of the Editorial Board of Journal of *Physics-Photonics*, published by Institute of Physics (IoP) publishing.

Prof. Riddhi Singh, Department of Civil Engineering, has been invited to serve as an Associate Editor of the *Journal of Earth System Science*, published by the Indian Academy of Sciences for 3 years from July 2020.

Prof. R. B. Sunoj, Department of Chemistry, has been invited to join the Editorial Board of *Chemical Society Reviews* for a period of 3 years.

Prof. Chandra M. Volla, Department of Chemistry, has been chosen by editorial boards of Synlett, Synthesis and Synfacts as one of the *Thieme Chemistry Journal Awardees* in 2021.

Solar Urja through Localization for Sustainability (SoULS)- a solar initiative started by **Prof. Jayendran Venkateswaran** (Industrial Engineering and Operations Research) and **Prof. Chetan Solanki** (Department of Energy Science and Engineering) has received the CSIR Award for S&T Innovations for Rural Development for 2019.

STUDENT ACTIVITIES

Events and Workshops

- **Online Fitness Sessions:** With the onset of the pandemic, the Institute teams were out of touch with their fitness routines and hence online fitness sessions were organised to maintain fitness
- **Workshops and Webinars:** Numerous workshops and webinars were conducted for the institute community in various fields of wellness and nutrition apart from sports:
  - 4 Pillars of Wellness: A webinar with Mr. Navin Hettiarachchi, Director of health and wellness at NBA, on the importance of mental well-being for the younger generation
  - Grandmaster's Webcast: A series for chess enthusiasts to interact with the best chess players like Pravin Thipsay, Bhakti Kulkarni and Swapnil Dhopade
  - Inside Indian Basketball: A live interactive session hosting the renowned Indian women's national Basketball team player Shireen Limaye
  - Nutri Talk: A webinar with nutritionist Somya Gupta about the importance of diet
  - Queen's Gambit: A beginner's training workshop for girls in the Institute taught by senior inter-IIT players along with a tournament on the next day.
  - Chess Training Workshop: A training workshop by International Master Kushager Krishnater followed by a simul where he played with 15 players simultaneously
  - Get Set Fit: A series of fitness sessions like zumba, circuit training, aero fitness, kick-boxing only for women in phase I followed by males in phase II
- **Other Events:**

  A lot of events were conducted for the institute community to keep people occupied during the pandemic.
  - Fitness Five and launch of Fitness Club-IIT Bombay: Conducted a five-day-long fitness challenge, witnessing great participation from 200+ students. Also launched the 'Fitness Club IIT Bombay' to cater to the fitness and diet requirements of students.
  - Virtual run in collaboration with Fit India Movement: A virtual run was conducted both online as well as in offline mode on campus under the Fit India Movement.
  - Quarantine Chess Battles: Conducted several inter-university chess battles to promote the culture of chess within the Institute, witnessing 1500+ participants across all 7 editions with teams from over six countries.
  - Freshers Chess Open: A tournament to scout talented freshers in Chess for potential inter-IIT candidates. Received 100+ registrations with good participation from girls.
  - Institute Fantasy League | Football: Inaugurated IIT Bombay's Fantasy League on the Fantasy Premier League platform with prizes for monthly as well as overall winners.
  - Freshmen Orientation: Conducted the UG Sports Orientation virtually for the first time, witnessing 450+ UG freshers. Also conducted pre-events like

Freshie Crypt Hunt and Freshmen Skillshow Challenge and invited fitness

celebrity Sonali Swami and 9th youngest chess GM in history Raunak Sadhwani as chief guests.

- Cyclothon: Conducted Cyclothon for the first time and the first offline event

  of the year witnessing 65+ participants from within the Institute.

- **Inter-Hostel General Championships:** With the semester being held online, the Inter-Hostel GC was remodeled to a virtual cup with the following events under it:
  - Virtual Chess Cup: An inter-hostel and inter-departmental online Chess

    tournament
  - Virtual Crossy: A crossy conducted online for the first time, witnessing 80+

    runners
  - IPL Fantasy League: Launched the IPL Fantasy League platform with daily,

    weekly and overall leaderboards and witnessed a participation of 1400+ students
- Blackcats Championship: Inaugurated a first-ever intra-contingent tournament in the

  form of a five-episode game show with 150+ participants from the various institutes'

  sports teams. A total of five Performance Gauging Sessions were conducted

  focusing on different aspects of athletic performance: balance, agility, strength, core and endurance.

Aavhan 2021

Aavhan, the annual sports festival of IIT Bombay, was conducted during April 27-28, 2021. It was a two-day fest with a lot of year-long events as a build up to the fest.

- **Virtual Run:** Ideated and conducted Aavhan's first-ever online event, the Virtual Run, witnessed by 1500+ participants. This event was promoted by fitness and sports celebrities like Sonali Swami, Shweta Rathore and Natasha Palha. Also staged a charity drive in collaboration with Goonj and Give India, raising an amount of more than INR 13,000

- **Aavhan Online Chess Tournament:** Conducted the second edition of the online Chess Tournament in collaboration with chess.com and a total prize fund worth INR 1,50,000. Catered to a user base of 4000+ people with regular social media posts and recorded the highest participation of 550+ amongst all single-day paid chess events in India. Also conducted an interactive session with Indian national champion Tania Sachdev in association with Redbull exclusively for the participants and the Institute audience

- **Aavhan Winter Trek:** Collaborated with Indiahikes - India's largest and safest trekking organization to organize two treks to Brahmatal and Dayara Bugyal in December 2020 and publicised the experiential learning trek to more than 10k students with 80+ registrations

- **The 2-day fest:** Aavhan was conducted during March 27-28 with the following events:

  - **Panel Discussions:** Conducted several panel discussions in the run-up to and during Aavhan with esteemed speakers:
    - Pursuing national level sports besides undergraduate studies
    - Future Olympics – A Chance for India and Cricket
    - Sports Fusion - Recent advances in Sports Management, Tech and E-sports

  - Lecture Series: Conducted several lectures in the run-up to and during Aavhan with the esteemed speakers listed below:
    - Artificial Intelligence in Chess by Mr. Reid McLLroy Young
    - Dieting the Millennial Way by Ms. Shikha Sharma

- The Mental Fundamentals by Malvika Fernandes, Tanvi Sambrani and Devika Kapoor
- Living a holistic life by Mr. Luke Coutinho
- Unboxing racing by Ms. Mira Erda
- Unraveling Indian Boxing by Mr. Amit Panghal

⏩ Workshops:

- Aavhan Fitfest: Fitness workshops (zumba and cardio) with 25+ participants
- Sports Analytics Workshop: Conducted two sports analytics workshops in association with ColLearn with industry experts witnessing 500+ registrations
- Career in Sports Commentary: Workshop by a professional commentator
- Mental Health: Conducted a webinar in collaboration with Project Mumbai

⏩ Other Competitions: Numerous other competitions were conducted like IPL auction, photography competition, case competitions, sports commentary competition

PG Sports:

- **Inter-Departmental PG GC:** The Postgraduate (PG) General Championship (GC) was also held online with the Virtual Cup also filling in for the PG GC, with Virtual Crossy, Chess Cup and IPL Fantasy League
- **PG Sports Orientation:** Conducted the PG Sports Orientation in online mode with 500+ PG freshers participating. Also invited fitness celebrity Sonali Swami and Padmashree awardee Deepa Malik and released the PG Sports handbook detailing rules and contacts
- **In-Campus Lawn Tennis Tournament and PG Camp:** Organised the first offline event for the student community in the form of a Tennis tournament, while ensuring the social distancing norms. This tournament witnessed great participation from the students and was followed by a month-long Lawn Tennis camp for PG students, which unfortunately had to be cut short after 15 days because of the second wave of Covid-19 in the country
- **Other events:** Organised Yoga 101 in coordination with Yogastha, the Yoga club of IIT Bombay for PG freshers and also conducted Quiz-o-Mania, an online quiz with 200+ entries in the prelims with the top 5 teams battling it out in the live streamed final

Cultural Council

The online semester posed a huge challenge to conduct events online, maintain the culture and propagate the same among the batches given the restraints. All the clubs worked diligently towards their goals devoid of the challenges set up by the pandemic.

Fourthwall

- The Fourthwall club conducted the first-ever radio drama

StyleUp

- StyleUp conducted its flagship event ShowStopper as the grandest online fashion competition
- Showstopper also collaborated with NGO Khushiyan to raise funds for Covid Relief
- Halloween night was also conducted featuring the club members in a spooky virtual fashion show

Rang and Pixels

- The members of the club hosted a virtual Kaladarshan exhibition exhibiting 300+ artworks and photographs
- 10+ workshops were conducted over various genres ranging from coffee painting, cartoon making to scribble art and origami

WeSpeak and Comedy Cons

- The flagship initiative of We Speak, Brave New World, consisted of a series of panel discussions and interviews with some of the most illustrious journalists, industrialists and politicians in the country
- The flagship event of Comedy Cons, Laughter Riots and Annual Standup Showcase was conducted in an entirely unique format
- The IIT Bombay pro AM debate and tournament and the IIT Bombay debate saw a high-quality judge pool with experienced judges from the Indian circuit as well as international champions
- A series of free workshops on public speaking were conducted by Supreme Court advocates, TEDx Speakers and Life Coaches

Symphony

- The club hosted open live mics, twice the whole tenure on its Instagram page
- Music-listening sessions and genre of the month were also looked after in the semester
- The intra-hostel Music League was held to cater to hostel competitions was a replacement of music GC
- Songwriting workshops, recording workshops and rap workshops were held among many others

Silver Screen

- The flagship initiative, Silver Edit, was a pan-IIT online editing competition with 10 participating IITs
- Adapted the on-spot filmmaking session in online mode as virtual filmmaking and filmmaking arcade i.e. music video making in online mode
- Animation and On Spot VFX workshops were held with attendees who were working on their individual videos

InSync

- The Annual InSync's Dance show hosted a total of 100+ dancers performing in a total of 9 performances with LYPs worth 25k offered to the online challenge winners
- The Sophie dance and league and the Freshiezza was conducted. The club members took part in various competitions held over the year
- InSync conducted first-ever international artist workshop at IIT Bombay, Rob-Rich, having 95k followers on Instagram

Roots

- Dharohar featured a themed video series of classical and folk dance forms and music by students to promote classical and folk art culture in the Institute
- Organized folk art workshops for Warli, Madhubani, Mandala and Gond art by professional artists all across the world to promote regional folk art
- Conducted ICSP under the supervision of Prof. Mazhar Kamran, PhD student Manisha Naskar and renowned folk artist Sampada Agarwal (based in the US). Students learned to make Warli and incorporated it to depict stories in this seven-week long project

Literati

- Literati conducted the Literary Arts Festival, Literarium which consisted of three workshops, three competitions and a speaker session by renowned author Meghna Pant
- Launched a Scrabble tournament among the IIT Bombay and five other IITs (Kharagpur, Madras, Kanpur, Hyderabad, Roorkee)
- A Haiku workshop was conducted by external speaker Mr. Raamesh Gowri Raghavan and a performance poetry workshop was conducted by artist Ms. Ramya Pandyan

Design Club

- Eight design-related projects were taken up (e.g. UI/ UX, Branding, 3D Modelling etc.)
- Organised three talks by national and international artists about their experiences and expertise in their respective design fields
- Various workshops were conducted over the semester

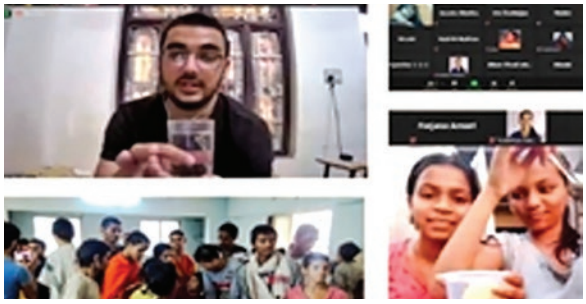
Abhyuday

Following year-long activities were conducted by Abhyuday 2020-21, with the focus on creating social awareness and impact through digital mode of communication.

Campaigns: -

- **Rising Above Corona** - In collaboration with UNICEF India, spread awareness to shed negative thoughts so that everyone can fight the stigma together. The team shared testimonials of doctors, shared artwork from competition participants and conducted and live talk on stigma by UNICEF Mumbai head with actor Shruti Seth

- **Career Counselling Campaigns (CCC)** were conducted for 400+ students with the help of 20+ volunteers from IIT Bombay. The students were told about the myriad of career opportunities through video conferences with help of their school
- **Animal safety awareness** - Collaboration with PETA India to start animal safety awareness campaign and published a blog post with PETA on rescue stories by IIT Bombay students and conducted a discussion on veganism
- **Masti Ki Paathshala** - Five online sessions were conducted, reached out to 250+ orphanages and underprivileged students to teach science with toys and stimulating fun experiments



- **Pride Month** - Celebrated Pride Month to remove discrimination against LGBTQ+. We organised a social media campaign to spread awareness of LGBTQ+ members' rights
- **Cyber Security Campaign** - Conducted an online campaign, shared information to create awareness and conducted a quiz to test knowledge of cyber threats

Events: -

- **Treaded Street series** – A series of lectures were held as part of the Annual Fest giving career guidance in different fields like politics, bureaucracy etc. Mr. Jayant Sinha (M.P.), Mr. Karn Satyarthi (IAS) and Ms. Priyal Keni (International Athlete) spread light in these career paths.

- **Abhyuday's Annual Social Fest** was held digitally for the first time encompassing many events dealing with social issues, along with which self-awareness and solutions were presented. Several renowned personalities including Mr. Jayant Sinha, Ms. Priyal Keni, Mr. Prashant Dhawan, Mr. Amitabh Behar, CEO of Oxfam India and many more talked on pressing issues including environmental issues, career choices, mental health, youth empowerment etc. A socio-tech exhibition was also incorporated.
- **Women Empowerment** - Organized live talk with actress Ms. Ira Dubey and Mr. India Dara Singh to encourage both men and women to work for the equality of every citizen of society. Also organised four online self-defense workshops to teach different self-defense techniques.

Competitions: -

- **Action Plan** - Challenges the youngsters across the country to come up with feasible and optimistic solutions to tackle social issues present in Indian society. This year, 700+ teams from all over India participated in the competition and 21 teams were invited to present their solutions in front of a panel of 18 incubators and investors. This year, we had a prize amount total of worth rupees three lakhs sponsored by Micron Foundation and ICICI Foundation.
- **PIL Competition on Road Safety** - To promote student involvement in laws and policies related to social issues by providing a fair and competitive environment for an exchange of thought and to strive and develop participant's knowledge related to them. The competition saw participation from 500+ students in 200+ teams.
- **Kalamanch** - The aim of Kalamanch was to convey the multifaceted themes in fighting the social problems which are related to human rights, thereby condemning the deterioration of human rights by raising awareness among one and all through art and photography, consisting of paintings, photographs, graffiti, digital art and different artworks. This year, we added one new sub part i.e. film-making to the competition.

Technical Affairs

TECHNICAL SUMMER SCHOOL

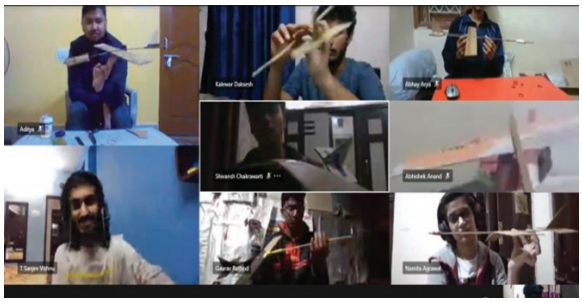
This year, the Institute Technical Council conducted the Technical Summer School under Learner's Space in collaboration with Undergraduate Academic Council (UGAC). Under this initiative, a total of 8 courses were conducted by different tech clubs. Web and Coding Club (WnCC) held courses on Python (70 completions), Web Development (80+ completions), Machine learning (35 completions). The MnP Club held a course on Scientific computing (42 completions). The Chemistry Club offered a course "Chemistry: Chemistry and History" and the Energy Club held a course on Fundamentals of Energy (85 registered) and Advanced topics in Energy (55 registered).

CLUBS

25 workshops, 14 competitions and hackathons and 40 talks were organised by all the clubs together reaching an audience of over 2500 students.

To establish an online presence, weekly problems and updates on technology were delivered via newsletters and social media. Some clubs started their own Podcast series and some clubs also participated in national competitions like Skyrush, TechKriti, E-Yantra.

All clubs conducted freshie orientation in online mode with interactive workshops at the end. Most of the clubs revamped their websites to improve presentation and make club-related info more accessible for all. Competitions like How Things Work, Glider making etc. were held to give students practical working experience in online mode. The Instagram and Facebook series were launched by various clubs which includes quizzes, general info posters etc. Student reading groups were formed to form a community and share knowledge. Documentary and movie screenings proved to be an effective medium of learning. Group discussions were held as a continuing tradition to promote knowledge sharing. The clubs launched various projects to engage the students productively during the holidays.



PROJECTS

Institute Technical Summer Projects (ITSP) is an annual programme organised by Institute Technical Council (ITC) for freshmen to provide them first-hand technical exposure during summer vacations. Students are encouraged to also target real-life problems that can be solved using technology and the selected projects are provided with mentorship by senior undergraduates. A total of 64 projects were completed. For further development, students were also encouraged to sign up for Founders' Garage, an Institute Technical Council (ITC) and Entrepreneurship and Business (EnB) Club collaboration aimed at nurturing projects into start-ups.

The Summer of Science (SoS) by Maths and Physics (MnP) Club matches enthusiasts with diverse interests to student mentors. SoS took off with 500+ mentees and 180 mentors. Seasons of Code (SoC) by Web and Coding Club (WnCC) had 30 projects and over 100 mentees were able to complete their respective projects. Projects ranged from Web Development and Cybersecurity to Data Science and Graphics rendering. Sustainability Cell collaborated with the Institute Technical Council and floated funded technical projects, guided by professors, aimed at solving issues related to sustainability in our Institute.

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9th INTER IIT MEET

The 9th Inter IIT Tech Meet was hosted by IIT Guwahati, during March 26-28, 2021. This year, IIT Bombay bagged the first runner-up position in the overall championship, winning 3 gold, 2 silver and 4 bronze medals. This was a considerable improvement from standing 8th overall in 2019.

GENERAL CHAMPIONSHIPS

10 intra-hostel General Championships (GC) were conducted over the year. These GCs saw participation of 13 teams from 16 hostels and Hostel 5 won the Tech-Cup.

- Jhatka GC
- Biomimicry GC
- Kuber ka Khazana GC
- SciComp Blitz GC
- Product Management GC
- Operations Research GC
- Un-Bill Energy GC
- Coding GC
- Path Planning GC
- Documentation GC

POSTGRADUATE (PG) TECH

One of the key objectives that Institute Technical Council (ITC) focused on was starting with tech orientation for postgraduate students with 150+ participation followed by PG tech weekend alongwith an exciting lineup of events exclusively for postgraduate students with 600+ participation. Other events like Quantum computing by Maths and Physics (MnP) Club, The Key to Automation by Systems and Control (SysCon) Engineering, Criminal Minds: A talk on Criminal Psychology, Energy Economics and Policy workshop, Tinkering Rootcamp, RattleSnake, Team Shunya competition and much more with the formation of some student groups for postgraduate students were held. Some new initiatives are also introduced like departmental postgraduate tech representative and regular feedback collection.

Webinar Series

One of the strongest resources and support systems for students at IIT Bombay is their alumni. During the pandemic, Institute Technical Council (ITC) launched one of the most popular webinar series, titled **'But What Exactly…? Careers**

in Technology', which had 2000+ individual registrations from and an enthusiastic participation for every talk. Held in June and July, we saw 17 exciting talks from our alumni about their career trajectories in all domains of tech. With scientists from NASA, engineers from Tesla, Google and Facebook and the CEO of Ansys among other notable alumni, we got to deep dive into their careers and the decisions they made on their way. The attendees also got the unique opportunity to interact with them directly to get to know more about the day-to-day challenges and the kind of work people actually do on the field.

Miscellaneous

Insti-X: There was a need to form a group for tech enthusiasts who were interested in developing products that can be deployed within the Institute for the betterment of the student community. One of the ideas that had started was the digitization of the mess. We're glad to say that the working prototype of the project has been tested in Hostel 11 mess and will be deployed soon in the entire Institute.

Internship initiative: The internship initiative by Institute Technical Council (ITC) is an effort to provide opportunities to students to experience real-life industrial problems as a part of their internships. We started in beta mode during the winters with internships offered by alumni only. The winters had three (Internship Announcement Form) IAFs and a total of 20 students were given internships. For the summers currently, six IAFs have been received and are still under process.

DevCom: This tenure DevCom (Developers' Community) introduced the Resume Verification Portal to streamline verification of resume points which received more than 50,000 hits/ day. Also, a Technical Projects & Funds Management Portal, Creddit Portal (a portal to consolidate course reviews) and the DevCom Gaming Portal was launched.

Mood Indigo

IIT Bombay's Mood Indigo, Asia's largest college cultural festival, witnessed its Golden Jubilee Edition from December 26-27, 2020. The team of Mood Indigo 2020 pioneered the first-ever virtual festival through a Virtual Reality (VR) platform with gamified UI/ UX, overcoming the COVID obstacles. The platform, 50th.moodi.org, witnessed a viewership of over 100,000+ from over 2000+ participating colleges with an average viewing time of 3 hours during the two days of the festival. An exclusive app namely "50th Mood Indigo" was made for the viewers by the team ensuring a better experience for those who had poor internet connection. The two-day extravaganza centered around the theme **"Ek Sunehra Karwaan"** signified the journey of Mood Indigo and the bonds and connections that the people make during the festival. Like every year, the team embarked on a unique social endeavour to combat the growing need for social validation and promote self-love (The Self Love Experiment - TRY The Real You) with a series of events, talk shows and workshops for the same.

The 50th Edition of Mood Indigo set a benchmark for all the upcoming virtual festivals and laid a strong foundation for the upcoming editions of Mood Indigo. The lockdown had a silver lining after all. With an aim of entertaining people amidst the nationwide lockdown, the team came up with a unique virtual initiative called 'Indoor Indigo'. It was an ensemble of YouTube Live and Instagram Live events, competitions and virtual concerts hosting well-known personalities in the fields of sports and art like **Ehsaan Noorani (Shankar-Ehsaan-Loy), Kirti Kulhari** (actress), **The Yellow Diary, Monali Thakur** and even **Magic!** The days leading to the fest saw some exciting events like Indian Premier League (IPL) Auction and Fantasy League and Scavenger hunts as part of it. With the social media space being extensively used with MI Studio and MI Diaries, the team managed to connect with their target group and keep the hype of the fest alive. Events like Freshers Orientation featuring famous

YouTuber **Prajakta Koli** were organized for the freshers to introduce them to Mood Indigo.

Platform:
With a concept of creating a virtual IIT Bombay Campus, venues like Gymkhana grounds, Convocation Hall, Student Activity Centre and Main Gate were recreated completely from scratch giving a feel of campus entry to everyone. Features like creating a group chat, exclusive Instagram filters made with unique installations, an autowala, fast travel and navigation feature to explore the platform, integrated video games, spin-the-wheel and many more were inculcated in it. A mosaic wall video depicting the journey of 50 years of MI was also created. The iconic MI Wall and the Main Gate Arch were designed beautifully and the aerial and street wall ambience was a cherry on the top. Hidden Mood Indigo coins and treasure hunt clues kept the audience engaged throughout.

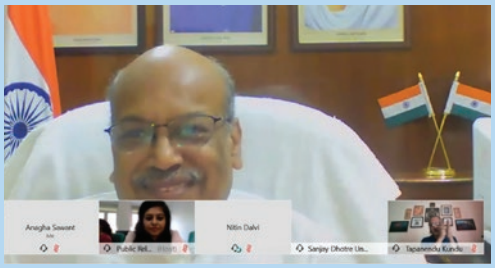
Mood Indigo 2020 saw a conglomerate of over 100+ events spanning across multiple genres. With the presence of over 150 national and international artists, Mood Indigo continued its legacy of providing the most assorted and entertaining experience to the crowd.

Student Award:
Mr. Sarosh Alam Ghausi, a post graduate student from the Department of Civil Engineering, IIT Bombay has been selected for the conferment of Innovative Student Project Award 2020 jointly with Mr. Suman Banerjee, IIT Madras at Masters Level by Indian National Academy of Engineering (INAE), Department of Science & Technology.

Mr. Akshay Modi, a student from the Department of Chemical Engineering, has been selected for the conferment of Innovative Student Project Award 2020 at the doctoral level by the Indian National Academy of Engineering (INAE).

Mr. Himanshu Sheoran, Mr. Sahil Jain and Mr. Tirthankar Adhikari, from IIT Bombay's Cybersecurity Club, have received a gold medal as a team at the University Division in NSUCRYPTO'2020, the 7th International Olympiad in Cryptography.

Mr. Arpon Basu, a student from the Department of Computer Science and Engineering, has won the 'Best Creative Idea Award' for his science fiction story "Life in COVID-19" in the Covid Gyan program organized by Homi Bhabha Centre for Science Education (HBCSE).



IIT Bombay launched Bandhu, a self-help web portal for its students' emotional well-being. The website, initiated by the Class of 1992, is dedicated to inspiring IIT Bombay students to deal with various challenges in a positive way. The website was launched online on November 1, 2020, by former Minister of State for Education, Government of India, Shri. Sanjay S. Dhotre. Director and writer Mr. Nitesh Tiwari, an IIT Bombay alumni from the Class of 1996, was the Guest of Honor during the event. The website aims to empower the students, help them to deal with their various mental health problems.

Ms. Neha Rathi, a Post-Doctoral Fellow in the Department of Humanities & Social Sciences, has been appointed as a Topic Editor for International Journal for Environmental Research and Public Health.

Pronites

The concerts at Mood Indigo have always been a perfect blend of uniqueness, upcoming talent and the most renowned names in the industry. Fusion Nite is known to feature rare and exclusive talent and 2020 was no different. The performance of the evergreen veteran band **Indian Ocean** followed by trending ace singer **Lucky Ali** set the tone for the festival. Popular Nite saw a full-house crowd witness one of the best contemporary singers of our time, a woman who is known for her melodious voice and energetic songs - **Sunidhi Chauhan** along with the famous cover band - **Twin String** performing a customized set for the golden jubilee edition of Mood Indigo encompassing the popular hits of the popular headliners over the years. For the first time at Mood Indigo, a heavy stage production was used along with gamified 3D Interactive visuals which made the concerts more engaging and interactive for the crowd who could witness this performance right from their homes.

Proshows

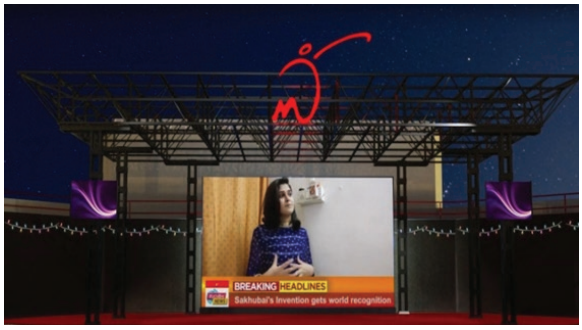
Eloquence featured interactive sessions with eminent personalities from various genres. The lineup was honored by the presence of veteran actor **Anupam Kher**, Bollywood actress **Daisy Shah**, among others. It also featured a panel discussion by **Ayaz Memon, Joy Bhattacharjya and Sharda Ugra** on sports from a spectator's perspective. Adding to the lineup, we had famous Bollywood singer **Amaal Mallik** talking about his career, trajectory and interests in Bollywood and indie music. Catching on to the recent chess trend, we hosted **Vishwanathan Anand** in a conversation with famous chess streamer **Sagar Shah**. Further exploring the trend, we had the cast of popular TV series Scam 1992, **Pratik Gandhi** and **Shreya**

Dhawanthary along with its directors **Hansal Mehta** and **Jai Mehta**. With the thought of raising awareness against environmental pollution, we had actress **Dia Mirza** alongside **Jyoti Lavakare** under MI's unique initiative "**MI Bringing the Change to You**". Stand-up sensations, the very funny **Aakash Gupta** and **Rahul Dua** were the major highlights of our Humorfest amusing the crowd with their insane performance along with the very trending **Sejal Kumar** and **Dolly Singh**. YouTube gamers **Nischay Malhan** and **Ujjwal Chaurasia** also graced Humorfest and talked about streaming as a profession. Vogue, the fashion competition, was presided over by the famous celebrity photographer **Daboo Ratnani**. The International Music Festival (IMF) hosted enthralling performances from international artists and bands like **Phavors**, the infamous cover band **Hollow Coves** and many more. IMF also witnessed an extremely special and scrupulously curated lineup of acoustic singers like **Faridkot, Samarth Swarup** and **Frizell D'Souza**. The proshows also staged unique performances catering to a plethora of genres like ballet, interactive theatre and many more.

Competitions and Workshops

Known to attract the best student talent from across the country, this year's Mood Indigo saw competitions in the field of music, dramatics, fine arts, dance, speaking arts, magic and

lifestyle, design and digital arts, journalism and communication, literary arts and informal events with a quirky twist. Facing the challenge of an online engagement, Mood Indigo witnessed a participation of 12,000+ participants in 49 competitions. The competitions were embraced by industry stalwarts like **Vartika Jha, Vaibhav Ghuge, Dabboo Ratnani, Anjum Shara** and **Parul Yadav** as mentors and judges. The competitions at MI also received online appreciation from **Madhuri Dixit** and **Navin Polishetty**. New concepts such as MI championship, genre championship, voting feature and certificate portal for distribution of digital certificates were introduced to enhance the participant's experience. As part of the multicity programme, eliminations were conducted in Allahabad and Chandigarh. Nine LYP partners including Dance With Madhuri, Hungama's ArtistAloud and India Art Festival provided real-life opportunities to winners of 27 competitions in 8 genres further adding on to their experience. Mood Indigo conducted various unique workshops in fields like music making, music production and careers, acting, interview preparation, digital arts, film making, percussion, cartooning, mobile photography, ukulele workshops and beatboxing. Flagship events like **She's Got the Look, Mr. and Ms. Mood Indigo, Hysteria, MI's Cosplay, Mood Indigo's Got Talent** were a great success as every edition.



Media and Publicity

Mood Indigo successfully maintained its high and continually increasing audience interaction and engagement via social media channels and online mediums with a year-on-year social media engagement rate increase of over 100%. State Bank of India was associated as the Title sponsor along with Josh as Co-Title sponsor. As a result, a great deal of publicity was carried out. Mood Indigo is the first ever college festival page to be verified on Instagram and had one of the highest mass media coverage and publicity in over 50 years, with a potential reach of around 14,000,000+ across mediums including television, print and digital media, radio and mobile applications. The incubation of the influencer programme was executed, engaging social media marketing and skill development among potential student influencers.

World Record

With the rising number of corona cases throughout the world, Mood Indigo united the students of various schools in order to make a **Limca Book of World Records** to craft the highest number of origami paper cranes at a time. The crane is auspicious in Japanese culture and legends suggest that making 1000 origami cranes can bring peace into the world.

Techfest

Techfest is IIT Bombay's annual college festival and is widely recognized as Asia's largest science and technology festival. Despite the pandemic, Techfest seized the opportunity to cater to the audience in every way possible, launching various online events like competitions, workshops, international summits, lectures, exhibitions, social initiatives and many more. The 24th edition was a triumph, with 3 million+ website hits, viewership and participation of more than 400,000+ among other highlights.

Lecture Series

Like every other edition, Techfest had an incredible lineup of lecturers from various genres this year and served an audience of over 300K+. Honorable 29th Prime Minister of Australia, **Malcolm**

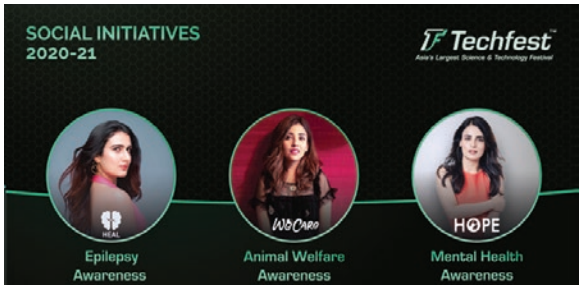
Turnbull, enunciated views on Australia's education systems and opportunities. He also talked over essential topics like mental health, global warming. Other significant highlights from the lecture series included **Andrew Ng, Viswanathan Anand, Abhinav Bindra, Arvind Krishna, Rana Daggubati** and Nobel laureates, including **Prof. Tasuku Honjo**, **His Holiness the 14th Dalai Lama**, **Prof. William D. Philips**.

Virtual Exhibit Series

With the 24th edition being online, Techfest used it to its advantage to present some of the world's best humanoid robots, including **ALTER 3, CNRS France, Nadine Social Robot, Furhat robotics** from different corners of the world in their Virtual Exhibit series. The zenith of the series was The **Daedalus**, developed by **GRAVITY** industries enabling humans to fly. The series launched their exhibitions portal, exhibiting more than 20 exhibits from 15+ countries with 20K+ visitors.

International Summits

Aiming to discuss solutions and opportunities imminent in this new era of digitalization, Techfest launched its International Digital Disruption Summit. Media being one of the most critical facets for disseminating and discussing vital information, Techfest launched the second edition of the International Media Summit. Speakers like **Ravish Kumar, Rajdeep Sardesai, Gary Knell, Anant Goenka** and **Pulitzer prize** winners, including **Paul Pringle, Michael Braga, Farah Stockman and Essdras M Suarez attended.**



Social Initiatives

HOPE: Techfest, under its social initiative **HOPE**, conducted sessions on mental health in **150**+ colleges across India, which had whopping participation of 20K+ students.

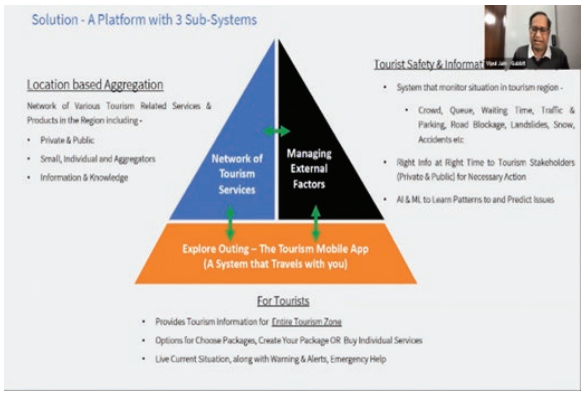
WeCare: WeCare, an extensive initiative to promote animal welfare and raise awareness about animal cruelty laws, was launched. To make this impactful, Techfest launched a petition for amending the Prevention of Cruelty to Animals Act 1960.

HEAL: To raise awareness regarding Epilepsy, Techfest launched **HEAL** to help Epilepsy Awareness last. Techfest was successful in educating society about epilepsy show them the perspective of a person battling epilepsy.

E-Cell

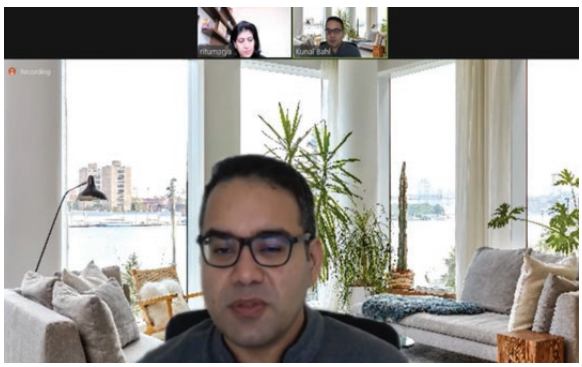
The 16th edition of **Entrepreneurship Summit (E-Summit),** IIT Bombay's E-Cell flagship event, was hosted online for the first time due to pandemic. This year, the E-Summit 2021 was organized during February 6-7, 2021 with the theme **'A Blizzard of Ingenuity'.** The theme aimed to provide breakthroughs to all aspiring entrepreneurs and students. The E-Summit has been a host to some of the biggest stalwarts of the industry over the years. This year too, E-Summit continued to inspire countless ideas from the students, expedite innovative startups and multiply social networking through a cluster of events designed for the participants. Various events, panel discussions, speaker sessions, competitions and workshops were organized during the two-day event.

It has become the first event of its kind to receive patronage from the Make in India,

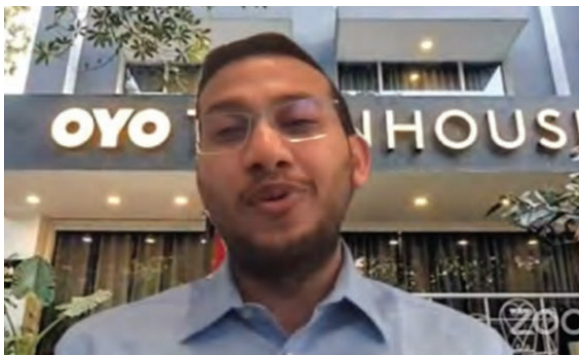


2.Startups pitching their ideas in 'The Ten Minute Million' to gain on-the-spot funding from Investors

UNESCO, Digital India and Startup India. The two-day event provided a platform to discuss the technologies of tomorrow and exhibit various technologies. The event hosted various entrepreneurs, corporates and popular celebrities such as **Mr. Jordan Belfort**, author of The Wolf of Wall Street; **Swami Ramdev**, Founder of Patanjali and a yoga guru; **Mr. Ritesh Agarwal**, Founder and CEO of OYO Hotels and Rooms; **Mr. Deepak Parekh**, Chairman of HDFC Bank, **Mr. Manish Sisodia**, Deputy Chief Minister of New Delhi; **Ms. Vani Kola**, Managing Director of Kalaari Capital; **Ms. B.K. Shivani**, spiritual teacher at Brahma Kumaris; **Mr. Ram Shriram**, Founding Board Member of Google; **Mr. Kanwal Rekhi**, Co-founder of TiE; **Mr. Kunal Bahl**, Co-founder and CEO of Snapdeal and **Mr. Scott Marcar**, CIO Corporate and Investment Banking, Deutsche Bank to name a few. This event was the largest entrepreneurship summit organized by a student organization.



1.Students in conversation with Mr. Kunal Bahl, founder of Snapdeal



3. Highlight session on startups with CEO and Founder of OYO Rooms and Hotels, Ritesh Agrawal

PLACEMENT

The Placement Office is the nodal point for recruitment of students from Institute. The placement season at IIT Bombay was a virtual event throughout the year, which started in the month of July 2020 and ended in June 30, 2021. Total number of companies registered on our job portal is 570, which was very heartening. The number of registered students increased by 11% when compared to previous year. The placements have been successfully completed in two phases amidst the pandemic following Government of India guidelines. General uncertainties in job creation due to COVID–19 pandemic, lockdowns, travel restrictions, global economic recessionary trends were observed. Despite these factors, graduating students were resilient with necessary preparatory activities using online software during the intervening months. Placement Office continuously strived to create a good track record of facilitating career aspirations through meticulous planning of the placement schedule. The Placement team strives to achieve the right job fit that is mutually beneficial with the corporate sector. The student team at the Institute takes the necessary inputs for identifying and mapping the student's skill sets by systematic industry ground work. Placement activity begins with ground work through job market data analysis, introspection and self-discovery. Efforts were made to understand the virtual process that include career planning and help was extended to discover opportunities based on student's unique background, qualifications and previous experiences.

Placement Season 2020 – 21

Table 1: Highlights in Brief

Key Metric	Details
Total Number of Companies offered jobs	292 (Including companies offering PPOs)
Total Number of Offers in both phases	1261
Total Number of Accepted Offers	1150
Pre–Placement Offers	149
International Job Offers	58
Highest Domestic Salary (CTC)	Rs. 64 LPA
Mean International CTC Salary	Rs. 52.87 LPA
Mean Salary Package	Rs. 17.91 LPA
Highest International Salary	Rs. 1.4 Crore PA (€ 1,57,750)
Top Recruiting Sector	Engineering and Technology

Student pre-placement preparation

Guest lectures with industry stalwarts, mentoring and interaction sessions with our alumni were organized online this year as per guidelines. This gave students enough opportunity to discuss their career and also gain practical insights into their industry at an individual level. The key focus of the placement office was to prepare students for their placement and internships in the online mode for career opportunities in various branches of engineering, coding, consultancy, finance, analytics etc. In addition, preparatory programs were arranged to enhance the communication skills, group dynamics and interview skills. Overall, these programs provided an insight into the job domains and

prepared the job aspirants to face the challenges of the future. The students were assigned mentors for guidance and a series of aptitude tests, were conducted to improve the problem-solving skills. The preparatory activities sourced information from various alumni. Various department level activities were conducted to cater to individual domain requirements.

The first event was the 'orientation' which gave information of the complete placement procedure. Next, there were preparatory activities conducted by the placement cell, in collaboration with assessment agency. Company officials approached the office during July and August months to commence discussions of their job offerings. Companies filled up the Job Announcement Forms (JAF) in July and August 2020. Completed JAFs were released to the students to start applying in late September. Limited pre-placement talks (PPT) were organized virtually to facilitate interactions with the students. In this age of globalization, privatization and liberalization, there is an ever increasing industry requirement for professionals who have high employability index and excellent competencies with an inquisitive mindset for innovations. The Placement team has taken additional efforts to expand the domestic placements during the pandemic and invite more regional firms, resulting in a marginal increase in domestic offers compared to the previous season during the pandemic.

Placement Season Phase 1

Interviews of both phases were conducted virtually through online mode, the main interviews were conducted during December 1-13, 2020. Prior to the placement season in December, 398 companies had registered job notifications on our newly upgraded portal. Not all notifications result in recruitments. The recruiter count in the first phase and second phase excluding PPOs is slightly less from 265 last year to 262 this year. In phase 1, 210 companies selected students excluding PPOs. A total of 1970 students registered for final placements and 2149 (2nd and 3rd year UG) students registered for internship opportunities. During the phase one, company's pre-placement activities were 548 and phase two pre-placement activities were 20, with a total of 568. The number of JAFs registered was 884. The registered students belonged to engineering, science, humanities and design departments of IIT Bombay in Bachelor's, Master's and PhD programs. For the students of IDC School of Design, the interviews were conducted concurrently, during phase 1. Companies have filed over 1177 JAFs during both phases in various sectors including core engineering, consulting, information technology, finance, analytics and education. The number of students opting for deferred placement was six, most of who plan to pursue entrepreneurship.

December 1, 2020, the first day of campus placements, witnessed well-known companies offering 159 jobs across sectors, which was crucial for the success of the placement season 2020-21. Placement of 317 students took place on first day including the pre-placement offers, re-affirming the faith of top recruiters in IIT Bombay graduates. The placement season saw the presence of several consulting, software, 'core' engineering and international companies on the first day and recorded decent job offers. The highest number of offers was rolled out by the engineering and technology sector, ascertaining the technical proficiency of IIT Bombay students. The highest domestic CTC package offered was Rs. 64 lakhs per annum. The highest international CTC package offered in Euros € 1,57,750 per annum (Rs 1.40 crores). During phase 1 of placements at IIT Bombay, students secured 976 selections (including 153 Pre-Placement Offers or PPOs) with over 210 companies participating this year. The campus received a total of 1261 jobs offers in phase 1. IIT Bombay's placement season started off on a good note on day 1, which witnessed the participation of 38 companies. About 35 companies offered jobs and recruited on day 1. The number of international offers were 58. Considering all the recruiting organizations at IIT Bombay, the mean CTC package this year has been Rs. 17.91 lakhs per annum.

Placement Season Phase 2

The phase 2 was also conducted online during January 15-June 30, 2021 to benefit those unplaced students and companies affected due to pandemic. The number of students re-registered in phase 2 was 723. The total number of selections is 177. Two hundred and seven (207) companies registered atleast one JAF and 58 companies have conducted interview and selected candidates in phase two. Seven companies of phase 2 had also visited in phase 1. Three students got offers in both phases.

Recruiter's profile

IIT Bombay has achieved tremendous progress with respect to the global standards. While the placement season has seen recruiters from the entire spectrum of the industry, the initial part of the season was dominated by a variety of firms from sectors like engineering, information technology, software programming, research, consulting, finance, banking and services. There were opportunities provided by the firms with vast learning, travelling experience and varied work culture. Most of these firms are world leaders in their respective domains. The world's best consulting firms, banks, software companies take part in placements, and over the years IIT Bombay endeavors to attract world's best engineering companies to hire students. Some 'non-core' positions have increased which attracts interest of some students due to factors such as the good remuneration, career growth prospects or some kind of aversion to their 'core' discipline.

International Recruitments

The Placement Office had taken additional efforts to expand the global outreach and invited more foreign organizations, but due to COVID-19 restrictions and ban on international travel many international companies couldn't participate during placement season. Students received a total of 58 international offers from different countries in Europe, Japan, UAE, Singapore, Hong Kong and Taiwan.

Engineering and Technology sector

The highest numbers of students were recruited by the engineering and technology sector. In various engineering domains, 314 students were selected in 73 core companies at entry level positions. They have been offered highly skilled work profile and decent remuneration package this year.

Information Technology/ Software sector

IIT Bombay students have superior programming skills and continued to attract prestigious recruiters through campus placement over the past several years. This trend was stronger this year. Around 267 students have been offered IT/ Software jobs by over 71 companies excluding PPOs through the campus placement, making the IT sector one of the biggest recruiters after engineering and information technology.

Consulting

Over 87 consulting sector offers were made by 26 consulting sector companies, who visited IIT Bombay for campus placement this year. These organizations work with large corporations across the world, helping them resolve complex business problems. With the high–quality of recruits these companies took last year, their return to the campus was marked by a renewed vigor.

Financial Services sector

The financial, banking and fintech companies were prominent recruiters. With IIT Bombay as the preferred choice of many of the top global companies, the sector saw participation of prestigious companies to recruit the brightest and the best from the campus. Over 154 offers were made by 33 financial service firms this year.

Research and Development sector

With pandemic, demand for high-end products was tepid. Most companies hired less students as compared to last year. The placement season witnessed a steady growth in the number of organizations hiring for R&D sector. Forty-six positions were offered by 16 organizations in 2020-21.

Start-up Companies

Some of the Start-ups as recruiters were screened based on the financial and technical status. The informal work culture, opportunity to make immediate and visible contributions, chance to own equity etc. seemed to be the attractions offered by such Start-ups.

Overall statistics

A comparison of offers received and accepted over the last four years is given below:

Table 2: Placement Statistics for last four years (phase 1)

Year	Pre-Placement Offers		Total Offers in Phase 1	
	Received	Accepted	Received	Accepted
2017-18	142	100	1156	1023
2018-19	168	125	1270	1122
2019-20	164	113	1319	1176
2020-21	177	149	1261	976

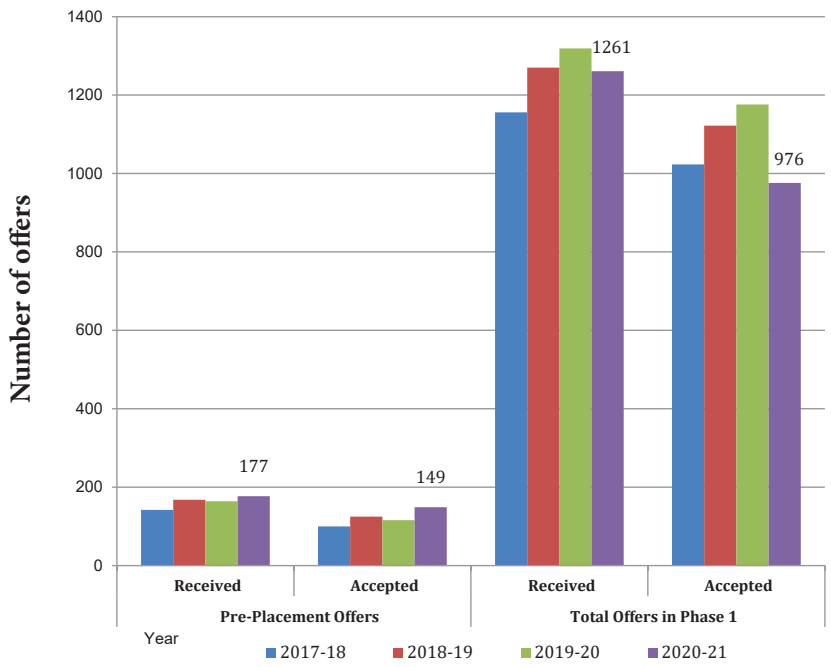


Figure 1: *Placement Statistics for last four years*

Table 3: Distribution of offers in different sectors of economy excluding PPOs

Sector	Number of Offers	Number of Companies
Engineering and Technology	314	73
IT / Software	267	71
Finance	154	33
Consulting	87	26
Other	77	26
Research and Development	46	16
Education	32	9
Services	14	5
Public Sector Undertaking	10	2
Total	**1001**	**261**

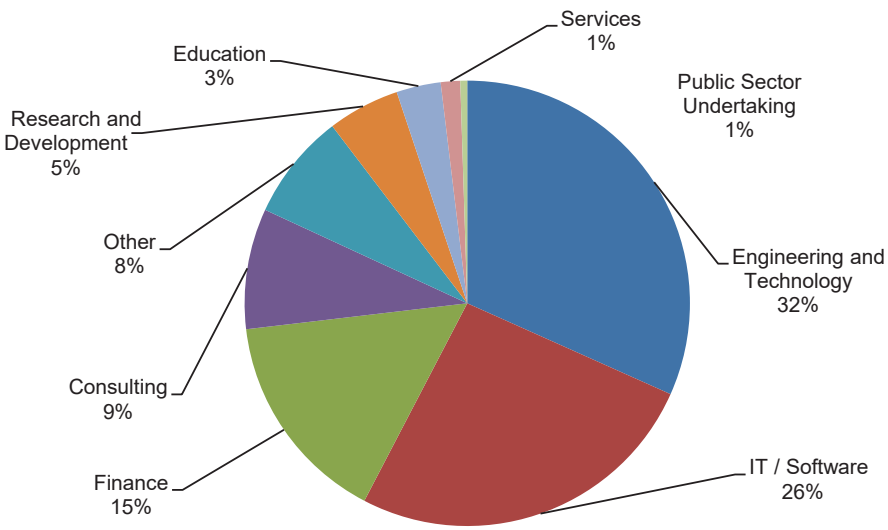


Figure 2: *Distribution of offers made in different sectors*

Programme-wise statistics

All the registered students do not necessarily participate actively in campus placements, opting for higher studies abroad or in different stream. It is important to note that students also get placed through channels other than campus placements. The Programme-wise placement data is provided in Table 4 and Figure 3.

Note: Participated count excludes students who opted for higher studies or had other career options and hence de-registered from the placement process.

Table 4: Programme-wise placement data 2020-21 including PPOs

Programme	Registered	Participated	Placed	Percentage placed
BTech	652	537	468	87.15
Dual Degree (BTech + MTech)	168	141	132	93.62
MTech	669	566	406	71.73
2-year MSc	162	77	38	49.35
MTech + PhD	10	5	4	80
BDes	18	14	12	85.71
MDes	63	55	48	87.27
Dual Degree (BDes + MDes)	10	9	9	100
4-year BS	42	26	20	76.92
PhD	152	68	10	14.71
Others Programmes*	24	11	3	27.27
Total	**1970**	**1509**	**1150**	**76.21%**

**Includes MPP, MUDE, 5 year Integrated MSc, BS + MSc, MTech + PhD, MSc + PhD, MPhil, IDDD, MS by Research (Exit) Degree.*

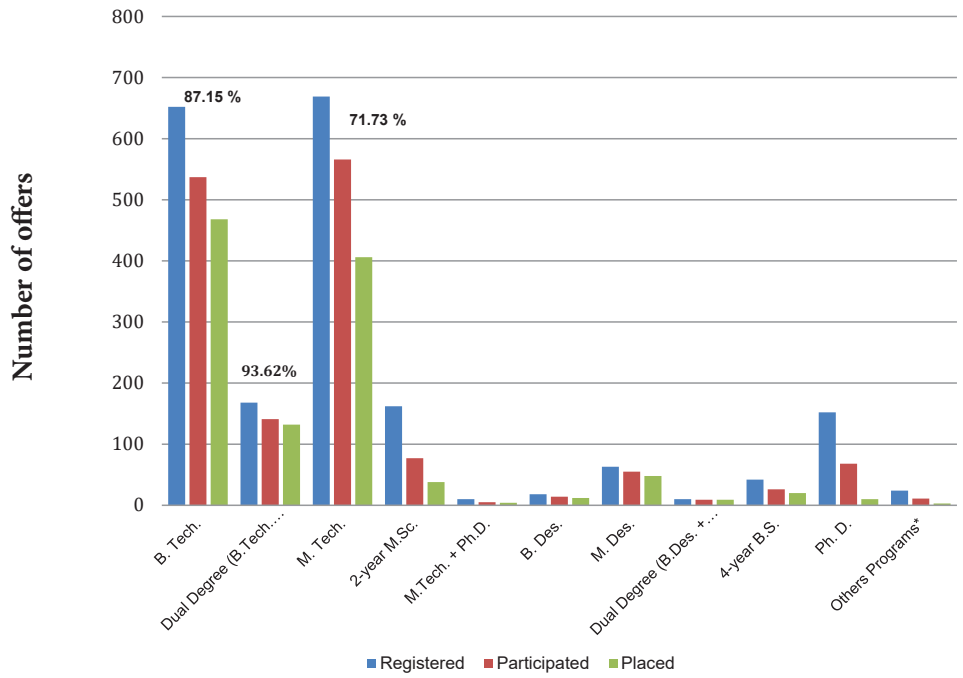


Figure 3: *Programme-wise placement 2020-21*

Department-wise statistics

IIT Bombay provides engineering education across 23 different departments, spanning students from under-graduation to PhD. The placement team endeavors to get companies from core as well as non-core sectors for students. The placement statistics of students across departments including all domains of jobs offered during the placement season 2020-21 are shown in Table 5.

Table 5: Department-wise classification of offers

Department	2018-19	2019-20	2020-21
Aerospace Engineering	50	71	54
Chemical Engineering	122	122	89
Chemistry	27	18	10
Civil Engineering	102	100	98
Computer Science and Engineering	207	186	199
Electrical Engineering	196	202	220
Mechanical Engineering	148	173	151

Department	2018-19	2019-20	2020-21
Metallurgical Engineering & Materials Science	97	97	90
Energy Science and Engineering	34	30	29
Earth Sciences	11	10	12
Engineering Physics	10	4	1
Applied Statistics and Informatics Engineering	19	22	23
IDC School of Design	59	59	69
Biosciences and Bioengineering	15	21	5
Others Programmes	89	92	100
Total	**1186**	**1207**	**1150**

While Department of Electrical Engineering bagged the highest number of offers, Departments of Computer Science and Mechanical Engineering had the best conversion ratio for placed versus registered number of students. IDC School of Design saw a steady growth in number of placements. Surprisingly in pandemic year, students from the Department of Physics, Chemistry and Biosciences and Bioengineering did not participate enthusiastically and opted for other avenues.

Compensation-wise distribution of offers. (in Rs. L.P.A.)

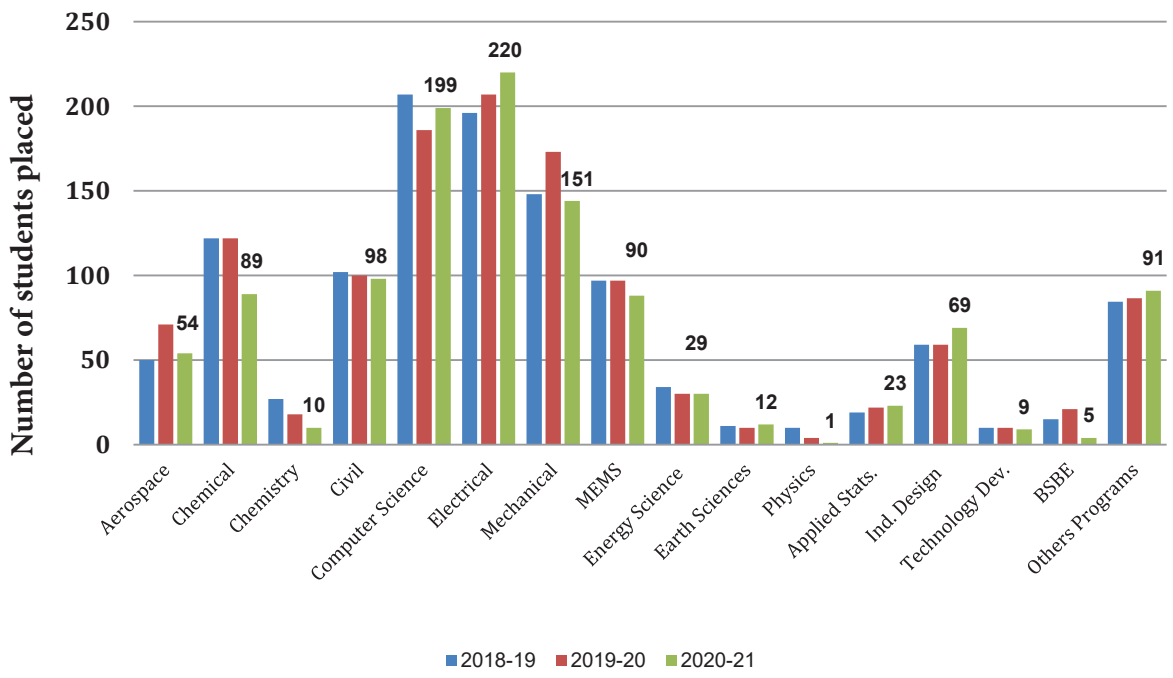


Figure 4: *Department-wise classification of offers*

Salary-wise statistics

The jobs offered by recruiting organizations are divided into various categories based on the gross compensation packages. Factors other than compensation package, such as job profile, past association etc. may sometimes influence the classification of a company. Salary-wise classification of total offers made in the year 2020-21 is shown in Table 6 and Figure 5.

Table 6: Placement details based on compensation excluding PPOs

Range of Gross Salary (Rs. in lakhs per annum)	Number of Companies	Number of Offers
Above 16	80	248
Between 13.5 to 16	50	151
Between 11.5 to 13.5	41	185
Between 9.5 to 11.5	40	155
Between 7.75 to 9.5	56	151
Between 6.25 to 7.75	29	77
Between 5 to 6.25	10	16
Between 0 to 5	4	16
Total	**310***	**999**

**Some organizations may have offered jobs in multiple salary categories*

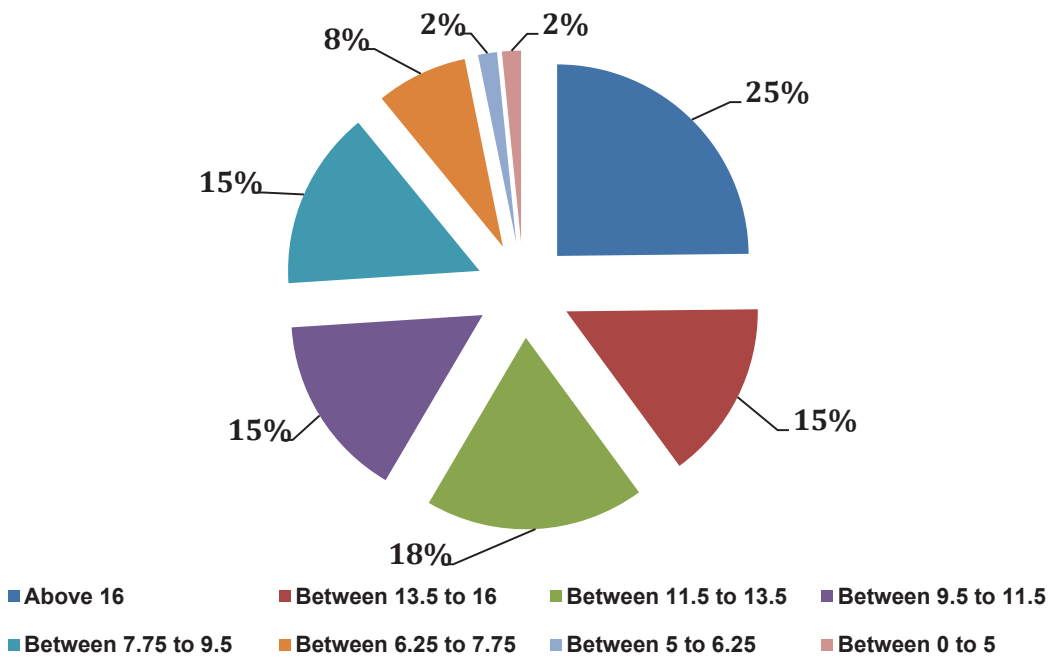


Figure 5: *Compensation-wise distribution of offers (in Lakhs P.A.)*

Comparison of average salary, international and pre-placement offers

The Average Gross Salary offered was Rs.13.67 LPA and the average CTC was Rs. 17.91LPA. Total number of Pre-Placement Offers (PPO) was 149. The number of international offers was 58 excluding PPOs. This suggests an increasing and a positive trend in the pay package offered by various organizations (Refer to Table 7).

Table 7: Average salary, international and pre-placement offer details

Description	2019 - 20	2020 - 21
Average Gross Salary (in LPA*)	16.06	13.67
Average CTC (in LPA*)	20.08	17.91
Total Number of International Offers	159	58
Total Number of Pre-Placement Offers	113	149

**LPA – Lakhs per annum (in rupees)*

Table 8: Salary / Pay Package given by domestic companies:

Maximum and Median Salary for last 5 years for select programmes

Program	Year	Maximum Salary CTC (Rs. in Lakhs P.A.)	Mean Salary CTC (Rs. in Lakhs P.A.)
Overall Domestic Pay Package over five years	2016 - 17	44.70	13.38
	2017 - 18	45	15.69
	2018 - 19	57	17.49
	2019 - 20	62.28	20.08
	2020 - 21	64	17.91

Table 9: Comparative of overall placement percentage over five years across all programmes

Year	Registered	Participated	Placed	Placement %
2016 - 17	1718	1518	1114	73.39
2017 - 18	1689	1495	1117	74.72
2018 - 19	1695	1404	1186	84.47
2019 - 20	1784	1444	1207	83.58
2020 - 21	1970	1509	1150	76.21

Over the years, some of the unplaced students prefer higher studies over the jobs being offered to them or they get placed through other sources.

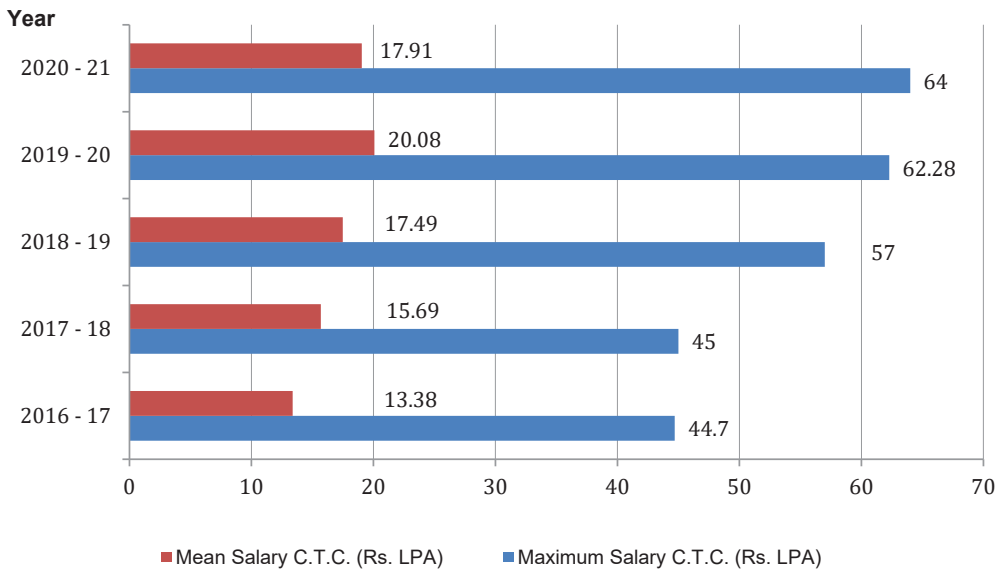


Figure 6: *Maximum and Mean Salary offered by Domestic companies in last five years for all programmes*

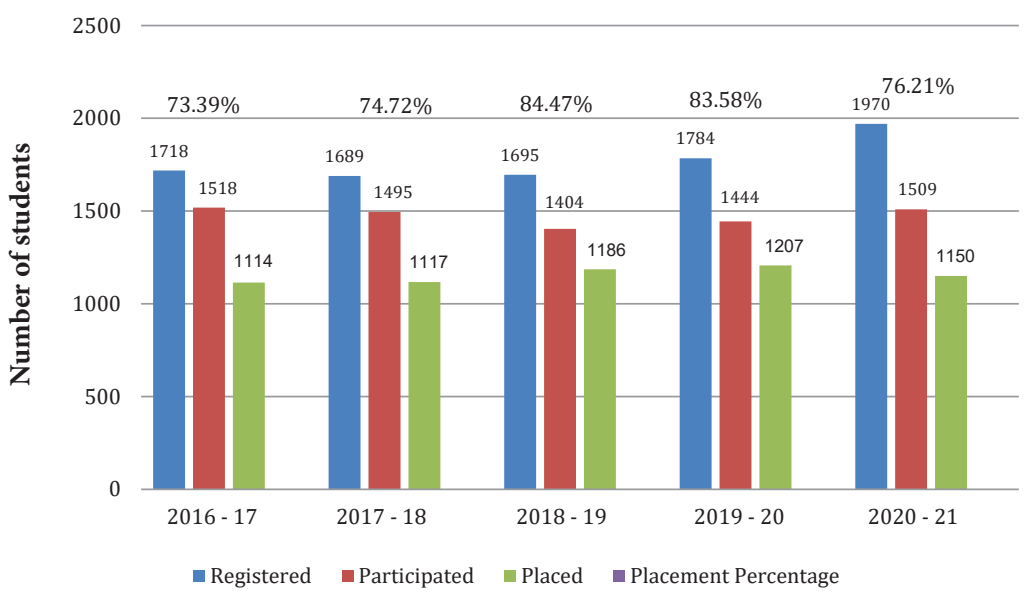


Figure 7 : *Comparison of Placement Statistics over five years*

Year-wise placement comparison

Despite the challenging market situation this year due to pandemic, IIT Bombay managed to maintain a good attraction for the recruiting firms in the job market. Table 10 represents the comparison of students placed over the last three years.

Table 10: Comparison of the number of students placed in the last three years

Programme	2018-19	2019-20	2020-21
BTech	475	492	468
Dual Degree (BTech + MTech)	151	133	132
MTech	402	423	406
Others	158	159	144
Total	**1186**	**1207**	**1150**

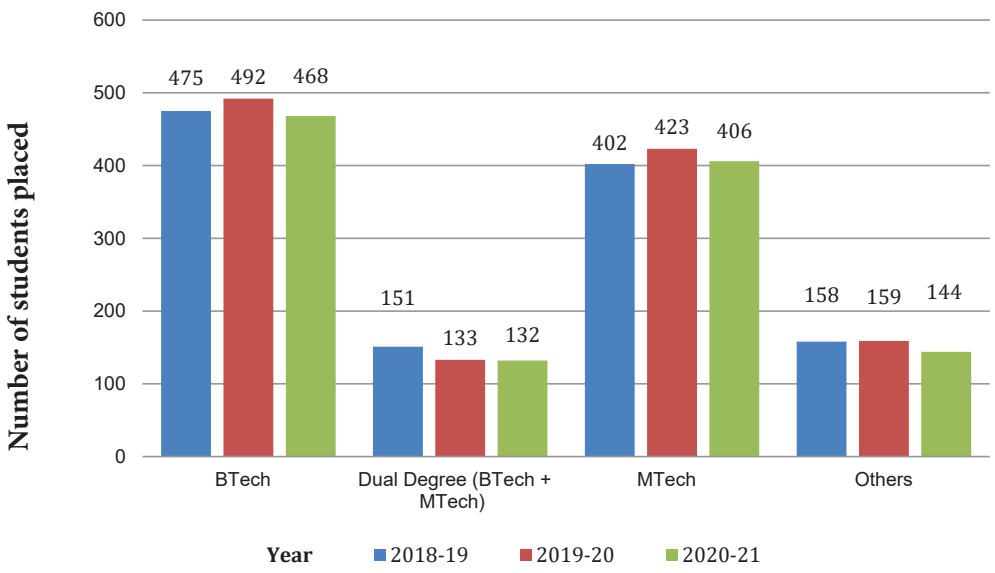


Figure 8 : *Comparison of the number of students placed in the last three years*

Sector-wise statistics for different programmes

BTech and MTech students maintained almost the same demand amongst companies of various sectors. Sectors like education, engineering and technology expressed greater interest in the students of IIT Bombay than the previous year.

Sector-wise statistics for different programs are shown in Table 11.

Table 11: Sector-wise statistics for different programmes

Sector	BTech	Dual Degree	MTech	Other Programmes	Total
Engineering and Technology	76	32	178	28	314
IT/ Software	83	23	124	37	267
Services	122	12	4	25	163
Finance	72	29	27	26	154
Consulting	50	18	10	9	87
Education	18	1	7	6	32
Research and Development	10	7	23	6	46
Others	32	10	30	5	77
Public Sector Undertaking	5	0	3	2	10
Grand Total	**468**	**132**	**406**	**144**	**1150**

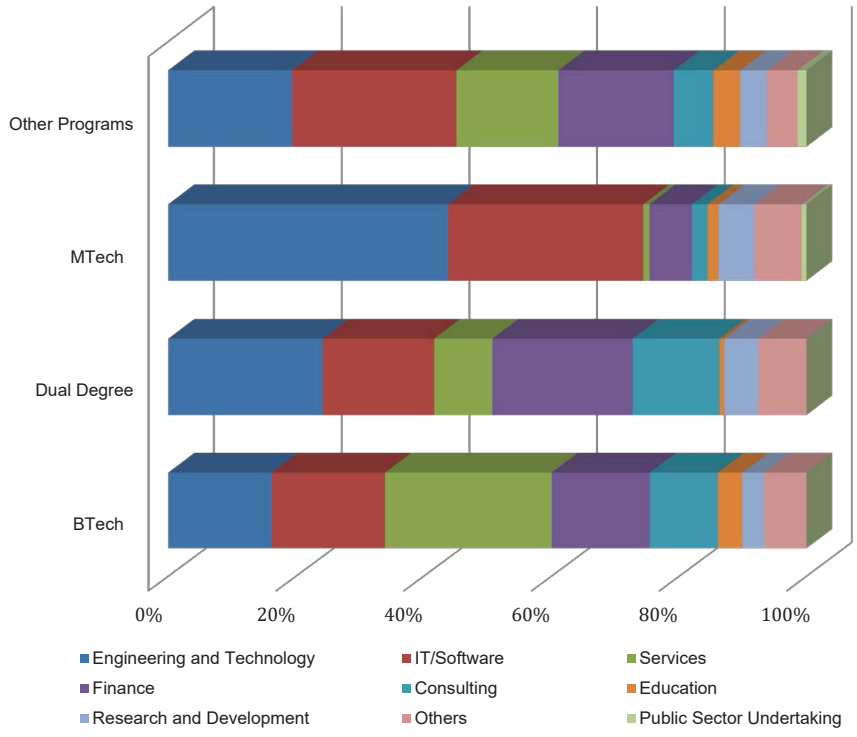


Figure 9: *Sector-wise statistics for different programs*

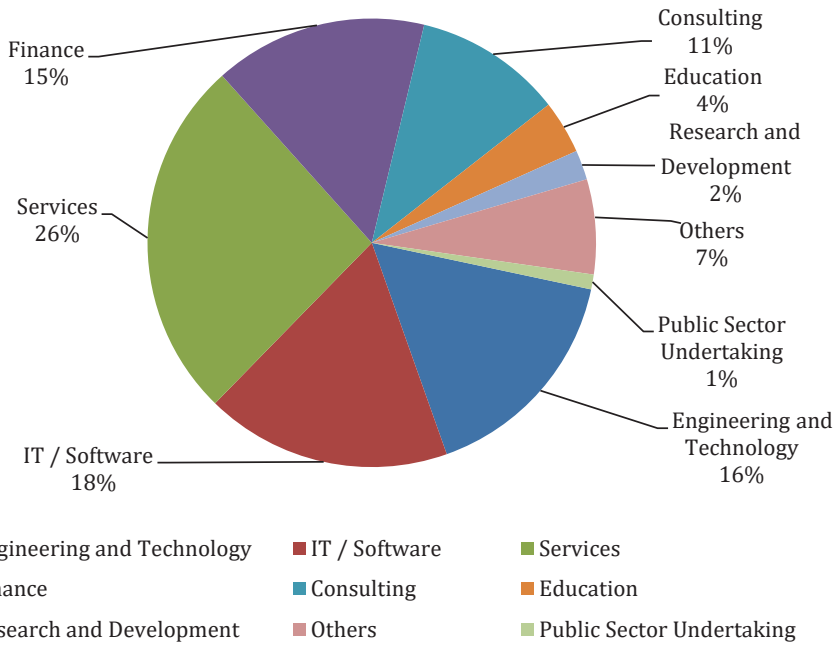


Figure 10: *Sector-wise demand for BTech*

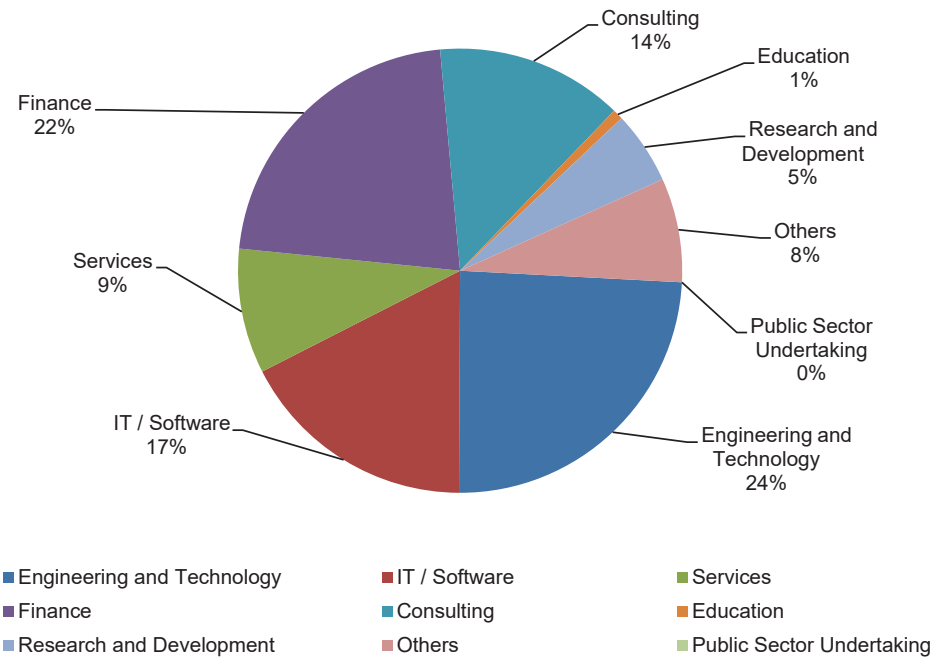


Figure 11: *Sector-wise demand for Dual Degree (BTech+MTech)*

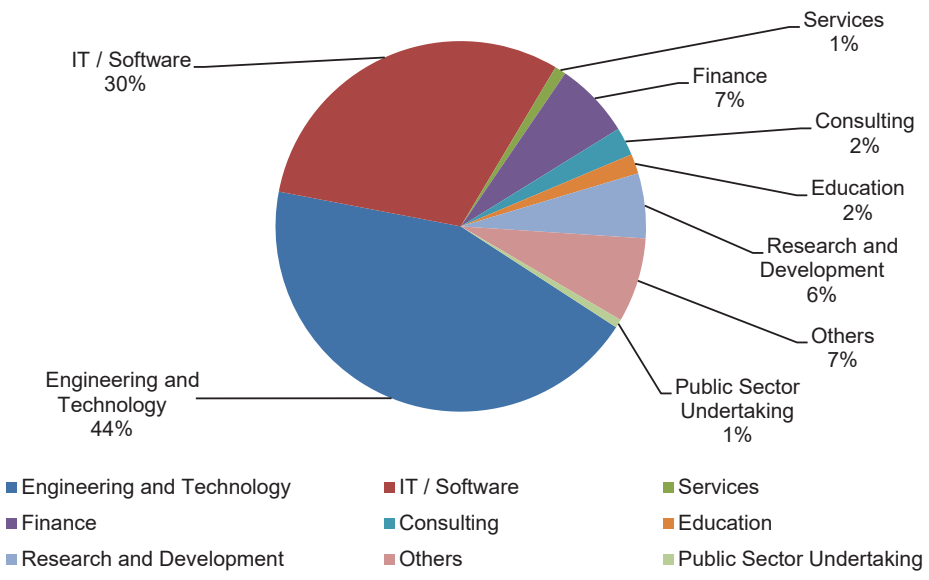


Figure 12: *Sector-wise demand for MTech*

Table 12: Number of companies conducting Campus Placements in last four years

Academic Year	No. of companies conducting campus placements
2016- 17	294
2017- 18	322
2019 - 20	313
2020 - 21	292

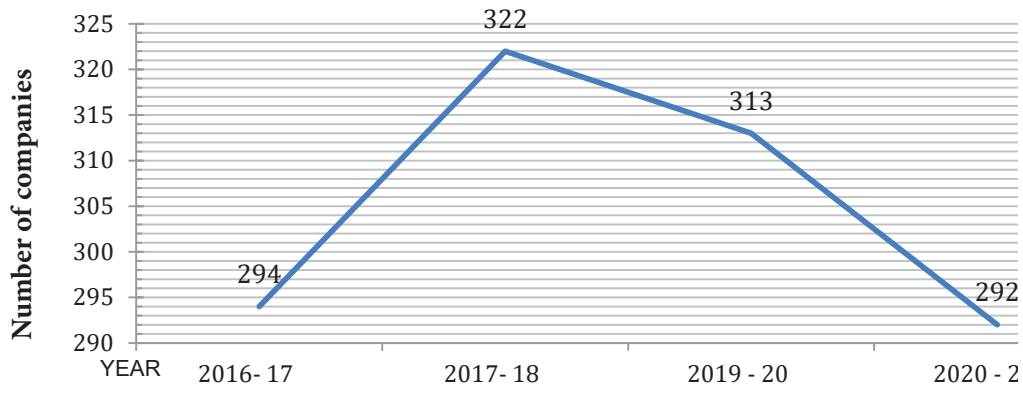


Figure 13. *Number of companies conducting Campus Placements in last 4 years*

Due to pandemic, few of the companies declined to participate in placement season this year.

Internships Report 2020-21

Industrial exposure and practical experience play a significant role while attempting to enter the corporate world. Internships provide industry exposure and real time experience but also help in one's personal growth and development. Students from their second and third year of Bachelor's appear for the internship recruitment. Keeping the diversity of students in mind and the importance of internships in context, the Placement Office strives hard to provide students with the best of the opportunities in their field of interest. Placement Office also encourages research by providing students the research internship opportunities at esteemed universities. The Internship season 2020-21 started in July 2020 and continued till June 2021. There were 940 offers. Companies have also benefited as they have offered 177 Pre-Placement Offers (PPO) out of which 149 were accepted.

Department-wise internship offers

Students from all the departments were in demand by firms and universities alike for internship positions. The demand for students from Departments such as Computer Science, Mechanical and Electrical Engineering was high. A slight decrease in the number of MSc and increase in Design internships was also observed in comparison with the previous year. Table-13 presents the department-wise distribution of internship offers made over the past 4 years.

Table 13: Department-wise internship offers over years

Department	2017-18	2018-19	2019-20	2020-21
Aerospace	34	49	41	33
Chemical	131	137	109	98
Chemistry	21	25	14	20
Civil	111	100	60	49
Computer Science	220	203	207	237
Electrical	176	133	139	138
Engineering Physics	17	23	22	19
Energy	23	18	17	11
Mechanical	158	166	132	130
MEMS	88	89	59	50
Others	96	98	101	155
Total	**1075**	**1041**	**901**	**940**

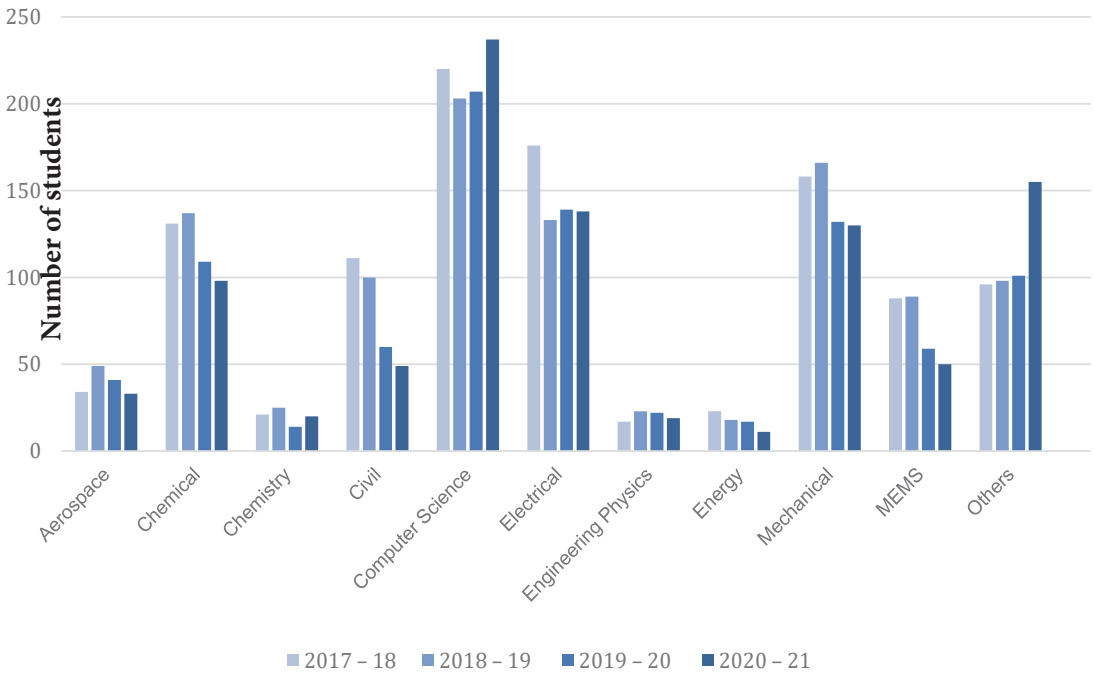


Figure 14: *Department-wise internship offers over 4 years*

Summer vs. winter internship offers

Summer internships usually begin in May and continue till mid-July, whereas winter internships are pursued in the month of December. The number of summer internship offers exceeds the number of winter internships, which is attributable mainly to the longer duration available in summer.

Table 14: Summer vs. winter internship offers

Total number of Internships	Summer Internships	Winter Internships
940	812	128

Companies vs. Universities internship offers

Companies of various business sectors offer internship positions to the students. This option presents an opportunity to gain industrial exposure and broaden one's skill-set in the domain of interest. A few years ago, the Institute started the credit-based internship program, by means of which the students could leverage the performance in their internship towards the academic credit requirement.

Table 15: Companies vs. Universities internship offers

Total number of Internships	Company	University
940	830	110

A major influence on a student's career path tends to be the internships they undertake during their third year summers. A little over half the students have pursued core internships related to their department, and about a third of all students settled for internships in sectors that were not their first choice.

CONCLUSION

The Placement Drive at IIT Bombay started in the month of July 2020 and ended on June 30, 2021. The placements were successfully completed in two phases, clearly demonstrating the demand IIT Bombay's graduates among the top recruiters in various segments of the economy. Interview procedure of phase 1, the main event of on-campus placements, was conducted during December 1-16, 2020 which witnessed a participation of companies including Pre-Placement Offers (PPO). A total of 1970 students registered for placements and 1184 (3rd year UG)students registered for internship programs. The registered students belonged to engineering, science, humanities and design departments of IIT Bombay in bachelor's, master's and PhD programs. The phase 2 was conducted during January 15-June 30, 2021.

The companies recruited virtually throughout the placement season this Covid–19 pandemic year 2020. Despite the difficult circumstances, students put their best efforts. The compensation package given to our students has steadily increased over the years. The salaries are four or five times the average entry level engineering package given to students of other engineering colleges in India. The placement percentage has been gradually increased over the years. The overall placement percentage is around 76.21 % this year.Some of the unplaced students prefer higher studies over the jobs being offered to them. Most of the participating companies have honored their job offers. This clearly shows the confidence the corporates have in the Institute. Our excellent placement record over years speaks about the value of our students to their employers.

SOCIETY FOR INNOVATION AND ENTREPRENEURSHIP

Society for Innovation and Entrepreneurship (SINE) is a Technology Business Incubator hosted at IIT Bombay, providing 'Start-to-Scale' support to emerging entrepreneurs and innovators. As an incubator, SINE runs programs that include prototyping grants, entrepreneur fellowships, boot camps for innovators and early-stage entrepreneurs.

Over the years, SINE has gained a leadership position in business incubation community in India. An early adopter of the incubation activities, SINE's practices have been referred to/ emulated in academic and R&D institutions across the country.

SINE in its journey of 17 years, has created the following impact:

181
STARTUPS

550+
ENTREPRENEURS

INR 1700 cr.
FUNDS RAISED

4300+
EMPLOYMENT

53 Current Co's	**78** Graduated Co's	**10** Merged/Acquired	**40** Folded
200+ IP Generated	**≈ 50%** Co's Funded	**1:80** Sine vs External Funding	**33** Co's with Social Impact

SINE continues to collaborate with corporates, government, institutions and international organisations for various activities like
joint accelerator & mentoring programs,
product/ service/ idea validation of incubates.
CSR initiatives

Ongoing activities

SINE provides Start-to-Scale support to the innovators/ start-ups, hence the programs implemented are accordingly aligned along with its regular incubation activities.

Incubation - SINE hosted 181 companies since inception, of which 15 are new companies that got incubated and 11 companies have graduated in 2020-21. During the year, SINE has also supported 46 innovators and entrepreneurs under its various pre-incubation programs.

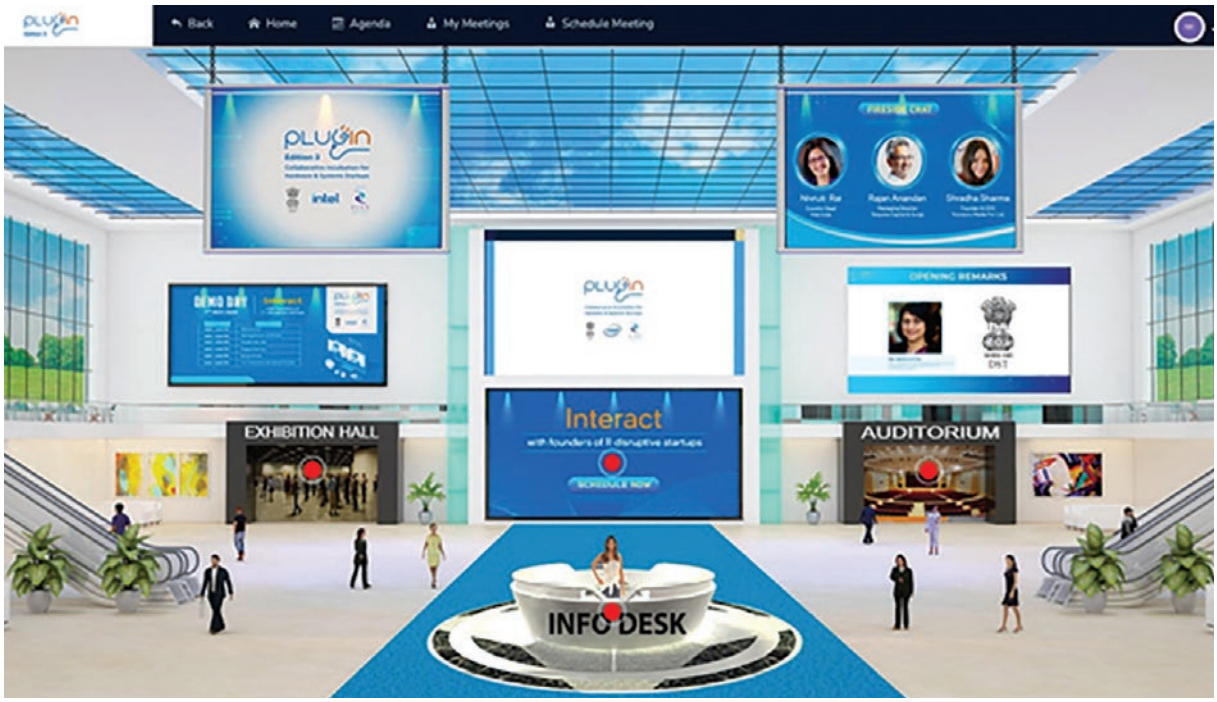
Pre-incubation programs – SINE has been successfully implementing government programmes such as NIDHI-PRAYAS of the Department of Science & Technology (DST), NIDHI-EIR, MeiTY TIDE 2.0 and BIG programme. These prototyping and entrepreneurial fellowship grants support aspiring or budding entrepreneurs in pursuing a promising technology business idea. SINE has concluded two cycles of the NIDHI programs and has supported:

- **30 innovations under PRAYAS** with the total funding support of Rs. 2 crores
- **20 entrepreneurs under the EIR program** providing fellowship of INR 30k per month per in-novator for a period of one year.
- During the year 2020-21, 12 innovators/ start-ups were supported under PRAYAS and five en-trepreneurs were supported under NIDHI-EIR
- Under MeitY TIDE 2.0, 13 innovators/start-ups have been supported under MeiTY TIDE 2.0 programs
- SINE as a BIG partner is executing and monitoring Biotechnology Ignition Grant (BIG) grant from BIRAC across India and have supported four start-ups

SINE continues to act as a **Program Management Unit (PMU)** for implementing the NIDHI-PRAYAS program nationwide and has executed three cycles with support to 31 centres across the country.

Seed Support Funding: During the year SINE has supported four companies under seed support funding, which act as a bridge between the development and commercialization of innovative products/ services.

Accelerator program: SINE in-collaboration with the Department of Science and Technology (DST), Government of India, and Intel India conducted the 3rd edition of the Plugin in virtual model. The programme culminated with 11 impressive start-ups showcasing at the virtual Demo Day.

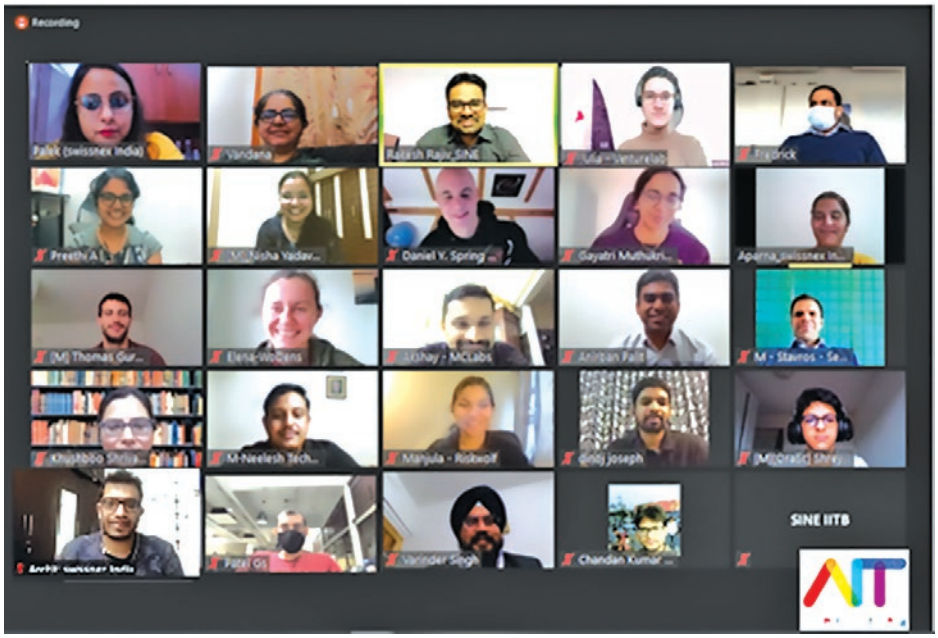


Plugin virtual Demo Day

So far 34 start-ups have been supported under the Plugin program.

Academia Industry Training (AIT): AIT Program is an initiative funded by the Department of Science and Technology (DST), Government of India and the Indo-Swiss Joint Research Program (ISJRP) of SERI, Switzerland, to promote research and technological entrepreneurship and enhance the interaction of academic researchers/ innovators with the industry. SINE completed sixth cycle of AIT program

in 2020-21, under which 10 start-ups were supported. A total of 68 innovators have been supported through the AIT program in six cycles.



Apart from the above programs, SINE also successfully implemented programs by DST and MeitY focused for COVID and post-Covid technology opportunities.

DST CAWACH: CAWACH is an initiative by the National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology (DST), Government of India to support the innovations and start-ups with innovations offering comprehensive solutions to address/ mitigate COVID-19 challenges. The program aims to support start-ups in the areas of diagnostics and drugs, disinfectants and sanitizers, ventilators and medical equipment, PPEs and informatics. A total of 51 companies were selected and funded under this program.

MeitY SASACT- The Ministry of Electronics and Information Technology (MeitY) came up with a funding program, Scheme for Accelerating Start-ups around post-COVID Technology Opportunities (SASACT). The objective of the program is to support electronics hardware/ ICT-based tech start-ups for developing or re-purposing technologies, tools, systems, solutions to respond to the post-COVID-19 scenario. Ten start-ups have been supported under this program.

Partnerships and Collaborations

Mahindra & Mahindra – SINE got into a joint alliance with Mahindra & Mahindra to assist Mahindra Mobility Services Sector's incubator program 'Catapult' to support start-ups. SINE as an experienced partner in the space of incubation facilitated the joint program by providing support in promotion, evaluation, selection of start-ups and mentor support for expert sessions.

Indo German Tool Room, IGTR (Aurangabad) – SINE has tied up with MSME Technology Centre, IGTR to work jointly on research projects, provide technological support to start-ups by way of design manufacturing and providing production training and tooling solutions.

MathWorks – SINE partnered for MathWork Accelerator Program, to enable start-ups free access to use Mathwork products like MATLAB, Simulink and many other Industry standard tools and solutions for research and production.

Recognition:

India Electronics and Semiconductor Association (IESA) conferred SINE as the 'Incubator of Year' under Technovation Awards of IESA for the year 2020.

Start-ups' Funding

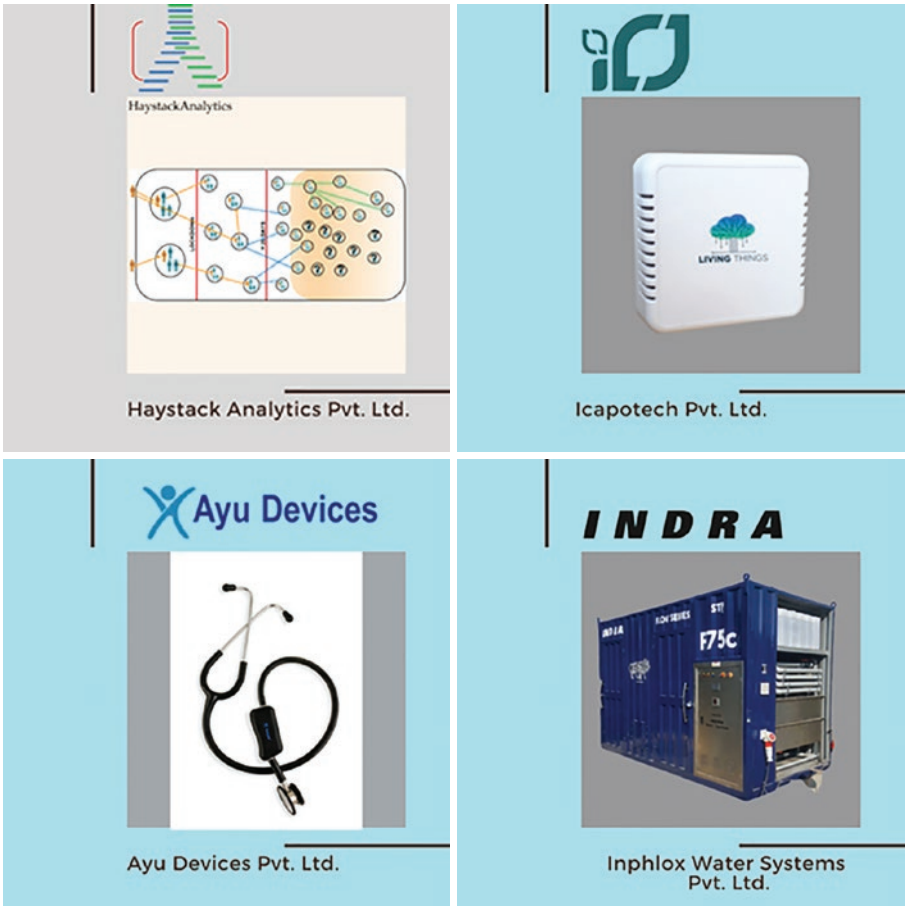
SINE graduate company IdeaForge Technology bagged a $20 million project from the Indian Military to supply high altitude SWITCH UAVs. The UAV start-up was founded by IIT Bombay alumni Ankit Mehta, Rahul Singh, Ashish Bhat and Vipul Joshi.

Atomberg Technologies secured Rs 70 crore in Series B funding led by A91 Partners. Atomberg was founded by IIT graduates Manoj Meena and Sibabrata Das.

Some pictures of company product, event and workshop:

1. BIRAC Meeting:

2. Some start-ups' product pictures:



IIT BOMBAY RESEARCH PARK FOUNDATION

IIT Bombay Research Park Foundation will be completing five successful years since its inception in June 2016. What started with a vision to bring industry and academia next to each other is thriving today on maturing science and technology towards collaboratively addressing real-world problems.

The Research Park continued to explore opportunities to increase its clientele even during pandemic situation through business development and outreach. Atomberg Technologies Pvt Ltd and igrenEnergi Services Pvt. Ltd. have enrolled as IIT Bombay Research Park member companies during 2020-21.

The IIT Bombay Research Park has introduced the 'Associate Model' for a virtual mode of collaboration for the companies interested in becoming the prospective clients of Research Park. Multi Nano Sense Technologies Private Limited (MNST), Amar Chemistry Pvt. Ltd., Virenxia, Ceremorphic, Inc. and Google are now the associate members of IIT Bombay Research Park and several other companies in different domains have expressed a strong interest to initiate collaboration in this virtual mode.

The Research Park is the nerve centre connecting clients seeking technical assistance with the expert faculty at IIT Bombay, thus facilitating companies to continue their engagement on different projects. Clients like Ubisoft Entertainment India Pvt Ltd, Viacom18 Media Pvt. Ltd., NCIIPC, Bharat Forge and Applied Materials are intensely engaged with the IIT Bombay faculty on exciting research projects.

During 2020-21, IIT Bombay Research Park has attracted an overall additional funding of approximately INR 167.24 lakhs for industry-sponsored research at IIT Bombay.

The pandemic situation has not entirely stopped the companies from offering student internships. About five students were hired as interns this year by the Research Park clients. This year, the Research Park has successfully implemented a new model of PhD student internships, wherein the companies may employ the PhD students who have submitted their theses. The companies could hire these students as interns for duration of six months to one year.

Highlights of few success stories of Research Park clients :

- ideaForge that has a focus on drone technologies, achieved a $20 million contract from the Indian Army to deliver its high-altitude variant product – Switch Unmanned Aerial Vehicle (UAV). Apart from working with armed forces, ideaForge assisted the police forces in Sangli (Maharashtra) and Guwahati (Assam) by deploying its drones for surveillance to monitor COVID-19 social distancing norms during the lockdown.
- NanoSniff Technologies Pvt. Ltd. has developed a unique deep tech-based product - NanoSniffer. Former Hon'ble Union Minister of Education, Mr. Ramesh Pokhriyal, launched this explosive trace detector on April 9, 2021.

  These achievements are a testament that the industry-academia collaborations are the new normal to resolve complex societal problems such as travel security.
- Applied Materials India, a member company of Research Park, has completed fifteen highly successful years of engagement with IIT Bombay. This association has served as a shining exemplar of industry-academia collaborations and has been a source of inspiration to deep tech companies to co-locate their R&D centres at the IIT Bombay Research Park.

To increase industry interaction, the Research Park facilitated the La Foundation Dassault Systems in India to organize a virtual conference 'ConnectNext' on September 17, 2020. It showcased the talent readiness of the next generation of students to industry representatives across India.

The Research Park also organised a Tech Meet_1.0 between the Institute Technical Council of IIT Bombay and the Research Park clients. This meeting was held to understand the various student initiatives at IIT Bombay and establish mechanisms for improved engagement between the member clients and the student technical teams of IIT Bombay.

The much-awaited Research Park building is now in its final stage of construction. It is expected to be ready and begin operations by early 2022. The business development by the Research Park Office has resulted in several existing as well as new industry member companies evincing interest to set up their R&D labs and collaborate with IIT Bombay faculty and students.

INTERNATIONAL RELATIONS

IIT Bombay assigns significant value to its relationships with various international partners. Over the years, IIT Bombay has steadily built up a reputation for research and education both in India and abroad. This has helped in attracting bright and young researchers from all over the world, as faculty of the Institute.

Owing to the ongoing pandemic, the Institute's International Relations activities have gone online. Even though our international visitors were not able to travel to the campus, many of the partners were still keen to continue our engagements with online workshops. These turned out to be very effective and we hope to leverage this activity even after the pandemic settles down. The interest in working on and signing new MoUs also continued and there are interesting joint degree programs ready to go into the implementation phase. The Senate also approved virtual students' semester-exchange. The numbers of students enrolling for the Master's degree program, with online instruction, were a bit higher than our usual intake.

Few international students have also come to the Institute either full-time or as exchange students. During the year, IIT Bombay has signed 5 MoUs with various foreign universities and met governmental and ministerial delegations (virtually) from countries across the globe for exploring areas of collaboration and cooperation.

MOUs with Foreign Universities:

- Washington University in St. Louis, USA (Joint Master's Degree Program)
- Università degli Studi di Urbino Carlo Bo, Italy
- Kookmin University, Korea
- Technische Universitat Ilmenau, Germany
- Lehigh University, USA

IIT Bombay – Lehigh University: MOU E-signing

Virtual Meetings

During the lockdown, virtual meetings became the new norm all around the world. These meetings led to building new partnerships as well as reviving the activities with our existing partners.

Virtual Visit of International Delegations

- The Ambassador of France in India, H.E. Mr. Emmanuel on June 11, 2020.
- Prof. Ted Sargent, Vice-President International, Prof. Alex Mihailidis, Associate Vice President International Partnerships, Prof. Ramin Farnood, Vice-Dean Research, Ms. Gwen Burrows, Executive Director International and Ms. Vanessa Laufer, Director International Relations from the University of Toronto, Canada on June 19, 2020.
- Prof. Richard Davies, Pro-Vice-Chancellor for Engagement and Internationalisation and Ms. Lesley Jackson, International Relations and Partnerships Manager from Newcastle University, UK on June 24, 2020.
- Prof. Andrew Martin, Chancellor, Prof. Kurt Dirks, Vice-Chancellor for International, Prof. Aaron Bobick, Dean, Prof. Pratim Biswas and Prof. Rajan Chakrabarty, McKelvey School of Engineering and Ms. Teresa Sarai, Associate Director from Washington University in St. Louis on August 20, 2020.
- Mr. David J. Ranz, U.S. Consul General in Mumbai, Jonathan Hwang, Assistant Cultural Affairs Officer and Ms. Behrooz Avari, Education Outreach Specialist on September 9, 2020.
- Mr. Mark Charnley - Senior Manager, International Recruitment, Office of the Vice-President and PVC (International), Mr. Tapam Srivastava - In-Country Representative (India) and Ms. Sadhana Lalla, Manager, International Recruitment and Partnerships (India) from Flinders University, Australia on October 20, 2020.
- Prof. Jimmy Hsia, Vice-President (Alumni and International Affairs), Prof Lalit Goel, Director, NTU-India Connect and Prof. B.V.R. Chowdari, Senior Executive Director from Nanyang Technological University, Singapore on October 22, 2020.
- Prof. Richard Dashwood, Deputy Vice Chancellor for Research, Mr. Michael Yap, Regional Managing Director for Singapore hub and Ms. Patricia Chengliong, Regional Policy Analyst from Coventry University, Singapore on November 16, 2020.
- Ms. Danielle Scott, Director International Relations, Mr. Jinjia Xu, Regional Manager (Asia) and Mr. Peter Carter, International Relations Coordinator (Asia), from the University of Alberta, Canada on December 4, 2020.
- Prof. Elizabeth H. Bradley, President, Prof. Wesley Dixon, Special Assistant to the President and Secretary to the Board of Trustees and Prof. Bill Hoynes, Dean of the Faculty from Vassar College on December 14, 2020.
- Prof. Nathan Urban, Provost, Prof. Cheryl Matherly, Vice President and Vice Provost for International Affairs; Prof. Steve DeWeerth, Dean of Engineering; Prof. Mayuresh Kothare, Department of Chemical and Biomolecular Engineering; Ms. Stacy Burger, Director Global Partnerships and Strategic Initiatives and Ms. Emily Groff, Director of Communications and Marketing from Lehigh University on December 17, 2020.
- Prof. Erik Lansard, Vice President Research, Prof. Gremillet Patrick, Director Research, Mr. Sekhar Sahay, India HR Head and Mr. Shyam Vaidyanathan, India Recruiting Lead from Thales Group on December 18, 2020.
- Prof. Milette Shamir, Vice President International Academic Collaborations and Prof. Gary Sussman, Advisor to TAU on India from Tel Aviv University (TAU) on December 28, 2020.

Asian Universities Alliance (AUA)

Asian Universities Alliance (AUA) is a consortium of Asian universities. It is a regional organization established with the aim of jointly addressing regional and global challenges, specifically related to higher education and economic, scientific and technological

development by strengthening collaboration among member institutions. AUA was established with a core of 15 universities, with IIT Bombay being a founding member university of AUA. There are many activities and interactions that happen under this consortium among its member universities and amidst the pandemic these were carried out in virtual mode: -

AUA Scholars Award and AUA Staff Exchange: AUA set up the AUA Scholars Award and AUA Staff Exchange Program with the purpose of increasing the mobility of scholars and staff among the AUA member universities. Scholars are encouraged to take this opportunity to advance research, share knowledge, conduct field study or establish international academic links in the community of AUA. AUA Staff Exchange program aims to enhance communications between staff of the AUA members as through this program, AUA members could have a better understanding of the programs, operations and management of other member universities. AUA provides financial support to scholars and staff to carry out short-term academic visits at another overseas AUA university. For the year 2020-21, five faculty members from IIT Bombay are selected for two-week visit to AUA member universities and IIT Bombay will host 4 faculty members from other AUA member universities. Likewise, three staff members are selected from IIT Bombay for a one-week visit to AUA member universities. These visits will be carried out when it is safe to travel and convenient for the host university.

AUA Board Meeting: The AUA Summit 2020 was scheduled to be conducted in April 2020, but due to the pandemic it did not take place. So the AUA Board Meeting was conducted by correspondence to take the major decisions related to next AUA Executive Presidency, Financial Statements and Budget, AUA Program Proposals and Framework. Each AUA member university had to send their votes, suggestions and feedback regarding these items to the AUA Secretariat and decisions were taken in the benefit of all involved. Prof. Subhasis Chaudhuri, Director, IIT Bombay; Prof. Prasanna Mujumdar, Deputy Director (Finance and External Affairs) and Prof. Swati Patankar, former Dean (International Relations) collectively made decisions on related matters.

AUA Working Groups Meeting: The AUA Working Groups meeting to study and provide policy advice on Financial Stability was held on September 9, 2020 in virtual mode and Prof. Prasanna Mujumdar, Deputy Director (Finance and External Affairs) participated on behalf of IIT Bombay.

AUA Executives Meeting 2020: AUA Executives Meeting 2020 was organised during November 5-6, 2020. Prof. Prasanna Mujumdar, Deputy Director (Finance and External Affairs) and Prof. Swati Patankar, former Dean (International Relations) represented IIT Bombay for this meeting. The first day of this meeting included discussions on the progress briefing of the Working Group Meetings, Asian Higher Education Outlook 2020 report, policy of the financial support for online programs and possible online activities for the coming year. The second day of the meeting was assigned to the special session named as *Empowering Creative and Responsible Students and Scholars During the COVID-19 Pandemic and Beyond.* In this session, each AUA member institution shared their experiences and perspectives relevant to the COVID-19 pandemic. Prof. Prita Pant, Associate Dean (Academic Programmes) represented IIT Bombay for this session and she gave talk on Restarting research activities after COVID induced lockdown.

AUA Presidents Forum 2020: IIT Bombay Director Prof. Subhasis Chaudhuri attended the virtual Asian Universities Alliance Presidents Forum 2020 held on November 26, 2020. Prof. Chaudhuri was the panelist for the discussion themed - *Knowledge is Power: The Resilience of Asian Universities in a VUCA World.* The Presidents Forum provided an opportunity for AUA Presidents to engage with one another on key topics about universities' activities/ initiatives post-COVID-19 era.

AUA Entrepreneurship Initiative (online program): International Innovation Center of Tsinghua University, Shanghai (IICTUS) hosted AUA Entrepreneurship Initiative online program for the students of AUA member universities during November 19, 2020 to December 5, 2020. Five IIT Bombay students participated in this program. The objective of this program was to encourage and empower AUA students to excel at developing solutions to regional and global challenges. The top 10 winners of the Entrepreneurship Competition will be awarded a competition certificate and up to 1,500 USD travel reimbursement to Shanghai to join events hosted by IICTUS when borders open (provisionally scheduled for Summer 2021).

SATU Presidents' Forum

The objective of Southeast and South Asia and Taiwanese Universities (SATU) Presidents' Forum is to strengthen the academic cooperation among Taiwan and Southeast and South Asian countries. The SATU Presidents' Forum Steering Committee Meeting was conducted on November 26, 2020 in a virtual mode. Prof. Swati Patankar, former Dean (International Relations) participated in this meeting representing IIT Bombay.

Heritage Network

The Heritage Network aims to strengthen Higher Education Cooperation (research and training) between Europe and India in the field of Engineering Sciences. A virtual consortium meeting was held on June 26, 2020 to get an overview of the current situation linked to the coronavirus both in India and in Europe. Prof. Swati Patankar, former Dean (International Relations), Prof. Sugandh Malhotra, IDC School of Design and Ms. Tanvi Mehta, Executive Officer, Office of International Relations participated in this meeting. On September 22, 2020, a group made of 8 institutions of Heritage Network brainstormed over how COVID-19 could foster innovative activities and incentives within the network. Prof. Swati Patankar, former Dean (International Relations) participated in this meeting.

Virtual Workshops

The pandemic brought about a change in regular-held workshops and switch to virtual research workshops/ symposiums which facilitates interactions between the researchers from many different world universities at the same time. Many of the workshops/ symposiums were multilateral. We had four research workshops/ symposiums with our partner universities in 2020 and the details are as follows:

1) Russian Indian Network (RIN) of Institution of Higher Education conducted online symposium on Data Analytics during October 6-7, 2020
2) IIT Bombay and University of Toronto, Canada held online workshop on Sustainable Agriculture and Rural Economic Development on October 14, 2020
3) Russian Indian Network (RIN) of Institution of Higher Education conducted online symposium on Nano Materials on November 3 and November 5, 2020
4) Indo-German Partnership (IGP) workshop on Energy, Transport, Environment and Climate was held on November 25, 2020

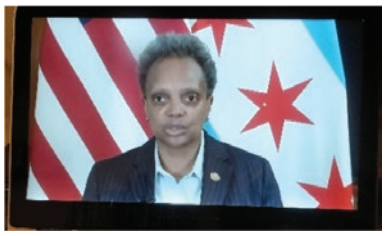
Partnerships

Indo-German Partnership

IIT Bombay has received an approval from the UGC for project titled "Exploration : New Opportunities in Indo-German Academic Co-operation" under the Indo - German Partnership in Higher Education (IGP). Our partners in this project are IIT

Kharagpur and Technical University of Munich, Germany. This is an institutional project and will be driven by Office of Dean (International Relations), IIT Bombay. IIT Bombay is the recipient of this grant and will be co-ordinating the activities in India. The areas being Climate, Energy and Environment, Transport and Mobility and Innovation and Entrepreneurship. Through this project, IIT Bombay, IIT Kharagpur and Technical University of Munich will get an opportunity to develop joint research projects and upgrade study programmes in order to enhance their strategies of internationalization. The project will contribute to the internationalization of the participating institutions through exchange of Masters students, doctoral students, post-doctoral fellows, faculty and institutional managers or employees looking after the international relations of the institution. Due to pandemic, online activities were conducted with IGP kick-off meeting and thematic workshops held on November 25, 2020. The opening remarks were given by Prof. Juliane Winkelmann, Senior Vice President International Alliances and Alumni, TUM; Prof. S. Sudarshan, Deputy Director (Academic and Infrastructural Affairs), IIT Bombay and Prof. Baidurya Bhattacharya, Dean (International Relations), IIT Kharagpur during the opening session of the meeting.

U7 Alliance



The Mayor of Chicago, Ms. Lori Lightfoot

The U7 Alliance is an international alliance of university presidents who engage both in discussion and in concrete action by making commitments that universities may take to address the most pressing global challenges in a multilateral context. It is the very first alliance of university presidents aimed at structuring and advancing their role as global actors across the multilateral agenda. North-western University hosted the second annual U7+ Presidential Summit, convening presidents and top leaders from universities in G7 nations and other countries to explore solutions to the world's most pressing issues. The Mayor of Chicago, Ms. Lori Lightfoot gave the opening address. Prof. Subhasis Chaudhuri, Director, IIT Bombay and Prof. Swati Patankar, former Dean (International Relations) participated in this summit held during November 23-24, 2020.

French Network

An umbrella memorandum of understanding between an Indian Network of Indian Institutes of Technology and a French Network of Engineering Schools members of the Federation Gay Lussac to better co-ordinate the Indo-French university collaboration between both Networks is finalised. Due to pandemic, all the participating institutes could not sign the agreement, but have carried out the preliminary activities together. IIT Bombay is the co-ordinating institute for the Indian Network and Ecole Nationale Supérieure de Poitiers is the co-ordinating engineering school for the French Network. The partners are involved in initiating Masters student mobility between French Engineering Schools and IITs. Many departments of IIT Bombay and other IITs have shown interest in this activity and we look forward to a good number of Masters student exchanges.

Finnish Network

The Memorandum of Understanding between the Consortium of Finnish Universities, Finland and the Indian Institutes of Technology, India is finalised and awaiting signatures from both ends which could not take place early this year due to the pandemic. IIT Bombay is the co-ordinating institute for the Indian side and Aalto University for the Finnish side. We have tried to gauge interest from the partners involved through a survey for the activities they look forward to doing in this network and many have shown interest for joint research cooperation and joint research seminars/

webinars. We look forward to organizing a joint webinar with the Finnish partners on a selected theme/ field in spring 2021.

Russian Network

IIT Bombay is the part of Russian Indian Network (RIN) of Institutions of Higher Education and has been co-ordinating activities for Indian Network of IITs involved. The aim of this network is to facilitate research collaborations, faculty and student exchange among the leading universities of both countries. IIT Bombay co-ordinated two workshops that were conducted under this network in the thematic areas of Data Analytics during October 6-7, 2020 and Nano materials held on November 3 and November 5, 2020, respectively. The faculty members from many IITs and Russian Universities participated in this exploratory workshop and presented their research. The objective of this workshop was to help faculty members identify the Indian/ Russian researcher with whom they can work together and have fruitful collaboration.

Pen Pals

As the pandemic propels the world to come closer virtually, IR office resorted to creative ways to collaborate remotely. This virtual setting has opened up previously unexplored avenues for student communities to network and engage with the global community. It gave them the chance to learn from academic communities across the globe and grow together. To further this agenda, the IR office launched a novel Pen Pals programme, the brainchild of our current Institute Student Secretary for International Relations. The programme kick-started on December 10, 2020. Interested students from partner universities are mapped to an IIT Bombay student for 6 weeks with similar academic interests and level of study. The students are encouraged to engage in academic discussions virtually during this period. They are utilizing this opportunity to broaden their knowledge horizons and learn about the academic atmosphere of their pal's university and country and 118 students from IIT Bombay and 7 partner universities from across the globe are participating in the programme. These include Cracow University of Technology (Poland), Kochi University of Technology (Japan), Fontys University of Applied Sciences (Netherlands), National Chiao Tung University (Taiwan), TU München (Germany), Politecnico di Milano (Italy) and Loughborough University (UK).

Japanese Culture Session and Origami Workshop

On December 19, 2020, Sensei Sunauchi (Japanese Instructor) along with Koo International organized a Japanese Culture Session and Origami workshop for the IIT Bombay community. Sensei has organised an in-person workshop during the last few years but the modality was virtual this year. Kiminami Yumiko san who is a Washi (Japanese traditional paper) craft artist led the workshop. It was a 2-hour interactive workshop in which attendees made their own Origami Cranes (Orizuru) and an Origami Masu box. The attendees also learnt about the process for making the Japanese Washi paper and the Japanese zodiac nomenclature for new years.

Kobayashi Nanae san from Koo International was also in attendance. All attendees ended up adding a few extra words to their Japanese vocabulary while enjoying a sneak peek into the Japanese culture through the virtual session.

Outbound Students

Considering COVID-19 situation, many universities have cancelled the semester exchange programme and are now offering virtual semester exchange. We had two students who went to University of Geneva, Switzerland and a student went to Ecole Centrale de Nantes, France. Whereas two other students got enrolled for virtual semester exchange with University of Calgary, Canada. The students also have opportunities to study in short-term programmes with the partner university. Also, four IIT Bombay undergraduate students had enrolled in the virtual program of International Linkage Degree Program (ILDP) at Hiroshima University (HU). The program was conducted during December 15-23, 2020. ILDP is a project promoted by the Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT). This program offers a variety of educational programs including degree-based program for students of Indian institutions and HU.

IIT Bombay students participated in Student Exchange Programs (under the Memorandum of Understanding) during Academic Year 2020-21:

Sr. No.	Name of the University	No. of students/ Programmes
1	Aalto University, Finland	One dual degree student from Department of Mechanical Engineering and one dual degree student from Department of Electrical Engineering
2	Technical University of Denmark, Denmark	Two dual degree students from Department of Electrical Engineering and two dual degree students from Department of Mechanical Engineering
3	Ecole Centrale de Nantes, France	One dual degree student from Department of Energy Science and Engineering
4	EPFL Lausanne, Switzerland	Three dual degree students from Department of Electrical Engineering
5	INSA Lyon, France	One BTech student from Department of Aerospace Engineering and one BTech student from Department of Civil Engineering
6	Malardalen University, Sweden	One BTech student from Department of Mechanical Engineering and one dual degree student from Department of Energy Science and Engineering
7	Politecnico Di Milano, Italy	One BTech student from Department of Civil Engineering
8	University of Calgary, Canada	One BTech student from Department of Mechanical Engineering and one B.S. Economics degree student from Department of Humanities and Social Sciences
9	University of Geneva, Switzerland	Two dual degree student from Department of Energy Science and Engineering and one B.S. Economics degree student from Department of Humanities and Social Sciences
10	University of Mons, Belgium	One dual degree student from Department of Electrical Engineering and one dual degree student from Department of Energy Science and Engineering

International Students

The COVID-19 pandemic has affected the exchange/ research of international students but few still have registered for Masters and PhD programme. Though the autumn semester was running in the virtual mode, approximately 40 international students have registered for Master's/ PhD programme which is more compared to last year. Institute looks forward to welcoming these students on campus very soon. There are about 20 international students currently staying on-campus. These international students have managed very well in the past year and the Institute is trying to make the difficult months of the pandemic as smooth as possible for them. One international student from Japan did virtual project work during February-March 2021.

ALUMNI AND CORPORATE RELATIONS

The Dean (Alumni and Corporate Relations) Office integrates two strategic thrusts for IIT Bombay. One is nurturing and enhancing alumni relations and the other is collaborating with corporations. The alumni and corporate donations, which have picked up significantly in the last few years, also provide a great support to the Institute. The Office of Dean (ACR) performs the important task of raising additional resources from the alumni and other well-wishers of IIT Bombay for the benefit of the Institute.

During 2020-21, the Institute received a total donation of Rs.77 crores. We express our deep gratitude and appreciation for the constant support shown by our alumni and other well-wishers of IIT Bombay. The major corporate donors for the last financial year, among others, were Technocraft Industries India Limited. With the generous contribution received from our eminent alumni Mr. Sharad Kumar Saraf (BTech, Electrical Engineering, 1969) and Mr. Sudarshan Kumar Saraf (BTech, Mechanical Engineering, 1970), IIT Bombay is setting up the 'Technocraft Centre for Applied Artificial Intelligence' (TCA2I). Through TCA2I, the Institute intends to foster collaboration between industry and academia in Applied Artificial Intelligence through research and outreach.

Mr. Ashank Desai, an IIT Bombay alumnus (Class of 1974) and Founder, Vice-Chairman and Managing Director of Mastek/ Majesco contributed a substantial amount of Rs. 15 crores towards the Centre for Policy Studies in IIT Bombay. Speaking on the occasion of Alumni Day celebrations, he said, *"I feel fulfilled to contribute towards IIT Bombay's journey of making Centre for Policy Studies a premier policy institution. This Centre will contribute towards India's need for talent, research and advisory to achieve a holistic approach to policy making, particularly with emphasis on technology"*.

Koita Foundation, a not-for-profit foundation, founded by technologists and esteemed alumni of IIT Bombay, Mr. Rizwan Koita (1992, Electrical Engineering) and Ms. Rekha Koita (1992, Metallurgical Engineering) have planned to establish the Centre for Digital Health at IIT Bombay. The Centre will offer academic and research programs with the objective of creating a robust ecosystem for Digital Healthcare and will strive to address the need for engineering and clinical professionals and entrepreneurs in digital health and create research and employment opportunities. The Centre aims to develop a strong digital health capability with a key focus on clinical applications including electronic patient records, medical imaging, healthcare analytics, healthcare AI/ ML, consumer health and public health policy.

The major alumni donations received during the year were from IITB Heritage Foundation, alumni representatives of Hostel 5, Mr. Balaji Srinivasan, Mr. Gagan Singh, Ms. Olina Raney and Prof. V. V. Chari and Class of 1993, 1994 and 1995 among others. The development and alumni activities of our Institute are not just a role model in India, but have also been appreciated by major international universities.

The major activities for which the donations were received are as under:

Centres of Excellence:

I. Centre for Policy Studies
II. Technocraft Centre for Applied Artificial Intelligence
III. Centre for Digital Health

Cherish IIT Bombay:

I. UG Laboratories
II. Lecture Hall Complex
III. Young Faculty Awards
IV. Makerspace Laboratories

Chair Professorship: The Chair Professorship is a distinguished academic position of the Institute and is conceived as an academic honour to recognize outstanding teaching/ research work and achievements of the permanent faculty in the Institute. It is also used to attract outstanding academicians to join the Institute as visiting faculty. Each Named Chair is supported

by an endowment created from a donation to the Institute. The establishment of new Chair Professorships is essential for IIT Bombay to attract and retain high-quality research faculty, which is one of the key elements required to fulfil the goal of the Institute to be a leading international research university. It is envisaged that Named Chairs will also lead to establish new areas of specialization through the recruitment of accomplished researchers in specific fields of study. The endowment for a Chair is currently Rs. 1.25 crore. Interest from the endowment will be used to meet expenses of the Chair, which include an honorarium of upto Rs. 30,000 per month and contingency expenses. The salary of the Chair Professor and all other benefits (housing, medical etc.) continue to be borne from Institute funds. Donors have the prerogative of naming the Chairs. The broad area of specialization for instituting the Chair may also be specified by the donor. The total number of Chair Professors for the year 2020-21 was 70, out of which 38 are Institute Chairs and 32 Donor-named Chairs.

Young Faculty Awards (YFA): IIT Bombay is undergoing a rapid growth phase even as other institutions in India and abroad are planning to expand, too. This creates significant challenges in attracting faculty to IIT Bombay. Given the current hiring spurt, the Young Faculty Award program was designed to have a substantial long-lasting impact on IIT Bombay and its faculty profile. The YFA ensures that IIT Bombay offers a more attractive package to achieve better results in recruitment. The "Young Faculty Joining Bonus", initially a Class of '82 Legacy Project, has been awarded from 2010 onwards. The class of 1978, '83, '84, '85, '88, '89, '90, '91, '92 and '93 have also joined this project. The project focuses on supporting young faculty in their academic pursuits in order to attract outstanding young faculty to replace retiring faculty and to augment current faculty as a key element for IIT Bombay to maintain its long-term competitiveness. Around 93 faculty members benefited from YFA in 2020-21.

Hostel Development: The Hostel Alumni Team Stewardship (HATS) is an important alumni-driven initiative that aims to channel the affinity and affection that many alumni have for their former hostels. This activity is run exclusively through the alumni support and contributions. The key goals of HATS are as follows:

a) Improve hostel infrastructure and facilities
b) Assist the current and retired mess workers
c) Increase interaction between the alumni and students
d) Empower students to improve their living conditions under the aegis of Make Hostel My Home (MHMH)
e) Organize hostel-level reunions in each hostel on the Alumni Day

The alumni from various batches have initiated projects to provide better facilities to the students for their academic progress.

Student Development:

a) Scholarships: One way to nurture excellence amongst students is by awarding scholarships to deserving candidates. The scholarships may be named after the donor. The Office of Dean (ACR) also works with students and alumni to identify and apply for relevant external fellowships and scholarships. The amount of scholarship is reviewed with the Institute Scholarship Committee from time-to-time to determine the viability of the same, given the prevailing economic conditions. During the academic year 2020-21, about 300 scholarships of varying amounts were granted. Desai Sethi, IITBHF Named scholarships, Round Memorial, C'1990, C'1992 and Indira Foundation scholarships are some of the prominent scholarships. This year, the Institute resorted to an entirely online mode of instruction. This meant making sure all the students across the Institute have a laptop and a stable internet connection to attend all the classes. IIT Bombay announced an initiative of IT Hardware scholarships for the needy students to help them buy a laptop and cover the internet expenses for the entire academic season. The Institute provided financial aid to over 750 needy students of the Institute towards obtaining the hardware and network

resources through the generous monetary support it received from the alumni.

b) **Awards and Prizes:** As every year, on the Convocation Day, about 45 awards and prizes of varying amounts and forms (certificates, medals, prizes etc.) were given away during 2020-21. The awards in the name of Prof. K.C. Khillar, Mr. R.G. Manudhane, Dr. P.V Sukhatme and Mr. Rakesh Mathur, Mrs. Rama Mathur are some of the prominent ones given during convocation.

Alumni and Corporate Relations Activities and Events:

a) **Cherish IIT Bombay:** As part of its ongoing fundraising effort, the Institute virtually launched its first ever annual fundraising campaign in India called 'Cherish IIT Bombay' on February 14, 2021. The current initiatives that needs alumni support are:

- Creation of world-class laboratory complexes
- Modernization of Lecture halls
- Continuation of Awards to attract and retain Faculty
- Makerspace Laboratory

The campaign raised Rs. 55 lakhs in just 45 days with no physical events being conducted. The campaign ended on March 31, 2021 with many first-time donors.

b) **Institute Valedictory Function:** The E-Valedictory Function for the graduating students and ceremonial welcome to the new batch of students – Class of 2020 to the family of IIT Bombay alumni was organised online on July 18, 2020, owing to our invisible foe-COVID-19. Mr. Toos Daruvala, Co-CEO of MIO Partners and the in-house investment management arm of McKinsey & Company, also the recipient of the Distinguished Alumni Award in 2014, delivered the keynote address. The other speakers on the occasion include our Young Alumni Achiever Awardee Mr. Rahul Singh who is the Co-Founder and Vice President (VP) Engineering of idea-Forge Technology. Delivering the valedictory address, they reminisced their campus life and shared some experiences which have helped shape them. The event was graced by the presence of Institute dignitaries Prof. Subhasis Chaudhuri, Director, IIT Bombay, Prof. Soumyo Mukherjee, former Dean (Student Affairs) and Prof. Suhas Joshi, Dean (Alumni and Corporate Relations). The outstanding contribution awards were also given out to felicitate the members of the Student Alumni Relations Cell who have contributed substantially to the Institute as members of the Dean (Alumni and Corporate Relations) Office.

c) **Alumination:** The flagship event of SARC, IIT Bombay 'Alumination', was organised during December 19-20, 2020. It is IIT Bombay's largest platform for bilateral exchange between the IIT Bombay alumni and students on a spectrum spanning career guidance, corporate exposure, life learning and motivational talks. The event witnessed presence of Distinguished Alumni Mr. Ashish Chauhan, MD and CEO, Bombay Stock Exchange and Ms. Shalini Govil Pai, Vice President and General Manager, Android TV Google.

The students were motivated and enlightened on a spectrum of topics spanning career, guidance, corporate exposure and life learning.

d) **Virtual Reunion Events:** IIT Bombay organized a "Pearl Reunion – Class of 1990" and "Ruby Reunion – Class of 1980" on 12th and 20th December 2020, respectively.

- **Pearl Reunion** – Class of 1990: 30th reunion of the class of 1990, 'Pearl Jammin' was held online on Zoom, on December 12, 2020. It was the first large-scale virtual reunion of any IIT Bombay batch. The event started off with nostalgia, an audio-visual of IIT Bombay from the late '80s. Around 175 batch mates attended the reunion.
- **Ruby Reunion** – Class of 1980: On December 20, 2020, the Class of 1980 came together virtually to elaborate Ruby Reunion. They came out with the dazzling

idea of fabricating a digital video album (yearbook) covering over one hundred batch mates narrating their lives.

e) Institute Alumni Day: The Institute celebrated E-Alumni Day on December 27, 2020. The Alumni Day saw two of the alumni, who have contributed in a notable and sustained manner to the progress of the Institute, being honoured with the 'Distinguished Service Awards'. The DSA was conferred on:

- Mr. Krishnamurthy Raghunandan (MTech, 1972, Mechanical Engineering)
- Mr. Sachin Galgalikar (BTech, 1986, Mechanical Engineering).

The Chapter Service Awards (CSA), instituted during the Diamond Jubilee year celebrations, were conferred on:

- Mr. Bhalchandra Gopal Deokule (BTech, 1975, MTech, 1977, Aerospace Engineering),
- Dr. Shankar Moni (BTech, 1984, Electrical Engineering),
- Mr. K. Sharat Chandra (BTech, 2001, Chemical Engineering),
- Dr. Chandan Mozumder (Dual Degree (BTech+MTech), 2005, Aerospace Engineering),
- Mr. Gaurav Porwal (Dual Degree (BTech+MTech), 2005, Chemical Engineering)
- Mr. Mudit Jain (BTech, 2011, Electrical Engineering).

f) Virtual Alumni Reunions: Virtual reunions of various batches of alumni of the Institute were organised in December 2020:

- Silver Jubilee Reunion of Class of 1995 was held during December 25-27, 2020. The batch of 1995 pledged a sum of Rs. 20.3 cr. towards the Legacy Project. They would be looking at deploying the funds in a number of projects largely related to student well-being, including scholarship programs for deserving students, upgradation of study facilities across the hostels, supporting the ongoing Institute efforts for student counselling, amongst other things.

g) Foundation Day: The 62nd Foundation Day of the Institute was celebrated on March 10, 2021. During the function, ten alumni were honoured with the Distinguished Alumnus Awards and five Young Alumnus Achiever Awards by the Chief Guest Mr. Rajesh Gopinathan, CEO and Managing Director of Tata Consultancy Services. The Distinguished Alumnus Award is conferred on those alumni who have reached positions of eminence in the areas of business, academics, research, government, public service and entrepreneurship. The Young Alumni Achiever Award is presented to those who have shown outstanding achievements in their chosen field of work and are below 40 years of age.

The Institute also felicitated the philanthropy of a few alumni under the 'Donor Appreciation' programme.

The recipients of the Distinguished Alumnus Award are as follows:

- Mr. Sunil Shenoy, BTech, 1980, Electrical Engineering
- Mr. Subramanian Sarma, MTech, 1981, Chemical Engineering
- Dr. Pandurang Nayak, BTech, 1985, Computer Science and Engineering
- Dr. Harrick Vin, BTech, 1987, Computer Science and Engineering
- Mr. Ramesh Mangaleswaran, BTech, 1989, Metallurgical Engineering and Materials Science
- Mr. Sharad Sanghi, BTech, 1989, Electrical Engineering
- Prof. Kavita Bala, BTech, 1992, Computer Science and Engineering
- Prof. Vikram Deshpande, BTech, 1994, Mechanical Engineering
- Prof. Govindasamy Mugesh, PhD, 1999, Chemistry
- Prof. Devavrat Shah, BTech, 1999, Computer Science and Engineering

The recipients of the Young Alumni Achiever Awards are as follows:

- Prof. Zubin Jacob, BTech, 2004, Electrical Engineering
- Mr. Akhil Gupta, Dual Degree (BTech + MTech), 2005, Chemical Engineering
- Mr. Gaurav Porwal, Dual Degree (BTech + MTech), 2005, Chemical Engineering
- Mr. Mohit Soni, Dual Degree (BTech + MTech), 2005, Electrical Engineering
- Prof. Yashodhan Kanoria, BTech, 2007, Electrical Engineering

h) Named Lectures: The following lectures were organised during the year by the Office of Dean ACR:

i) Prof. N. R. Kamath Chair Distinguished Lecture:

Prof. N. R. Kamath Chair Distinguished Lecture by Prof. Bruce Hajek, Leonard C. and Mary Lou Hoeft Endowed Chair in Engineering, Department of Electrical and Computer Engineering, and Coordinated Sciences Laboratory, University of Illinois at Urbana Champaign titled "Life and Random Algorithms" was organized on March 24, 2021

ii) Radhika Rajan Women Leadership Lecture Series:

Radhika Rajan Women Leadership Lecture by Ms. Manjeet Hirani, Senior Commander and Pilot with Air India, on Nanoscience and Nanotechnology titled "How to be HUMAN" was organised on February 18, 2021

INSTITUTE EVENTS

58th Convocation: The 58th Convocation of IIT Bombay was held on August 23, 2020 in Virtual Reality (VR) mode. The personalized avatar of each graduate received the graduating degree certificate from the personalized avatar of Prof. Subhasis Chaudhuri, Director of IIT Bombay.

Prof. Duncan Haldane, co-recipient of the 2016 Nobel Prize in Physics and a Professor of Physics at Princeton University, was the Chief Guest and delivered the convocation address. Mr. Stephen Schwarzman, Chairman, CEO and Co-Founder of Blackstone, world-renowned investor and philanthropist was the Guest of Honor at the event. The event was telecast on DD India and DD Sahyadri channels as well as on YouTube and Facebook Live.

Republic Day: IIT Bombay celebrated the 72nd Republic Day at the Institute's campus on January 26, 2021. Republic Day was celebrated with a minimum number of attendees by maintaining social distance. The celebration began with the unfurling of the national flag by the Institute's Director Prof. Subhasis Chaudhuri at the Institute's Gymkhana ground. The programme was broadcast live.

Chief Medical Officer Ms. Nisha Shah receiving the COVID Warriors' certificate on behalf of IIT Bombay Hospital from Director Prof. Subhasis Chaudhuri

The Institute appreciated the Corona Warriors from IIT Bombay community who worked during the lockdown and extended their helping hand to the needy during the pandemic. As a token of gratitude, over 900 IIT Bombay staff, faculty, students were felicitated and given certificates online in appreciation of the work performed during the pandemic.

Constitution Day: To mark the Constitution Day (Samvidhan Divas), IIT Bombay staff read the Preamble to the Constitution of India on November 26, 2020 (online). Dr. R. Premkumar, Registrar of IIT Bombay read the Preamble in English followed by a reading of the Preamble in Hindi by Mr. Ganesh K. Bhorkade, Joint Registrar of IIT Bombay.

Azadi Ka Amrit Mahotsav: Indian Institute of Technology Bombay had organized various online talk sessions, panel discussions and essay writing competitions, to celebrate 'India's 75 years of Independence - Azadi Ka Amrit Mahotsav'. Various events are held throughout the year by the Institute. The idea of the Mahotsav is to showcase accomplishments since 1947 to instil a sense of pride and to create a vision for India@2047. Few panel discussions and talks were held in the month of March 2021.

International Women's Day: IIT Bombay's Gender Cell celebrated International Women's Day on March 25, 2021. The event was organized online and broadcasted on the YouTube channel of the Institute. Prof. Subhasis Chaudhuri, Director, IIT Bombay graced the occasion as Chief Guest for the event.

International Day of Yoga: IIT Bombay celebrated sixth International Yoga Day on June 21, 2020 to raise awareness about the benefits of yoga in daily life. The celebration included various workshops, online quiz series, slogan writing and poster-making competitions. The online event witnessed the participation of all members of the IIT Bombay community. The flagship event of Yogastha named 'Yogathon: 108 Suryanamaskar Challenge', was organised online due to the pandemic.

Teachers' Day: The 62nd Teachers' Day was celebrated online on September 8, 2020. Prof. Meric Gertler, President, University of Toronto, Ontario, Canada, was the Chief Guest for the occasion. IIT Bombay Director Prof. Subhasis Chaudhuri presented the 'Prof. S. P. Sukhatme Award for Excellence in Teaching' and 'Departmental Award for Excellence in Teaching' to selected faculty members.

The recipients of the Awards for Prof. S. P. Sukhatme Excellence in Teaching (2020) are:

- Prof. Gajendra Kumar Adil, Shailesh J. Mehta School of Management
- Prof. Sudesh Balan, IDC School of Design
- Prof. S. Baskar, Department of Mathematics
- Prof. Anurag Mahesh Kumar Garg, Environmental Science and Engineering Department
- Prof. Suvarn Subhash Kulkarni, Department of Chemistry
- Prof. Malay Mukul, Department of Earth Sciences
- Prof. Sahana Murthy, IDP in Educational Technology
- Prof. Suresh C. Patel, Department of Earth Sciences
- Prof. Nithyanand Prabhu, Department of Metallurgical Engineering and Materials Science
- Prof. Vaijayanthi Mala Sarma, Department of Humanities and Social Sciences
- Prof. Dinesh Sharma, Shailesh J. Mehta School of Management
- Prof. Nishant Sharma, IDC School of Design
- Prof. Sanjeeva Srivastava, Department of Biosciences and Bioengineering
- Prof. Vikram Singh Sirola, Department of Humanities and Social Sciences
- Prof. Perumal Vedagiri, Department of Civil Engineering

The recipients of the Departmental Awards for Excellence in Teaching (2020) are:

- Prof. Aniruddha Sinha, Department of Aerospace Engineering
- Prof. Samir Kumar Maji, Department of Biosciences and Bioengineering
- Prof. Chandra Venkataraman, Department of Chemical Engineering
- Prof. Rajdip Bandyopadhyaya, Department of Chemical Engineering
- Prof. Rajarshi Chakrabarti, Department of Chemistry
- Prof. Irishi N. Narayanan Namboothiri, Department of Chemistry
- Prof. Subimal Ghosh, Department of Civil Engineering
- Prof. Mandar M. Inamdar, Department of Civil Engineering
- Prof. S. Sudarshan, Department of Computer Science and Engineering
- Prof. Uday Khedker, Department of Computer Science and Engineering
- Prof. H. C. Sheth, Department of Earth Sciences
- Prof. Girish Kumar, Department of Electrical Engineering
- Prof. Anupama Kowli, Department of Electrical Engineering
- Prof. Pradeep R. Nair, Department of Electrical Engineering
- Prof. Venkatasailanathan Ramadesigan, Department of Energy Science and Engineering
- Prof. Ramesh Bairy T. S., Department of Humanities and Social Sciences
- Prof. Mrinmoyi Kulkarni, Department of Humanities and Social Sciences
- Prof. Preeti Raman, Department of Mathematics
- Prof. Siuli Mukhopadhyay, Department of Mathematics
- Prof. Ramesh Kumar Singh, Department of Mechanical Engineering
- Prof. Sridhar Balasubramanian, Department of Mechanical Engineering
- Prof. R. P. Vedula, Department of Mechanical Engineering
- Prof. Rajiv O. Dusane, Department of Metallurgical Engineering and Materials Science
- Prof. N. K. Khosla, Department of Metallurgical Engineering and Materials Science
- Prof. Mithun Kumar Mitra, Department of Physics

- Prof. K. G. Suresh, Department of Physics
- Prof. Venkatesh Rajamanickam, IDC School of Design
- Prof. Shishir Kumar Jha, Shailesh J. Mehta School of Management
- Prof. P. S. V. Nataraj, Systems and Control Engineering
- Prof. Amit Y. Arora, Centre for Technology Alternatives for Rural Areas
- Prof. Y. S. Rao, Centre of Studies in Resources Engineering

Hindi Pakhwada: IIT Bombay celebrated 'Hindi Pakhwada' during September 1-14, 2020. The Hindi Cell organized an online essay writing competition for all faculty, staff members and students of the Institute. On Hindi Diwas, celebrated on September 14, 2020, a message from former Honourable Education Minister Mr. Ramesh Pokhariyal 'Nishank', along with the message of Honourable Union Home Minister Mr. Amit Shah was circulated to all members of the Institute.

Van Mahotsav: To spread awareness on environmental conservation, Van Mahotsav was celebrated at IIT Bombay on August 30, 2020. Around 400 saplings of 70 varieties were planted in Hostel 18 premises during the annual tree plantation drive.

Rashtriya Ekta Diwas: IIT Bombay observed Rashtriya Ekta Diwas (National Unity Day) on October 29, 2020. The employees took a pledge to promote a culture of unity and integrity by maintaining social distance following COVID-19 guidelines.

Vigilance Awareness Week: The Vigilance Awareness Week was observed during October 27, 2020 to November 2, 2020. The staff of IIT Bombay took a pledge to promote a corruption-free society. The Vigilance Cell of IIT Bombay had also organised an (online) essay competition on 'Satark Bharat, Samriddh Bharat (Vigilant India, Prosperous India): My Roadmap' for the campus community.

National Education Day: The Institute commemorated the birth anniversary of India's first Education Minister Maulana Abul Kalam Azad by observing National Education Day (Rashtriya Shiksha Diwas). IIT Bombay had organised a programme on November 10, 2020 with Mr. Ramesh Pokhriyal 'Nishank', former Hon'ble Minister of Education, Government of India as the Chief Guest. The Minister inaugurated the National Education Day programme via video conference. Dr. K. Kasturirangan, Former Chairman, ISRO and Chairman of the committee for drafting the New Education Policy was the Guest of Honor for the occasion.

59th Interim Convocation: The Institute's 59th Interim Convocation was held on February 27, 2021 at the Institute's Convocation Hall in Hybrid mode (3-D Virtual Reality Enabled). Mr. Adil Zainulbhai, Chairman, Quality Council of India and Former Chairperson, McKinsey India, was the Chief Guest for the function. IIT Bombay awarded degrees to 178 students. The degrees were presented to those graduating students who have completed all the requirements during the period from August 2020 to February 2021 and have requested for the degree to be awarded earlier than the 59th Convocation in August 2021.

Matribhasha Diwas: IIT Bombay celebrated Matribhasha Diwas (Mother Language Day) virtually on February 21, 2021. Every year, the Institute's Hindi Cell organises various cultural programmes to celebrate the linguistic diversity of India. The celebrations include promoting various languages to create awareness of linguistic and cultural traditions amongst Institute community members.

Marathi Bhasha Samvardhan Pandharwada: IIT Bombay celebrated Marathi Bhasha Samvardhan Pandharwada (Marathi Language Conservation Fortnight) during January 14-28, 2021 by organizing various competitions and a cultural programme in online mode. The objective of the celebration was to preserve and practice the Marathi language. The Marathi Pandharwada Committee organized various competitions such as Katha-Kathan (storytelling), Hast-Lekhan (handwriting) and Nibandh-Lekhan (essay writing).

150th Birth Anniversary of Mahatma Gandhi: As part of the commemoration of the 150th Birth Anniversary of Mahatma Gandhi for a period of two years during October 2, 2018, to October 2, 2020 various initiatives/activities were undertaken by the Institute till August 2020. Institute lectures, panel discussions, seminars, competitions were organised by the Institute.

Institute Lectures/ Colloquia:

Prof. Nishikant Kolge, Associate Professor, Centre for the Study of Developing Societies (CSDS), New Delhi, spoke on "Was Gandhi a Champion of the Caste System?", at an Institute lecture on September 30, 2020

Prof. Chetan Singh Solanki, Department of Energy Science and Engineering, IIT Bombay, spoke on "A New Look at Energy & Sustainability through Gandhian Ideals", at an Institute lecture on September 30, 2020

Lord Prof. Bhikhu Parekh, Emeritus Professor of Political Philosophy at the Universities of Westminster and Hull, spoke on "Why is Gandhi the Father of the Nation?", at an Institute lecture on October 1, 2020

Prof. Bindu Puri, Jawaharlal Nehru University (JNU), New Delhi, spoke on "Moving Beyond Liberal Tolerance: Gandhi on Religion and Religions", at an Institute lecture on October 2, 2020

Mr. Tushar Gandhi, great-grandson of Mahatma Gandhi, spoke on "Relevance of the Gandhi Values in contemporary times", during an Institute lecture on September 29, 2020

Prof. Debasis Chakraborty, Department of Aerospace Engineering, IIT Bombay, spoke on "The recent flight demonstration of hypersonic air-breathing cruise vehicle by India", at an Institute lecture on October 19, 2020

Prof. Gérard Berry, Professor and Algorithms, Programs and Machine Chair, Collège de France, spoke on "Time, from Physics to Informatics and Music", at an Institute lecture on November 4, 2020

Dr. Sanjay Chandra, the former Chief of Research & Development at Tata Steel, spoke on "Indian Innovations at Indian Steel Plants", at an Institute lecture on February 3, 2021

Prof. Chris Pistorius, POSCO Professor and Co-Director of Center for Iron and Steelmaking Research at the Department of Materials Science and Engineering at Carnegie Mellon University, spoke on "Hydrogen in steelmaking", at an Institute lecture on March 3, 2021

Prof. Bruce Hajek, a Center for Advanced Study Professor of Electrical and Computer Engineering, Hoeft Chair of Engineering and Research Professor in the Coordinated Science Laboratory at the University of Illinois at Urbana Champaign, spoke on "Life and Random Algorithms", at the N. R. Kamath Chair Distinguished Lecture on March 24, 2021

Conferences

International Conference on theme 'IIM at Seventy Five: Inspiration and Aspirations'

The Indian Institute of Technology Bombay along with the Indian Institute of Metals (IIM) organized the 58th 'National Metallurgists Day' and 74th Annual Technical Meeting (ATM) of IIM, International Conference online during February 23-26, 2021.

The online conference was held for the first time keeping in mind the pandemic guidelines. Dr. V.K. Saraswat, Member, NITI Aayog and Director of IIT Bombay Prof. Subhasis Chaudhuri were the Guests of Honour. Prof. Subra Suresh, President, NTU Singapore was the keynote speaker for the inaugural session on February 23, 2021.

The international conference on the theme 'IIM at Seventy-Five: Inspiration and Aspirations', featured 13 speakers from seven countries - Japan, Singapore, India, Portugal, Germany, UK and USA. Around 300 papers were presented during the conference. During a 'microstructures contest', participants displayed materials and micro-structures that are scientifically significant and aesthetically artistic in nature. Around 100 entries were received this year. The event was organized by IIT Bombay after a gap of more than two decades.

Entrepreneurship e-conference

The Indian Institute of Technology Bombay's SJMSOM E-Club had organized a two-day E-Conclave, the annual flagship entrepreneurship conference during November 20-21, 2020 online. The E-Conclave saw the participation of more than 900 participants across the six fireside chat sessions.

The fireside chats and keynote sessions delivered by various eminent personalities such as Mr.Vinod Khosla, founder of SunMicrosystems and Khosla Ventures; Mr. Sanjeev Bikhchandan, Investor and Founder, Info Edge; Mr. Dinesh Agarwal, Founder and CEO, IndiaMART; Mr. Suraj Saharan, Co-founder, Delhivery; Mr. Balaji Viswanathan, Founder & CEO, Invento and Mr. Mukesh Bansal, Founder, Myntra, Curefit were truly inspiring and engaging. Eminent VCs, media personalities and leaders of IIT Bombay such as Mr. Gaurav Chaturvedi, Partner at KAE Capital; Mrs. Harshada Sawant, Senior Editor, CNBC TV18; Mr. Rakesh Rajiv, Incubation Manager, SINE-IIT Bombay; Dr. Love Sarin, Head, IDEAS, DSSE, IIT Bombay and Mr. Anand Lunia, General Partner, India Quotient, moderated the fireside chats.

Workshops

Prof. G V Sreekumar, IDC School of Design, presented a paper on "Significance of Optical Illusion, Optical Correction and Visual Balance in Calligraphy and Font Design" and conducted a workshop on "Story-telling and Visual Narrative through experimental typography" at the international conference on Typography organised by AtypI - Association Typographique Internationale (the International Typography Association) in November 2020.

HINDI CELL

Hindi Cell is actively engaged in providing support for the implementation of Hindi in the Institute. The Institute's circulars, office orders, registers, forms, visiting cards, signboards and degree certificates are prepared in bilingual form.

Due to COVID-19 pandemic, 'Hindi Pakhawada' was celebrated online during September 1-14, 2020. Online competitions in Hindi essay writing was organised on the occasion for the student and staff members of the Institute. The winners of the competition were felicitated with certificates and cash awards.

Awareness and informational documents related to COVID-19 such as posters, questionnaires related to its information, precautions, rules related to entry into the premises etc. were issued in bilingual form.

FACILITIES

INFRASTRUCTURE DEVELOPMENT

During this year, construction of four major infrastructure projects namely Hostel No 17 (30,500 SqM), Type 'B' housing 78 flats (Building No. B-25: 14.710 SqM) and combined building for Society for Innovation and Entrepreneurship (SINE), Industrial Research and Consultancy Centre (IRCC) and IDC School of Design (RBTIC: 19,901 SqM) are in good progress and slated to be completed by the end of 2021. IIT Bombay Research Park building Phase 1 and Phase 2 with 48,000 SqM BUA (Built Up Area) is slated to be completed by March 2022.

The Institute is making sincere attempts to cover the setback received in executing projects due to COVID-19 pandemic. Apart from these projects, Executive Education Complex (EEC) above SJSOM building with 1115 SqM BUA was completed in March 2021. This has a state-of-the-art lecture hall and classroom (with seating capacity of 70 and 50 respectively) and breakout rooms.

The new guest house called Padmavihar Guest House and Department of Energy and Environment building were certified as '4-STAR' and '3-STAR' by the Green Rating For Integrated Habitat Assessment (GRIHA) - an initiative of Ministry of New and Renewable Energy of Government of India, respectively.

The Institute is planning to take up construction of Centre of Propulsion Technology (COPT) building in Paspoli area, Desai Sethi School of Entrepreneurship building (adjacent to central library), a new annex building behind the Department of Humanities and Social Sciences, structural retrofitting of Main Building and other miscellaneous works in the Department of Energy and Environment building.

Other buildings in pipeline are: Hostel 19 for boys 1100 rooms (forwards north side of Hostel 18) with 31,000 SqM BUA; Hostel 20 for 1200 girls (located towards south of Hostel 17); central animal facility; new Academic Building with 10,400 SqM BUA; 78 flats G+20 staff building; SAC building with 2500 SqM BUA and architectural planning for new Open Air Theatre (OAT) and Nano building with 28,000 SqM BUA.

In order to counter spread of COVID-19 pandemic and also to safeguard faculty, staff and students, number of hygiene measures like foot-operated door openers, foot-operated sanitizer stands, thorough virus disinfectant measures etc. are being implemented on war-footing basis.

CENTRAL LIBRARY

The Central Library, IIT Bombay housed in a huge 3-storey building having central air-conditioned facilities with state-of-the-art amenities provide a vibrant ambiance to the students, faculties, staff, alumni and corporate/ member users for study, research and access to library resources. The efficient and courteous staff backs the services of the library. It holds a vast collection of books, back volume of journals, monographs, standards, reports, thesis/ dissertation and current journals/ magazines etc., in the varied areas of engineering, sciences, technology, humanities and social sciences both in print and electronic format. The institutional repository of IIT Bombay publications attracts a large number of users from around the world throughout the year.

Around 12,000 users used the library collection during the year. The institutional repository of IIT Bombay has 29,179 publications. During this year, 741 Master's degree dissertations, 309 PhD thesis, and 180 Dual Degrees dissertations were submitted online.

The Central Library continues to provide access to more than 22,600 e-journals and e-resources and has added about 307 volumes including books, theses, reports, standards, pamphlets and other reading materials during the year. It also acquired 668 e-books during the year. All the library collections can be accessed through an online public access catalogue.

The Central Library also renders user-services like reference, consultation, document delivery services, book lending, arranging materials from other libraries through inter-library-loan, providing the book bank facility for IIT Bombay students belonging to economically and socially weaker sections of the society and organizing the user-awareness programmes to enhance their awareness about library resources, services and activities. The library allows users to self-check-out books as well as renew borrowed books online. It facilitates inter-library-loan facilities of books and other informational documents for its members as and when required. It also provides internship facilities to Library Science graduates. It handled over 15,101 circulation transactions of books and other documents for its members during the year. Central Library also offers services to industry and corporates, IIT Bombay alumni and engineering (educational) institutions, professional members and has earned over Rs. 1,97,880 for the services rendered.

During this year, the majority of digital resources were made available online and all bonafide Institute users were given remote access to the Digital Library. During the lockdown, the library remained open, mostly to safeguard the library's collection and technology. Within a limited period, physical space was also made available to users by following COVID-19 protocols. The library staff provided outstanding user service beyond office hours and working days by sharing their personal cell phone numbers and assisted the users. During the year, the library hosted author talks and user awareness sessions online to support users.

COMPUTER CENTRE

The Computer Centre continues to provide improved, efficient and effective computational, network infrastructural facilities and services to the IIT Bombay user community during the difficult times of the COVID-19 pandemic. The academic activities, including the conduct of admission tests for new students, regular classes via online sessions and final course examinations were possible using the internet facilities through various web-conferencing platforms like Cisco's Webex, Zoom, Google Meet, Microsoft Teams etc. These were provisioned and integrated with the LDAP using a single sign-on (SSO) having Two-Factor Authentication (2FA) by the Centre. The online course registration for all students including new students were provisioned over the internet so that the students could complete the course registration from their respective homes at their native place over the internet. The number of concurrent open VPN (Virtual Private Network) connections has been increased so that the VPN services could also be extended to the students.

Network and Connectivity

The Centre manages the campus network and is responsible for the availability of intra-campus connectivity with ~25000 wired nodes spread over all the departments, hostels, residential complexes and internet connectivity of the Institute with the outside world. In addition, about 100 wireless access points providing wi-fi access at various departments and other key locations on campus. The following activities were undertaken during the year:

- The total Internet bandwidth was maintained for the campus community at 10 Gbps from NKN and 3 Gbps from Vodafone and Tata Communications respectively
- The internet bandwidth from the above two ISPs was managed with BGP (Border Gateway Protocol) routing using appropriate router switches
- Four Class C IPv4 address ranges acquired from APNIC provide internet access via NATing
- Separate password for the users at the residences for web access was managed so that the employees do not have to share their passwords with their families
- Transport Layer Security (TLS) was procured via a digital certificate from DigiCert
- The field support team for network infrastructure provided prompt responses in restoring the reported failures of network issues to enable smooth conduct of online classes and meetings during the hour of the need.

The Centre operates a network of non-academic areas, hostels, and residential areas. Few external wi-fi access points have been deployed on campus to cover common areas in student's hostels. Access through IITB-Wireless for IIT Bombay users, IITB-Guest for guests of IIT Bombay and EduRoam for visitors affiliated with EduRoam partners was managed with these wi-fi access point.

The computer network set up by the Computer Centre enables the Electric Maintenance Division to monitor the Power Distribution Systems check the status of various Lifts, functioning of UPS Systems, etc. in the Institute. The Telephone Exchange also runs about 1000 IP telephones (Voice over IP) using the computer network of the Institute.

The Centre largely deploys open-source software for its service offerings. An example is shown in Figure 1: Monitoring of network switches using ZABBIX

National Knowledge Network: IIT Bombay continued to be a member of the National Knowledge Network (NKN) during the year. This multi-gigabit network initiative started by the National Informatics Centre (NIC) is being used by CDEEP to conduct distance education programmes.

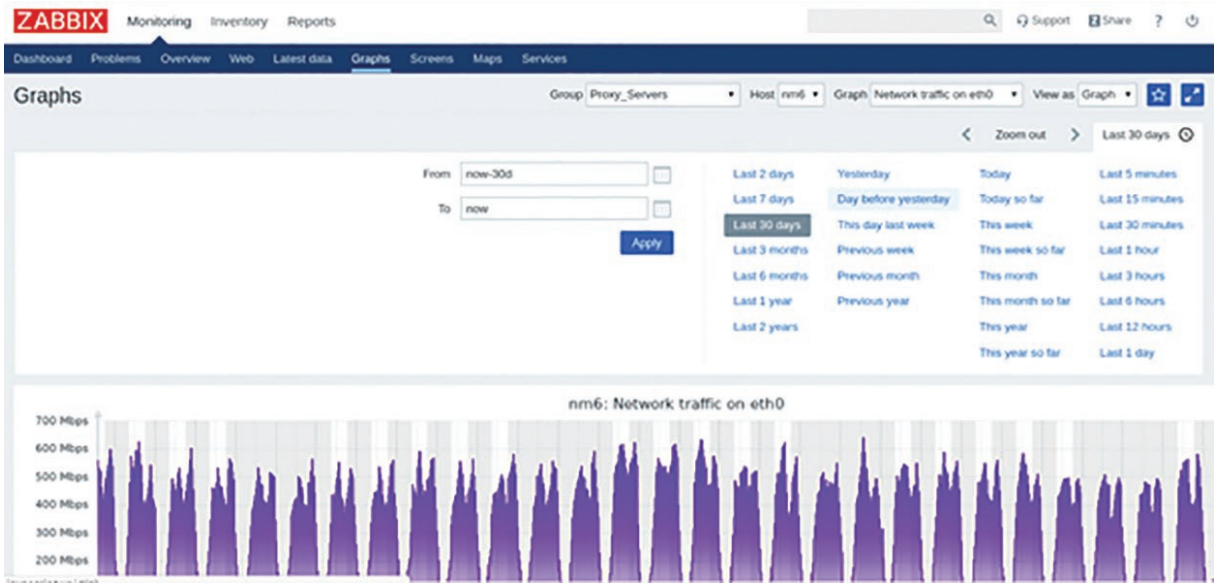


Figure. 1: *Network switch monitoring by open source software ZABBIX*

Grid Computing Facility GARUDA: The grid computing facility GARUDA is also supported by the Computer Centre allowing the users of the Institute to access the available resources on the National Grid.

Hardware/ Software Infrastructure: All service offerings at the Computer Centre are based on Open Source Software Systems. The Computer Centre has registered IIT Bombay as an official mirror for various versions of Linux operating systems on its anonymous FTP server (ftp://ftp.iitb.ac.in) that is available to the user community at large.

To support the ERP resources of the Institute, the recovery system of ERP is housed in the Computer Centre. The Centre staff is involved in the management of the ERP hardware.

The Institute continues to be a member of Microsoft Azure for education software licensing programme. These licenses allow the user community to use most of the Microsoft software products in a non-production environment. Volume licenses of the latest Microsoft Office Professional (with 100 activations) have been acquired to meet the critical needs of the Institute. License (2000 activations) of AVG anti-virus software has been in operation.

The Institute Software Committee solicits, specifies and negotiates the purchase of useful commercially available licensed software for the IIT Bombay Academic community.

Software packages meant for scientific and technical computation such as Ansys, Matlab, Labview, OriginLab, Cisco's WebEx for video conferencing facility, Zoom, etc. that are available through appropriate license schemes are procured, upgraded and administered by Computer Centre. Currently, floating network licenses of proper number of the packages like Ansys, Abaqus, Autocad, Comsol, Maple, Mathematica, SPSS, etc. are also maintained at the Computer Centre. These facilities are as per the requirement of the students, faculty, scientists, and staff in the Institute. The Centre also maintains and analyses the software license usages so that an optimum number of licenses could be made available to the users. As an example the concurrent floating network license usage for the software Matlab is shown in Figure 2.

Apart from this, the online Matlab portal available through the campus-wide licenses purchased from Mathworks registers around

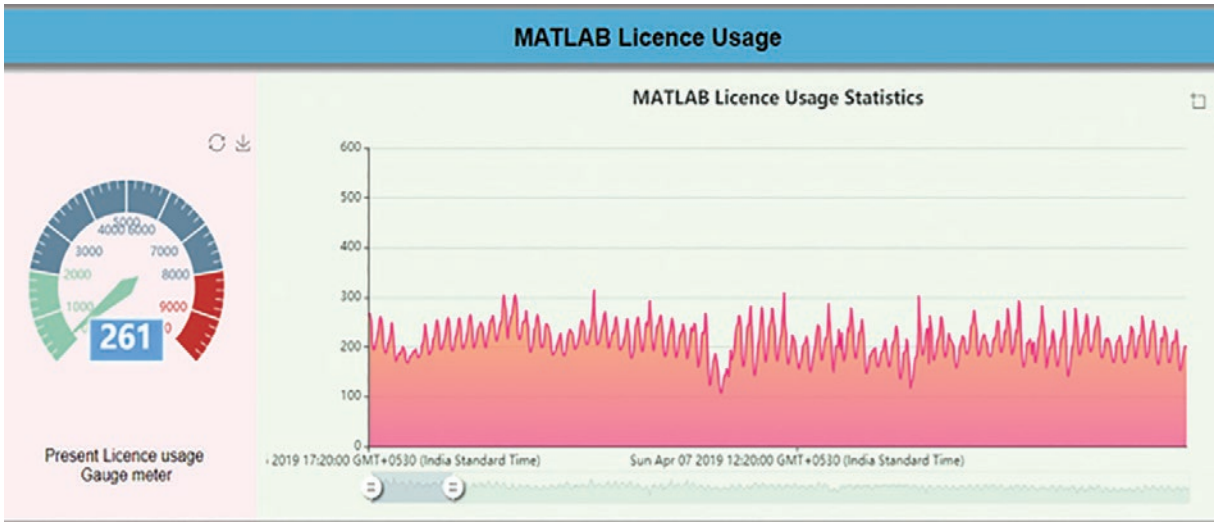


Figure 2: *Concurrent network license usage statistics for software Matlab*

6250+ users. These users have downloaded a licensed copy of the software for their own computer to accomplish the academic and research needs.

As a step towards a paperless office and fast response in terms of searching information among the members of the respective meetings, the Institute has started using digital meetings for its important high-level conferences. This facility has enabled the members and experts of the meetings to electronically participate over the web to review and finalize the proceedings of the conference. The Computer Centre hosts the required server and software needed for this facility.

The Computer Centre encourages and has implemented the use of Open Source Software Systems for Office Automation in about 775 PCs deployed in the various administrative sections of the Institute. Additionally, 30 desktop PCs with Microsoft Windows operating systems (under appropriate Volume Licensing scheme), necessary antivirus software, and other essential software as per requirement are also used for various administrative activities. The use of Open Source Operating Systems and Software has eliminated to a great extent the menace of the spread of computer virus and thus has optimised the IT support overheads required for network management and PC maintenance.

Word processing tools and facilities and support: The Computer Centre provides Open Source Operating Systems which has word processing applications (namely OpenOffice.org, LibreOffice) capable of handling various Indian languages especially Hindi for the preparation of multilingual (bilingual) documents. The documents prepared in OpenOffice.org/ LibreOffice (available for Windows as well as Mac OS) can be saved in files compatible (edit/ save) with MS Office.

User Awareness Sessions: At appropriate intervals and as per requirements Computer Centre conducts a two-hour training session on the usefulness of the applications under the Open Source Operating Systems for Office Automation and also apprises users about the IT Infrastructure facilities provided by the Computer Centre for the administrative staff of the Institute.

IP CCTV Surveillance activity of the Institute: The Computer Centre continues to play a secondary role by providing technical support to install and run the IP based Security Surveillance

SpaceTime HPC (Cray Systems)

Systems having 284 IP cameras and storage for the Security Section.

The Computer Centre has acquired, installed and manages 16 nos. of IP CCTV surveillance system that vigils critical locations of the Computer Centre building. Few offices of the departments like Computer Science and Engineering, Application Software Centre, Centre for Formal Design and Verification are housed in the Computer Centre.

High-Performance Computing (HPC) Facility: In its continued efforts for providing excellent infrastructure for cutting-edge research and because of the growing demand for a world-class supercomputing facility at IIT Bombay, the Centre has completed the installation of a Cray system for High-Performance Computing. This system is known as "SpaceTime" with 216 CPU (2x Intel Xeon 6148) only nodes and 64 CPU + GPU (Intel Broadwell + Nvidia P100) nodes, 1000 TeraByte parallel file system as storage, 1003 TFLOPS Total Peak Performance has enhanced the computing capabilities in various areas of modeling and simulation. The system is operational for the past three years.

In addition, the 49 nos. of HPE Apollo 6000 server with a theoretical peak of 45 TF (each server has 2 X Intel Xeon 2680 v3 processors and 128 GB of RAM), connected to a 100 TB of parallel file system as storage and known as Corona, continue to provide computing facilities for more than 50 users from different scientific research groups.

General Purpose Computing nodes: Two user halls called Bits and Bytes Lab with 120 nos of HP all-in-one Intel Core i5-7500T CPU @ 2.70 GHz x 4, GeForce 930MX graphics from NVIDIA, 15.6 GiB RAM, 1 TiB hard disk desktop computers. The facilities are open for use by courses, exams and the campus community.

The Computer Centre runs a help desk for all users as a part of its day-to-day activities.

A total of 10 students enrolled for the MTech program in the Department of Computer Science and Engineering and the Department of Electrical Engineering actively work for the various facilities run by the Computer Centre.

Projects for the near future: To enhance the performance and security of the services offered by the Computer Centre, following tasks are earmarked for the near future:

a) Smart Log Analysis

b) Find resource utilization by per user basis on HPC systems

c) Integration of Email and Centralized Storage Facility

d) IPSec VPN

e) Bare-Metal Switch Programming

f) IPV4 to IPV6 Migration

g) Log Analysis for spam, web access, security breaches

h) Automation of Labs using Ansible

i) Video Conferencing (VC) Gateway

j) Smart NIC programming

Bits and Bytes Labs (General purpose Computer User Halls)

CENTRE FOR DISTANCE ENGINEERING EDUCATION PROGRAMME

The Centre for Distance Engineering Education Programme (CDEEP) continued its functioning as a support unit to various 'outreach' activities of the Institute. During the year, CDEEP recorded 21 courses, and 15 labs/ experimental setup, covering nine disciplines at IIT Bombay.

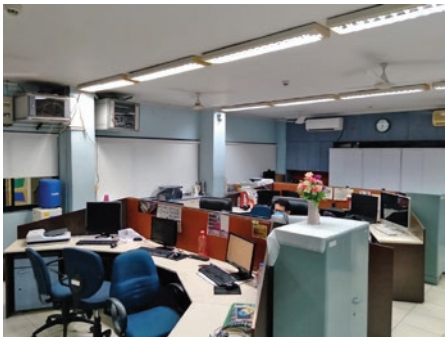
During the year, CDEEP provided eight semester-long courses content to National Programme on Technology Enhanced Learning (NPTEL) which are offered as Massive Open Online Course (MOOC). The Centre has an archive of 348 full semester-long courses.

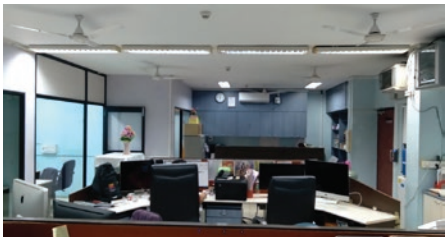
This year, contents of seven courses were supplied to five individuals on demand. The viewership (enrolled) of courses through the web stood at 5140 for 29 active courses.

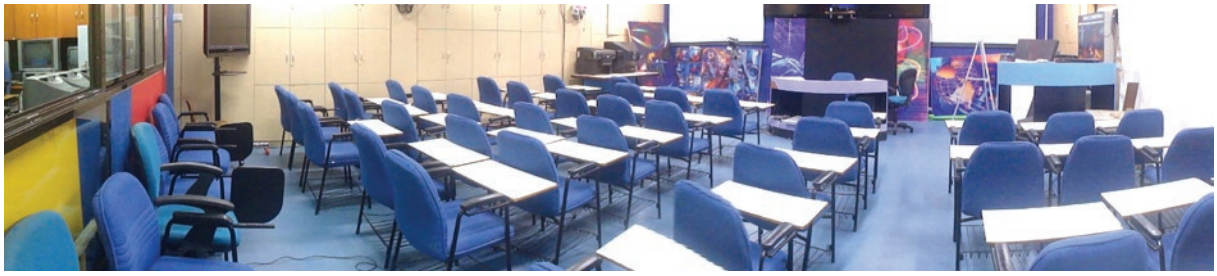
The Centre continues to offer (recorded) current semester courses with certification showing grades by the course faculty to distant participants as individuals or as a group.

The Centre covered Institute events such as Annual E-Convocation, Foundation Day, which were streamed live having more than one lakh viewers. The Centre also assisted for live streaming/ webcasting other events including Institute Colloquia, seminars and talks by distinguished speakers arranged all over the campus during the pandemic.

During the lockdown period due to COVID-19 pandemic in March 2020, CDEEP offered its online services to create video courses for the current semester and shared them with IIT Bombay students. A detailed documentation for making course videos, sharing videos with students and different distance learning tools for online student interaction are made available on the CDEEP website.







DEPARTMENTS/ CENTRES/ SCHOOLS AND INTERDISCIPLINARY GROUPS

Science & Engineering Departments:

The engineering departments at IIT Bombay offer undergraduate and postgraduate programmes leading to BTech, BS, MTech and PhD degrees. The five-year Dual Degree programme pioneered by the Institute in 1996 offers a BTech degree in a basic discipline and an MTech degree with specialization in a field on its completion. This programme is now offered by all engineering departments. The science departments at IIT Bombay were set up to provide basic grounding in science and mathematics to engineering students. However, apart from providing core courses in undergraduate programmes, these departments also offer postgraduate courses which lead to MSc or PhD. Following are the science and engineering departments at IIT Bombay:

- Aerospace Engineering
- Biosciences and Bioengineering
- Chemical Engineering
- Chemistry
- Civil Engineering
- Computer Science and Engineering
- Earth Sciences
- Electrical Engineering
- Energy Science and Engineering
- Environmental Science and Engineering
- Mathematics
- Mechanical Engineering
- Metallurgical Engineering and Materials Sciences
- Physics

Arts and Humanities Department:

The Arts and Humanities Department at IIT Bombay were set up to familiarize the students of Science and Technology studies with the broader social, cultural, economic, ethical and humane concerns underlying social change. The advanced courses offered at the postgraduate level aim at cultivating critical thinking and enhancing the analytical capabilities of students engaged exclusively with the study of these concerns. These departments offer postgraduate courses which lead to MSc, MPhil, MDes and PhD.

- Humanities and Social Sciences

Schools:

- IDC School of Design (IDCSoD): The school offers an excellent environment for academics, research and applications in the field of design. The centre interacts with industries and institutions for promotion and awareness of design
- Shailesh J. Mehta School of Management (SJMSoM): The school offers postgraduate programmes in new, emerging areas and aim to expand the scope of the academic programmes in the Institute.
- Desai Sethi School of Entrepreneurship (DSSE): The school offers several courses and labs relevant to innovation and entrepreneurship.

Centres offering academic degrees:

Some of the Centres and Interdisciplinary groups offer postgraduate programmes and reflect the Institute's multi-disciplinary approach and emphasis on staying with leading-edge technologies in its academic approaches.

- Centre of Studies in Resources Engineering (CSRE)
- Centre for Technology Alternatives for Rural Areas (CTARA)
- Centre for Formal Design and Verification of Software (CFDVS)
- Centre for Urban Sciences and Engineering (C-USE)
- Centre for Research in Nanotechnoloogy and Science (CRNTS)
- Centre for Policy Studies (renamed in 2021 as Ashank Desai Centre for Policy Studies)

Centres providing research and support facilities:

These Centres host a large number of sophisticated equipments and advanced facilities for carrying out R&D activities at IIT Bombay. Following are the research facilities at IIT Bombay:

- Application Software Centre (ASC)
- Center for Aerospace Systems Design & Engineering (CASDE)
- Computer Centre (CC)
- Centre for Distance Engineering Education Programme (CDEEP)
- IITB-Monash Research Academy
- National Centre for Aerospace Innovation and Research (NCAIR)
- National Centre for Mathematics (NCM)
- Tata Centre for Technology and Design (TCTD)
- Wadhwani Research Centre for Bioengineering (WRCB)
- Centre of Excellence in Steel Technology
- Centre of Propulsion Technology
- Biomedical Engineering and Technology Incubation Centre
- Centre for Computational Engineering and Science
- Centre of Excellence in Nanoelectronics
- Forbes Marshall Energy Efficiency Laboratory
- Geospatial Information Science and Engineering
- National Centre for Photovoltaic Research and Education (NCPRE)
- National Centre of Excellence in Technology for Internal Security (NCETIS)
- National Mission on Education through ICT
- National Solar Thermal Research, Testing & Simulation Facility
- Tata Teleservices- IIT Bombay Centre of Excellence in Telecommunication
- Water Innovation Centre: Technology, Research and Education (WICTRE)
- Centre of Excellence in Oil, Gas and Energy (CoE-OGE)
- Koita Centre for Digital Health (KCDH) (04.06.2021)
- Parimal and Pramod Chaudhari Center for Learning and Teaching (PPCCLT)
- Sophisticated Analytical Instrument Facility (SAIF)

Interdisciplinary Groups:

- Climate Studies
- Systems and Control Engineering
- Industrial Engineering and Operations Researchers
- Education Technology
- Corrosion Science and Engineering

During the year 2020-2021, all the Departments continued to be actively engaged in teaching, research and other professional activities such as workshops, seminars, industry interactions, projects, professional development course modules etc. even during the pandemic. The Departments saw a steady increase in the strength of doctoral students resulting in a vibrant research culture. This is reflected in a large output of research as seen by the publication records. During 2020-2021, the Departments received significant grants from the government and private agencies towards various sponsored and consultancy projects. The Departments witnessed many webinars, symposiums through the rigorous efforts of faculty and students alike. Various faculty members continue to be Editors, Associate Editors or Members of the Editorial Boards of several reputed international/ national journals. The CEP/ QIP programmes conducted by faculty members help in outreach activities, including distance education. Students and faculty members have received prestigious national and international awards and recognitions, and continue to bring laurels to the Department and the Institute.

Department of Aerospace Engineering

Established in 1966-67 as the Department of Aeronautical Engineering, it was renamed as the Department of Aerospace Engineering in 1992. The department has 26 regular faculty members. The academic programs of the Aerospace Engineering department focuses mainly on science and engineering/ technology of flight vehicles and their sub-systems. The curriculum focuses on fundamentals of fluid dynamics, propulsion, structural mechanics, vehicle dynamics, control and guidance etc., as well as applications of these fundamentals to the analysis and design of aerospace vehicles.

Academic Programmes: The Department runs strong undergraduate and graduate programmes in Aerospace Engineering and carries out basic and applied research as well as continuing education activities in various sub-disciplines of Aerospace Engineering such as aerodynamics, propulsion, structures, dynamics, control and design. The academic programmes include the four-year BTech degree programme, five-year Dual Degree programme, two-year MTech programme and the PhD programme. The Department has around 590 students, out of which about 270 are graduate students and 320 are undergraduates. The Department has MTech and PhD students from the armed forces, HAL, ISRO, DRDO and various other government and private agencies related to Aerospace Engineering.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	29
No. of Post-Doc Fellows	13

	Student intake	Degrees awarded
BTech	90	42
DD (BTech+MTech)	-	06
MTech	64	46
PhD	22	07
PGDIIT	-	01

R&D Activities: The Department carried out sponsored and consultancy projects for government organizations like ISRO, DRDO, DRDL etc. and as well as from private agencies.

The Department has extensive experimental and computational facilities that support its research and teaching activities. Among these are:

a) Aerodynamic lab houses wind tunnels, laser doppler velocity meter (LDV), anechoic chamber

b) Instrumentation lab has experimental setups for control education, in addition to sensors, actuators and other accessories as part of mechatronics related facilities

c) Structures lab has facilities for composite fabrication, testing, apart from experimental set-ups for demonstrating static and dynamic aspects of structures

d) Propulsion lab houses axial flow compressor research test rig, low speed low turbulence wind tunnel, diffuser test rig centrifugal blower and motor control unit for air delivery

e) MAV Lab has facilities for building and flying unmanned aircraft models, hardware in loop simulation for MAVs. The Department also has powerful serial and parallel computers, which provide computational resources for sophisticated flow simulation tasks like in computational fluid dynamics and computational electromagnetics. The Department has supported many students' technical activities like Mars Rover, Student Satellite, Autonomous Underwater Vehicle, Unmanned Air Vehicle etc. Students are also engaged in national and international competitions as participants/ organizers.

Notable activities in the Department:

Development of indigenous anti-Hail gun for suppression of hailstorms

Every year, crops of apples and other fruits are damaged extensively by hailstorms in Himachal Pradesh, causing significant losses of approx. Rs. 400–500 crores to the farmers and horticulturists. To minimize these damages, anti-hail nets are widely used. The indigenously designed IIT Bombay anti-hail gun works with LPG as fuel. Design and development were undertaken at Combustion Research Laboratory, Department of Aerospace Engineering, IIT Bombay. The device is nearly 22 feet tall, made up of stainless steel and consists of a detonation tube and a convergent-divergent duct. This device uses a Shchelkin spiral to induce flame/ flow turbulence, which helps in the transition of a deflagration wave into detonation wave. The expected cost of this device is around Rs. 8-10 lakhs on site. The use of LPG (~ INR 1000/- per cylinder) as fuel will further help significantly bring down the operating cost for the farmers in the field. LPG is relatively cheaper and easier to obtain as compared to acetylene fuel. Acetylene fuel is also difficult to handle and store as this gas is highly inflammable (Flammability limits 0–100 % by volume). An anti-hail gun, designed and developed by IIT Bombay, is being evaluated for its effectiveness in collaboration with the Department of Environmental Science, Dr. YS Parmar University of Horticulture and Forestry, Nauni, Solan (HP). To assess its effectiveness, a prototype has been installed at KVK Kandaghat, Solan, HP. Field trial experiments are being conducted for performance evaluation and better optimization of the device. From initial experiments performed, the detonation waves generated travels at a speed of 1100m/s or 3960 kmph, which is close to the C-J (Chapman-Jouguet) velocity of 1200m/s for LPG-air mixtures (as predicted by NASA SP-273 code). This project is developed by Prof. Sudarshan Kumar, Head of Aerospace Department, IIT Bombay.

Anti-Hail Gun installation at KVK Kandaghat, Solan, HP

	Sponsored Projects	Consultancy Projects
New Projects	09	09
Ongoing	19	04
Completed	11	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	02	43	81

Department of Biosciences and Bioengineering

The Department of Biosciences and Bioengineering comprises two broad areas representing Biotechnology and Biomedical Engineering. The Department aims to create an ambience for the efficacious pursuit of scholarly activity in research and education, and endeavours to produce the leaders of tomorrow in this field.

Academic Programmes: The academic programme currently consists of the DBT-supported MSc Biotechnology programme, MTech in Biomedical Engineering programme and the PhD programme. All these programmes are well-regarded nation-wide.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	33
No. of Post-Doc Fellows	35

	Student intake	Degrees awarded
MSc	15	24
MTech	23	22
PhD	30	12
DD (MSc+PhD)	-	02
DD (MTech+PhD)	-	03
PGDIIT	-	01

R&D Activities: Research in the Department encompasses both basic biology and applied bioengineering topics. A high-level of research output is ensured by the research infrastructure in the Department that has been built up assiduously over the years. Miscellaneous cutting-edge facilities such as MASSFIITB (Mass Spectrometry facility) and 3-D Laser Lithography have been proved extremely beneficial.

Extensive interactions with various groups in Electrical Engineering, Chemical Engineering, Aerospace Engineering, Computer Science, Mechanical Engineering, Material Sciences, Physics, Chemistry and Mathematics make the departmental research activities truly interdisciplinary.

	Sponsored Projects	Consultancy Projects
New Projects	31	13
Ongoing	80	03
Completed	40	-

Several webinars/ symposiums/ workshops were organized including Achieving Bio-safety in COVID-19 times, IITB-Bank of Baroda Innovation Centre, Webinar (2020), Indo-UK Big Data and Precision Medicine (March 2020), Mass Spectrometry based Proteomics (Online) and Big Data and Precision Medicine (March 2020).

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	06	14	94

Department of Chemical Engineering

The Department of Chemical Engineering at IIT Bombay started in 1958. Today, the Department is recognized as a leading Department in India, primarily because of its strong academic programmes, large faculty strength and diverse range of research areas.

Academic Programmes: The academic programmes offered by the Department are BTech (4-Year), MTech (2-Year), Dual Degree (5-Year) and PhD programme (5-Year). The Department has a total of 906 students on roll:

583 BTech/ Dual Degree Students, 100 MTech and 221 PhD students.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	51
No. of Post-Doc Fellows	23

	Student intake	Degrees awarded
BTech	167	124
DD (BTech+MTech)	-	01
MTech	77	32
PhD	36	29
DD (MTech + PhD)	-	03
PGDIIT	-	01

R&D Activities: The Department has a solid focus on education and research. The diverse research areas of the Department include Biological Systems Engineering, Soft Matter Engineering, Process Systems Engineering, Catalysis and Reaction Engineering, Thermodynamics and Molecular Simulations and Energy, Environment and Sustainability. The Department of Chemical Engineering also houses state-of-the-art research facilities.

	Sponsored Projects	Consultancy Projects
New Projects	19	10
Ongoing	65	09
Completed	27	03

The Department has developed strong industry interaction and the faculty has been engaged in supporting various industry consultancy projects. Industry reciprocation has been excellent in terms of responding to various initiatives such as Students-Industry Meet, Course on Wheels, Role model lecture series, a course on Industry Defined Problems and sponsorship support for various department events. Few faculty members and their groups worked on Covid-related projects and contributed significantly to mitigate a few Covid crisis.

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	-	06	202

Department of Chemistry

The Department of Chemistry at IIT Bombay is one of the premier research and teaching hubs for chemical and chemistry-driven interdisciplinary sciences in India. The faculty is strongly supported by numerous motivated and talented young students.

Academic Programmes: The Department offers six academic modules including Masters in Chemistry (2-Year), BS in Chemistry (4-Year), Integrated MSc, Integrated (MSc+PhD) and PhD programmes. The General Chemistry programme of the Department harbors two theory and two laboratory courses in the core curriculum of the first year BTech.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	62
No. of Post-Doc Fellows	62

	Student intake	Degrees awarded
BS (4-Year)	39	16
MSc (5-Year)	-	02
MSc (2-Year)	47	46
BS + MSc	-	03
PhD	77	38
MPhil	-	01

R&D Activities: Research problems of basic, applied and interdisciplinary nature are actively pursued in the Department through sponsored and industrial research projects. Major thrust areas of research include Biophysical Chemistry, Coordination Chemistry, Bio-inorganic Chemistry, Organometallic Chemistry, Bio-organic Chemistry, Chemical Biology,

Theoretical Systems Biology, Membrane Biology, Chemistry of Natural Products, Synthetic Organic Chemistry, Photochemistry and Spectroscopy, Polymer Chemistry, Thermodynamics, Electrochemistry, Solid state Chemistry and Physics, Catalysis and Theoretical Chemistry.

	Sponsored Projects	Consultancy Projects
New Projects	26	08
Ongoing	78	08
Completed	26	03

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	09	02	219

Department of Civil Engineering

The Department of Civil Engineering has been a part of IIT Bombay since its inception in 1958. Over the years, the Department has grown tremendously and is now recognized as one of the best and major engineering departments in the country and ranked high in the world for Civil Engineering. It has developed strong links with the building and construction industry and academia, both inside and outside the country. With its multifaceted faculty, it provides technical advisory support through various R&D projects and consultancy to infrastructural industry, academic and research institutions.

Academic Programme: The Department runs BTech, MTech and PhD programmes with its additional Dual Degree programmes (BTech+MTech) and (MTech+PhD) in Civil Engineering. The Department also hosts Postdoctoral Fellows in various specializations, sponsored by the Institute, sponsored research projects and other agencies.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	53
No. of Post-Doc Fellows	25

	Student Intake - 2020	Degrees Awarded - 2020
BTech	169	106
MTech	101	56
PhD	39	31
DD (BTech+ MTech)	-	05
DD (MTech+ PhD)	-	03
PGDIIT	-	04
MS by Research	-	01

R&D Activities: The Department has a strong focus in the research areas of Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Systems Engineering, Remote Sensing, Ocean Engineering and Construction Technology and Management. The Department is actively involved in basic and applied research and consultancy and provides high quality technical advisory support.

	Sponsored Projects	Consultancy Projects
New Projects	13	~390
Ongoing	62	~210
Completed	21	~110

Eight faculty members of the Civil Engineering Department are featured in Top 2% Scientists of the world as per a document published in 2020 by Stanford University, USA.

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	14	84	239

Department of Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) is the largest Department among CSE department of Institutes in India.

Academic Programmes: The Department offers Bachelor of Technology (BTech), Master of Technology (MTech) and Doctor of Philosophy (PhD).

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	44
No. of Post-Doc Fellows	03

	Student Intake	Degrees Awarded
BTech	162	120
MTech	141	81
PhD	14	15
DD(BTech + MTech)	-	01
MS by Research	-	03

R&D Activities: The research and teaching in the Department spans a wide spectrum of areas including algorithms, animation, artificial intelligence, compilers, combinatorial optimization, computer vision, data mining, embedded systems, formal methods, functional programming, e-commerce, graphics, databases, image processing and analysis, machine learning, medical image computing, mobile computing, natural language processing, object-oriented systems, parallel and distributed processing, programming languages, reinforcement learning, query processing and optimization, real-time systems, security, speech processing, software engineering, systems, theoretical computer science, wireless and sensor networks and verification.

	Sponsored Projects	Consultancy Projects
New Projects	20	15
Ongoing	78	10
Completed	23	06

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	165	40

Department of Earth Sciences

Academic programmes in Earth Sciences began when a section in the Department of Civil Engineering was established in 1959. As this educational programme flourished, the team grew to become a separate Department of Earth Sciences in 1982. Though in its nascent stage, the Department has been able to leave its mark as one of the major academic units contributing to the Earth sciences field. The Department of Earth Sciences strives to be a center of excellence in teaching and research in Earth Sciences. It has been working towards this goal by hiring the best faculty to create sophisticated analytical and experimental laboratories and periodically restructuring the courses to incorporate emerging areas of Earth Sciences into the syllabus. The Department aims to establish links with various institutes within India and abroad that address similar challenges. The Department's mission is to be a globalized institution that will enable interactions among researchers, offer educational programmes, encourage faculty and student exchanges and help the country grow. The Department is interdisciplinary in nature and hosts multifaceted faculty.

Academic Programmes: The Department is offering Masters and PhD programmes. Over the last 23 years, more than 1600 students have graduated from the Department. It is recognized as one of the best departments in the country in terms of teaching, research and placements. It offers four academic programmes in which 76 students graduated this year. The Department has 250 students on roll of various programmes/ disciplines.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	26
No. of Post-Doc Fellows	06

	Student Intake	Degrees Awarded
MSc (2 -year)	47	44
MTech	44	21
PhD	17	05
DD (MSc+PhD)	-	01
PGDIIT	-	05

R&D Activities: The Department is actively involved in basic and applied research and consultancy. It also provides high-quality technical advisory support through various R&D projects and consultancy to multiple organizations.

	Sponsored Projects	Consultancy Projects
New Projects	05	05
Ongoing	27	04
Completed	05	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	04	04	09	91

Department of Electrical Engineering

Since its inception in 1958, the Department of Electrical Engineering has been active in teaching and research. Currently, the Department has more than 1300 students.

Academic Programmes: Initially the Department began with three programmes namely, Bachelor of Technology (BTech), Master of Technology (MTech) and Doctor of Philosophy (PhD). Since 1996, the Department has been offering a five-year Dual Degree (Bachelor of Technology and Master of Technology) in the two specializations — Communications and Signal Processing and Microelectronics. In 2019, under the revised curriculum, the Department started admitting Dual Degree (DD) students post-JEE without a pre-assigned specialization. Depending on their interests, students can choose the specialization after completing five semesters in the Institute. The Department admits UG students from other Departments to MTech programme through Interdisciplinary programme.

Since 2019, under the revised curriculum, the Department of Electrical Engineering offers six MTech specializations as {Communication Engineering (EE1), Control & Computing (EE2), Power Electronics & Power Systems (EE3), Electronic Systems (EE5), Integrated Circuit & Systems (EE6) and Solid-State Devices (EE7)}.

The Department has been offering admissions to Dual Degree (MTech + PhD) programmes since 2009. The Department of Electrical Engineering has a strong Department Academic Mentorship Program (D-AMP), under the aegis of the Institute Student Mentor Program (ISMP).

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	72
No. of Post-Doc Fellows	26

	Students Intake	Degrees Awarded
BTech	93	68
MTech	158	107
MTech+ PhD	-	05
DD (BTech+MTech)	90	73
PhD	54	40
MS by Research	-	02
PGDIIT	-	01

R&D Activities: The Department is equipped with state-of-the-art experimental and computational facilities for undertaking research and development, and consultancy activities in various fields. Research collaborators also include researchers from several national and international universities and research organizations. The Department has a strong collaboration with industry in the past two decades and a number of laboratories have been established through such collaborations.

	Sponsored Projects	Consultancy Projects
New Projects	24	12
Ongoing	128	21
Completed	29	07

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	146	223

Department of Energy Science and Engineering

The Department of Energy Science and Engineering is a unique blend of science and engineering faculty working on developing sustainable energy systems and solutions for the future.

Academic Programmes: The Department offers several academic programmes that include the BTech-MTech dual degree programme through JEE, the MSc-PhD dual degree programme through JAM, MTech programme in Energy Systems Engineering, PhD programme and a Minor in Energy Engineering programme.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	25
No. of Post-Doc Fellows	26

	Students Intake	Degrees Awarded
DD (BTech+MTech)	43	23
MTech	21	30
PhD	35	09
DD (MSc +PhD)	15	11
DD (MTech + PhD)	-	01
MSc	-	02
BTech	-	03
MS by Research	-	02

R&D Activities: The Department's research areas include renewables (solar PV and thermal, wind and biomass), thermal and electrochemical storage systems, power systems and power electronics, energy integration, energy efficiency and nuclear energy. Some of the major ongoing initiatives are the National Centre for Photovoltaic Research and Education (NCPRE), the Indo-UK Clean Energy Research Centre, Intelligent Microgrids and Advanced Storage (IMASE), the IMPRINT projects on fuel cells and hydrogen storage, the DST-IIT Bombay Energy Storage Platform on Hydrogen and the interdisciplinary Centre of Excellence in Oil, Gas and Energy with support from the Indian public sector companies (IOCL, ONGC, HPCL, BPCL, GAIL, OIL and EIL).

As a part of the Centre's activities, a course on renewable energy technologies and strategies was organised for GAIL in January 2021. The Department also organised an international workshop on "Technologies for Emission Control" in February 2021. It also launched its official newsletter "ENsider" in May 2020. The newsletter issues is available at https://www.ese.iitb.ac.in/ensider/. The Department was involved in coordinating the Vaishwik Bharatiya Vaigyanik Summit (VAIBHAV) Energy theme for the Government of India and initiated a Living Laboratory as part of the TU Munich Sustainable Energies, Entrepreneurship and Development Centre.

	Sponsored Projects	Consultancy Projects
New Projects	10	05
Ongoing	36	04
Completed	11	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	06	33	106

Environmental Science and Engineering Department

The Environmental Science and Engineering Department (ESED) was established in 1985 as a Centre and got the status of "Department" in 2019. The graduate program offered by this Department prepares individuals for careers as engineers and scientists in Environmental Quality & Pollution Control. This program offers course work and research opportunities leading to masters and doctoral degrees and ultimately enable our graduates to contribute to the solution of current and future environmental problems. The Department offers a minor in Environmental Science and Engineering for undergraduate students from other departments in IIT Bombay. ESED also offers an Institute core course "Environmental Studies: Science and Engineering" to all undergraduate students and MSc+Phd students.

Besides, the Department offers several elective courses for sensitizing students across all disciplines towards the urgent need.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	15
No. of Post-Doc Fellows	03

	Students Intake	Degrees Awarded
DD (BTech+MTech)	37	-
MTech	20	13
PhD	17	09
MSc (2-Year)	-	05
DD (MSc+ PhD)	07	01

R&D Activities: The ongoing research activities of the Department are focused towards addressing the priority areas (local and global) set by major national agencies like the Ministry of Education (MoE), Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB), Ministry of New and Renewable Energy (MNRE), Department of Biotechnology (DBT), Ministry of Environment, Forest and Climate Change (MoEF), Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST).

The research activities of ESED are supported by excellent experimental and computational facilities, along with competent and dedicated technical staff and high-quality students.

	Sponsored Projects	Consultancy Projects
New Projects	09	10
Ongoing	18	20
Completed	02	03

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	02	16	05	67

Department of Mathematics

The Department of Mathematics conducts basic, applied and interdisciplinary research in varied areas of Mathematics, including Algebra and Number Theory, Analysis, Geometry and Topology, Combinatorics and Theoretical Computer Science, Partial Differential Equations and Numerical Analysis and Probability and Statistics.

The year witnessed excellent contributions and achievements of faculty and students in research; interaction with industry and noted national and international institutes, universities and organizations; and extended educational activities beyond the departmental academic programmes.

Academic Programmes: The Department offers Masters Programme - one in Mathematics

[MSc (MA)] and other in Applied Statistics and Informatics [MSc (ASI)], an integrated MSc programme and also a PhD programme. The Department launched the 'Bachelor of Science (BS) in Mathematics' during the Academic Year 2018-19. The programme is designed to build a strong foundation in the initial semesters while encouraging students to pursue more targeted interests in the second half of the programme through advanced elective courses within the Department of Mathematics. The curriculum also includes basic science courses and incorporates elective courses from the science, engineering and humanities disciplines, allowing considerable flexibility and academic freedom. There are minor programmes for undergraduates offered in both Mathematics and Statistics, an integrated MSc programme in addition to the core undergraduate curriculum.

The Department is also involved in teaching Mathematics-related courses in the BTech Programme of the Institute.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	52
No. of Post-Doc Fellows	09

	Students Intake	Degrees Awarded
MSc (MA)	27	54
MSc (ASI)	39	-
PhD	14	08
BS	15	-

R&D Activities: Continuing with its tradition, the Department has further augmented its basic research, focusing on contemporary areas of fundamental, developmental and strategic importance as well as applied and interdisciplinary research. It is also engaged in a productive collaboration with industries and reputed R&D departments in India and abroad.

	Sponsored Projects	Consultancy Projects
New	07	-
Ongoing	32	-
Completed	12	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	01	01	79

Department of Mechanical Engineering

The Department of Mechanical Engineering continues to be one of the largest departments of IIT Bombay. Currently, the total student strength of the Department is over 1500, with more than 250 of them being post-doctoral fellow students.

Academic Programmes: The Department offers undergraduate BTech degrees and postgraduate programmes awarding MTech and PhD degrees. The postgraduate programme offers specializations in the areas of thermal and fluid engineering, design engineering and manufacturing engineering. Dual degrees, which confer a combined BTech + MTech and MTech + PhD, are options which students can avail to accelerate their career advancement. Presently, students can pursue PG minor in any specialization, i.e. Thermal, Design and Manufacturing.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	63
No. of Post-Doc Fellows	41

	Students Intake	Degrees Awarded
BTech	177	121
DD (BTech+MTech)	30	34
MTech	111	74
PhD	45	25
DD (MTech + PhD)	-	01
IDDDP	-	02

R&D Activities: The Department continues to evolve in research and activities, keeping up with times, in largely interdisciplinary manner. In the IC engines and combustion lab, our faculty members and students are engaged in the development of innovative techniques. One of the highlights of their work is a novel method to measure flame temperatures solely using a consumer grade DSLR camera (Figures 1 and 2). Such techniques usually need research grade equipment that is expensive and not easily accessible. Efforts are on to universalize this technique so that any consumer grade camera including the one present in mobile phones, can be used for optical temperature measurement in flames. Additionally, there have been innovations in soot measurement techniques and also in the area of novel propellant development.

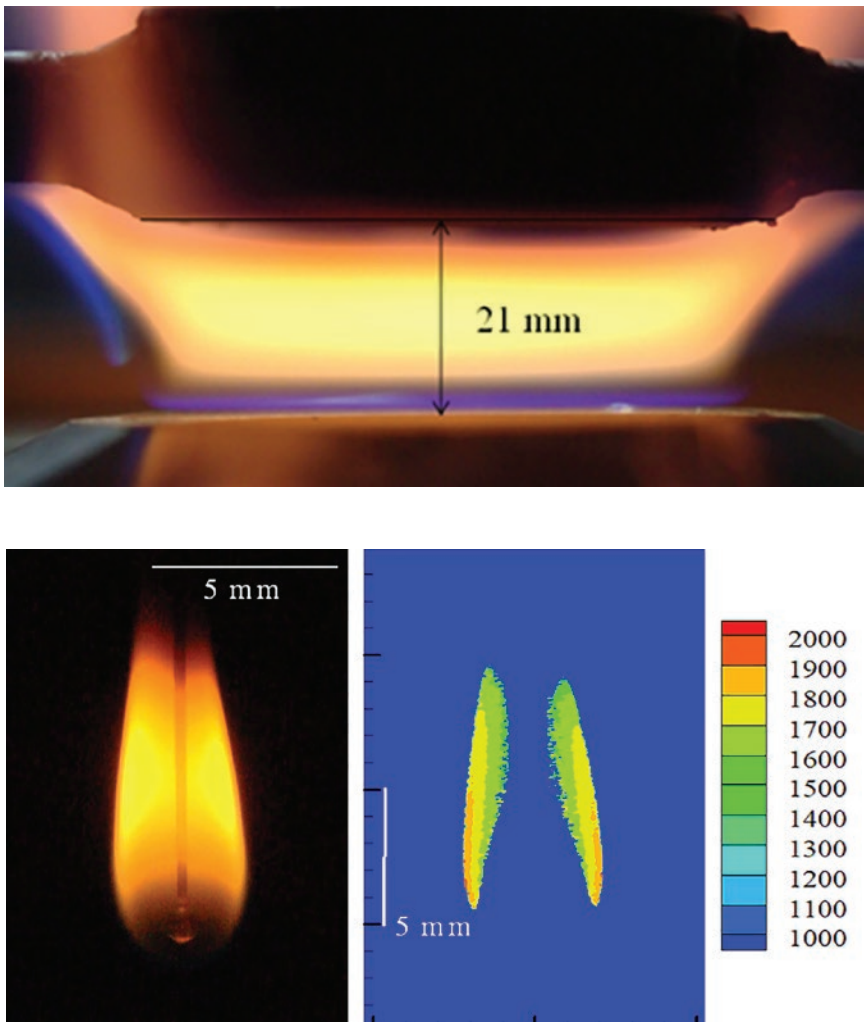


Figure 1: Flat flame burner

	Sponsored Projects	Consultancy Projects
New Projects	23	26
Ongoing	102	14
Completed	35	05

Other events:

The 58th National Metallurgists' Day, Indian Institute of Metals (IIM) Platinum Jubilee, International Conference and the 74th Annual Technical Meeting (ATM) of the Indian Institute of Metals (IIM) (NMD-ATM-2020) was organized online in association with IIT Bombay during January 23- February 26, 2021. The highlights included insightful lectures by Dr. V. K. Saraswat (NITI Aayog member) and Prof. Subra Suresh (President, NTU Singapore) where the importance of extraction and associated machinery for rare earth metals (e.g. lithium) and titanium were impressed upon. The panel discussion on Enhancing Global Competitiveness of Indian Metal Industries was graced by Anirban Dasgupta, Director In-charge, Bhilai Steel Plant; Abhijit Pati, CEO, Bharat Aluminium Co. and others. The enthusiastic participation of the industry could be gauged by the presence of 20 industrial exhibitors and 112 posters. The National Metallurgists' Day saw distinguished guests viz. the former Cabinet Minister for Petroleum, Natural Gas and Steel, Government of India, Mr. Dharmendra Pradhan; Union Minister of State in the Ministry of Steel, Mr. Faggan Singh Kulaste and Additional Secretary, Ministry of Steel, Ms. Rasika Chaube. Stirring lectures by Prof. B.K. Mishra, Director, IIT Goa and Prof. I. Manna, VC, BITS Mesra followed by the JRD Tata Award being conferred on Mr. Vikram Kirloskar made the event truly memorable. The international conference saw 170 oral presentations spread over 40 parallel sessions in three days. Entrepreneurship in Metallurgy and Materials was highlighted in a panel discussion with advice and anecdotes from entrepreneurs at various stages of their journey.

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	03	08	>250	295

Department of Metallurgical Engineering and Materials Science

The Department of Metallurgical Engineering and Materials Science (MEMS) made progress in research and teaching despite the ongoing pandemic. The Department continues to excel in a wide variety of areas, ranging from classical metallurgy to non-metallic materials in various forms and dimensional scales for applications ranging from advanced structural components to electronic, optical, sensing, health-care and energy harvesting/ conversion/ storage devices. There has been a steady increase in academic activities, especially growth in PhD student intake. MEMS is one of the leading Departments in the country. Its annual output, which includes more than 200 publications in peer-reviewed international journals (including in highly rated journals like *Acta Materialia, J Mater Chem A*, etc.), allows it to compete with other metallurgy-materials departments in the world. The Department also continues to design and offer new courses pertinent to the cutting-edge areas.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	39
No. of Post-Doc Fellows	24

	Students Intake	Degrees Awarded
BTech	121	74
DD (BTech+MTech)	34	20
MTech	74	46
PhD	39	15
IDDDP	-	02
MPhil	-	01
MS by Research	-	01

The unique strength of the IIT Bombay MEMS Department lies in its ability to balance between teaching and research, between traditional and emerging materials, between applied and basic research. The Department strives for excellence in manpower development.

Some PhD students of the Department have been successful in receiving highly-renowned international level awards due to the excellence in research (like the 2020 Carbon Journal Prize for an 'an outstanding Ph.D. thesis in carbon materials science and technology'). The classical teaching combined with short-term courses (continuing education and quality improvement programmes, special training programmes like GIAN and SERB Schools etc.) has generated an excellent pool of highly-motivated and competent manpower for the country.

R&D Activities: There has been significant contribution of the focused research programmes. These include programmes under CoEST (Centre for Excellence in Steel Technology: funded by the Ministry of Steel), providing a platform for critical research collaborations for the Indian Steel Industry, several technological products and a wide range of sponsored research projects. Another relatively new collaborative Centre funded by the Department of Science and Technology this year is the Water Innovation Centre: Technology, Research and Education (WICTRE), which focuses on a very important area, especially considering the present needs of our country.

	Sponsored Projects	Consultancy Projects
New Projects	15	10
Ongoing	54	06
Completed	28	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	03	37	211

Department of Physics

The Department of Physics at IIT Bombay started functioning in 1959. It has a tradition of vibrant teaching and offers many research topics. It remains as one of the most preferred destinations for students at all levels. The members of the Physics faculty are playing a leading role in establishing a Centre for Quantum Computing in IIT Bombay. An important role of this Centre is to offer an IDDDP program in quantum computing.

Academic Programmes: The Department offers a four-year BTech in Engineering Physics, two-year MSc in Physics as well as PhD programme.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	51
No. of Post-Doc Fellows	36

	Students Intake	Degrees Awarded
BTech	59	32
DD (BTech+MTech)	-	09
MSc	48	42
DD (MSc+MTech)	-	03
PhD	15	10
IDDDP	-	01
MPhil	-	01
DD (MSc+Phd)	-	07

R&D Activities: The Department has five major research groups namely Condensed Matter Physics, High Energy Physics, Soft Matter-Biophysics-Non-linear Dynamics - Statistical Physics, Optics - Photonics - Spectroscopy

and Astrophysics - Cosmology - Gravity. The Department has many high-end computational, materials preparation and characterization facilities for common use, in addition to a workshop. In addition to the present facilities, the Department is in the line of setting up "Electron Beam Lithography Central Facility" as part of the Institute of Eminence initiative. The members of the Department continue to participate in Mega Science projects of the country, such as LIGO, Indigo (gravitational wave detectors), ASTROSAT (X-ray, UV and optical studies from satellite), INO (India-based Neutrino Observatory) and ALICE (Heavy Ion experiment at CERN, Geneva).

Other Highlights: The Department was approached by the Hiroshima University of Japan to explore research collaboration in the areas of particle physics, astrophysics and gravitational waves. An online workshop on neutrino physics was conducted in October 2020 as a start. Eventually, the collaboration envisages exchange visits by faculty and research students with a possibility of students being mentored by faculty from both institutions.

	Sponsored Projects	Consultancy Projects
New Projects	13	01
Ongoing	49	-
Completed	10	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	79	216

Department of Humanities and Social Sciences

The Department of Humanities and Social Sciences (HSS) houses the disciplines of Economics, English Literature, Linguistics, Philosophy, Psychology, Sociology and CISTS (Sanskrit). The Department is in the line of expanding by incorporating other disciplines like History and Political Sciences in the near future.

Academic Programmes: The Department commands an independent space within the Institute by offering a Bachelor of Science in Economics, an MPhil in Planning and Development and a PhD programme in all disciplines currently constituting it. The Department launched the MA-PhD programme in Philosophy in the year 2020. At present, 112 students are enrolled in the BS programme in Economics and the first batch of students will graduate in 2021. The PhD programme by the Department has been running since 1973 and the MPhil programme was initiated in 1993.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	47
No. of Post-Doc Fellows	10

	Students Intake	Degrees Awarded
MPhil	21	15
PhD	33	27
MA+PhD (Philosophy)	10	-
BS (Economics)	32	-

The Department, apart from the production and dissemination of its disciplinary concerns, also plays a unique and distinctive role within the vision of the Institute, which seeks to promote a holistic science and technology education. The inclusion of the study of the Humanities and other Social and Behavioural sciences ensures that our quest within the frontiers of science and technology takes place in an informed manner and attends to humanitarian and social concerns. The Department offers a number of core and elective courses for the BTech, MTech and MBA Programmes of the Institute.

Apart from the facilities made available to all students at the Institute-level and at the Department-level, the students also have access to the resources available in the Department's Library, Computer Labs and the newly-established Econometrics Lab. The Department also has psychology laboratories.

R&D Activities: The Department faculties are involved in a number of research projects independently in collaboration with faculty members from other Departments of IIT Bombay and as part of international research networks and partnerships. Faculty members and student researchers of the Department conduct research in several cutting-edge areas and emerging sub disciplines as well as trans-disciplinary themes such as computational linguistics, climate studies, organizational justice, digital media, innovation, gender and environmental change.

	Sponsored Projects	Consultancy Projects
New Projects	02	02
Ongoing	16	01
Completed	07	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	23	10	44

IDC School of Design

IDC School of Design (IDCSoD) at IIT Bombay offers an excellent environment for academics, research and applications in the field of design. The Centre interacts with industries and institutions for promotion and awareness of design. These interactive activities are in the form of seminars, short-term courses and workshops. In the area of design practice, IDCSoD offers professional design consultancy and advisory services to industries and other organizations. The potential for innovation at IDCSoD lies fundamentally in terms of solving real-world problems.

IDC School of Design (IDCSoD) envisions a holistic design education that shapes the students into responsible contributors to society. It enables the students to identify significant contemporary problems, inculcate critical thinking, critique conventional solutions and challenge the status quo to arrive at creative solutions through collaborative team efforts at different levels of society and influencing policymaking that lead to innovations.

Academic Programmes: IDC School of Design at IIT Bombay has a well-established Master of Design degree (MDes) programme in Industrial Design, Communication Design, Animation Design, Interaction Design, Mobility and Vehicle Design and minor courses as well as a PhD programme in Design. From the year 2015 onwards, IDCSoD has started a four-year, eight semesters Bachelor of Design (BDes) programme and a five-year, ten-semester dual degree (BDes+MDes) programme.

The Bachelor of Design (BDes) programme is a four-year, eight-semester course and (BDes+MDes) dual degree is a five-year, ten-semester course, which is available only at the end of the third year. Both these programmes are credit-based and thus offer the flexibility to progress at one's own pace.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	46
No. of Post-Doc Fellows	-

	Students Intake	Degrees Awarded
BDes	37	17
DD (BDes + MDes)	-	10
MDes	64	64
PhD	02	07

R&D Activities: IDC School of Design undertakes research and development in the field of product design, communication design, interaction design, mobility and vehicle design, and animation and film making. The projects at IDCSoD are subjected to address cultural needs, livelihood and sustainability issues, humanizing technologies for mass use, addressing communication, interaction and product needs of the underserved, typography in local language, interfaces for masses and conservation and development of ethnic craft techniques.

	Sponsored Projects	Consultancy Projects
New Projects	-	02
Ongoing	01	03
Completed	-	02

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	18	05

Talks by IDCSoD Alumni Award winners:
On the occasion of IDCSoD Golden Jubilee in January 2020, the first set of IDCSoD Alumni Awards were announced by the Department. A series of online talks were organized during January 22-24, 2021 which gave a platform for the alumni to interact. The alumni spoke about the projects they worked on, their design journeys and challenges they faced along the way. There were 21 distinguished speakers from all disciplines of design.

Awards received by the alumni

Dr. Dinesh Katre, IDCSoD Alumnus (VC batch 1990-92), while receiving the prestigious '2020 Emmett Leahy Award' on October 29, 2020, for his outstanding contributions accomplishments that have a major impact on digital information and records management

Ms. Sheetal Paknikar, IDCSoD Alumnus (VC batch of 1993), while receiving the Corporate Communication Award for 'Best Innovation in Digital Communication 2020' on February 13, 2020 at the 2nd Edition of the Corporate Communication Bootcamp & Awards by Transformance Forums, India.

Shailesh J. Mehta School of Management

Today, Shailesh J. Mehta School of Management has occupied its distinct place across the globe as an Institute of excellence in Management, Education and Research. The year 2020-2021 was marked by further strengthening and consolidation of the academic programmes of the School.

Academic Programmes: The School of Management offers Doctoral Programme (PhD) in Management, 2-year full-time Master of Business Administration (MBA), Executive MBA (E-MBA) joint degree by Shailesh J. Mehta School of Management, IIT Bombay, India and Olin Business School, Washington University in St. Louis USA, certificate programmes for Executive Education: short and long duration in-house and open Management Development Programmes for the corporate executives/ professionals of all areas and BTech (Minor) Courses in all areas of Management.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	29
No. of Post-Doc Fellows	-

	Students Intake	Degrees Awarded
MBA	114	110
PhD	25	06
E-MBA	34	18

R&D Activities: Apart from focusing on research in the functional areas of management, faculty members are also involved in applied research related to rural development, climate change and other interdisciplinary areas.

	Sponsored Projects	Consultancy Projects
New Projects	01	02
Ongoing	08	01
Completed	02	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	02	02	09	61

Centre of Studies in Resources Engineering (CSRE)

Centre of Studies in Resources Engineering (CSRE) is a teaching academic unit of IIT Bombay established in the year 1976. The Centre holds a global repute in the fields of remote sensing and natural resources management. The Centre is noted for its extensive research in the areas of machine learning, microwave remote sensing, optical remote sensing using hyperspectral imagery, image processing and computer vision, geology and mineral exploration, GPS and applications, deep learning for remotely sensed imagery, geo-computation and HPC and finally, precision agriculture.

The Centre has a global reach with international collaborations in the fields of microwave remote sensing, mineral resources exploration and data sciences in agriculture. The Centre also houses excellent research infrastructure in terms of state-of-the-art hardware (labs, servers, compute towers, HPC cluster etc.), supporting software (ArcGIS, MATLAB, ENVI etc.), image datasets and image acquisition platforms (UAV, Hyper and Multi spectral cameras etc.).

Academic Programmes: The Centre offers MTech and PhD programmes in Geoinformatics and Natural Resources Engineering (GNR). The Doctoral programme at the Centre aims to develop highly qualified and trained manpower that is needed for the effective utilization of contemporary technologies as applied to Natural Resources and related areas.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	12
No. of Post-Doc Fellows	-

	Students Intake	Degrees Awarded
MTech	31	22
PhD	11	12
MPhil	-	01
DD (MTech+Phd)	-	01

R&D Activities: The Centre is actively involved in several research and development activities through sponsored and consultancy projects spanning across interdisciplinary domain expertise of faculty members and applications in geoinformatics, remote sensing, GPS and its applications.

	Sponsored Projects	Consultancy Projects
New Projects	02	03
Ongoing	19	06
Completed	05	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	03	43	49

Centre for Technology Alternatives for Rural Areas (CTARA)

The Centre for Technology Alternatives for Rural Areas (CTARA) was established at IIT Bombay in 1985 to work on the problems of the rural areas and to sensitize technical professionals to the ground realities and the wider needs of the society.

Academic Programmes: The Centre offers a MTech programme in Technology and Development and a PhD programme. It also offers Technology and Development Supervised Learning (TDSL) courses to BTech students across the Institute. The unique inter-disciplinary MTech programme at CTARA was

started in 2007 with an objective to sensitize engineering graduates towards the wider needs of the society. What is the role of "Technology" in addressing the "Development" issues? Today we need professionals across various sectors who can work at the interface of "Technology" and "Development" – hence the focus of the program is on the connector and between the two key words. The course work provides an overview of development issues, resource analysis, rural needs assessment, technological interventions and impacts and has a strong field component. Teaching and research are aimed at providing relevant solutions to the rural areas. In order to do this effectively, CTARA has developed linkages with NGOs, government departments and ministries, and industry. In addition to the existing MTech fellowships from the Ministry of Rural Development (MoRD) and UNICEF, the Centre will have 3 more fellowships per year from BAIF (baif.org.in) starting 2021.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	12
No. of Post-Doc Fellows	04

	Students Intake	Degrees Awarded
MTech	35	30
PhD	13	06
MS by Research	-	01

R&D Activities: The major research areas at the Centre are the sectors of agriculture and food, health and nutrition, water and sanitation, energy, environment, planning and policy and governance. "Field work" and "Stakeholder Engagement" are the key features of the research work undertaken at CTARA, which is mostly "Demand-Driven" and addressing issues of the unorganized and disadvantaged sections of our society. The research work at CTARA was majorly affected by the COVID-19 pandemic and the constraints in undertaking fieldwork. CTARA was instrumental in coordinating an effort to conduct and compile a survey to understand the awareness of, the challenges faced by and the coping strategies adopted by villagers across the country during the COVID-19 lockdown period. Researchers across various academic units including IDCSoD, SJMSOM, CPS and TCTD were involved in this work and villagers from 59 villages from 35 districts across 10 states were covered. The report was submitted to the Ministry of Education in June 2020. The Child Nutrition and Infant and Maternal Health Team in CTARA conducted a number of activities, trainings and workshops in 2020-21. Similarly, projects such as Rural Technology Action Group (RuTAG), Unnat Bharat Abhiyan (UBA), Unnat Maharashtra Abhiyan (UMA), Technology & Development Solutions Cell (TDSC), Project on Climate Resilient Agriculture (PoCRA), CANALPY and others continued with their past activities and also initiated some new ones during the past year.

	Sponsored Projects	Consultancy Projects
New Projects	06	05
Ongoing	30	02
Completed	14	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	03	16	31

Other events:

CTARA had a year-long weekly online seminar series. The Centre has benefitted from seminars by and interactions with a wide range of eminent scholars and practitioners, not only from various parts of India, but across the world.

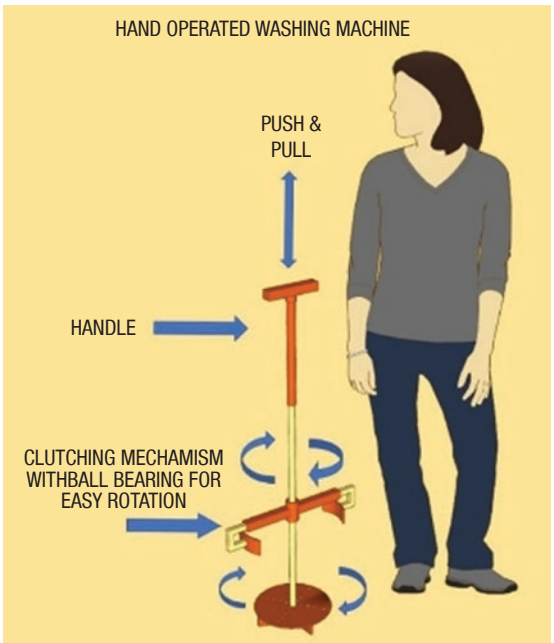
On September 30, 2020, CTARA organised a special panel discussion on the occasion of 150th Gandhi Jayanti. This was a panel discussion titled "Living with Gandhi in the 21th Century". The panelists were: i) Shambu Prasad, Professor, Strategic Management and Social Sciences, IRMA, Anand; ii) Rajni Bakshi, Author and Journalist, Mumbai; iii) Chaitra Redkar, Associate Professor, Humanities and Social Sciences, IISER, Pune. The panel was moderated by Prof. Pankaj Sekhsaria (CTARA).

The All India Council for Technical Education (AICTE), in association with Indian Institute of Technology Bombay (IITB) and Indian Space Research Organisation (ISRO), conducted an online map making competition titled "Mapathon". The event was organized as national level collaborative Indian Mapping Event with a motto, 'Lets Map India Together!' Mapathon was aimed at promoting and using Indian satellite imagery and open source GIS software to develop useful resource maps. The event was successfully organized by FOSSE (Free Open Source Software in Education) IIT Bombay in collaboration with Rural Data Research and Analysis (RuDRA) Lab at CTARA and WHEELS global foundation. The website for the event was released on November 27, 2020 and it was also promoted by the Prime Minister's office. The event was inaugurated on December 7, 2020 by Dr. Anil Sahasrabudhe, Chairman AICTE, Prof. Subhasis Chaudhuri, Director, IIT Bombay, Prof. Kannan Moudgalya, Principal Investigator, FOSSEE IIT Bombay and Prof. Pennan Chinnasamy (CTARA). A total of 9000 submissions were received across all parts of India.

CTARA students took part and won prizes and awards at various Institute-level, national as well international competitions spanning across various genres, including sports, cultural, literary, innovation, technical and academic.

Glimpses of students who received prizes and awards in various competitions held across India and internationally too

Abdul Wase, First year- CTARA
2nd prize in Pixel Photography Competition

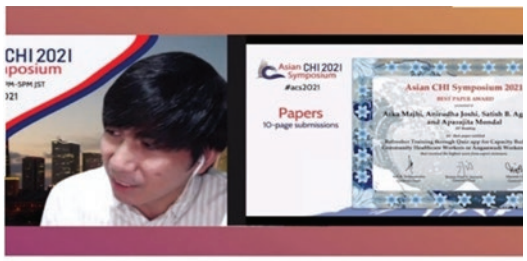


Jayant and Sameer, First year- CTARA
1st position, GenAdda competition by Gender cell

Amogh & Yashwant
Silver Medal-Drishti tech led rural entrepreneurship competition

Rachna & Vikas
Bronze Medal- Bosch Electric Vehicle, medium prep

Kaustubh
Bronze Medal-
Rutag Agrobot team



Arka Majhi, PhD CTARA, won best paper and presentation award
Asian CHI symposium conference 2021

Litan ,Priya, Yashwant, Saran, First year- CTARA
1st position, short film making competition, PG Cult

Aditi, Arshee, Rakendu
1st position, Girls GC chess competition

CTARA students won prizes in various competitions held by the Institute

Centre for Formal Design and Verification of Software (CFDVS)

CFDVS has established itself as a national R&D Centre in the area of formal verification of high-integrity software and hardware. Although the initial focus of the Centre was on the design and verification of software, it was quickly realized that the scope of activities needed to be expanded to include both software and hardware systems to provide a comprehensive approach to design and verification of safety-critical systems. Safety-critical system includes computer-based control systems used in nuclear reactors, space, avionics, process control and robotics. Failures in such systems due to software or hardware bugs can be catastrophic both financially and in human terms. Verification of safety-critical systems was the primary inspiration behind Department of Atomic Energy's (DAE) establishing the Centre for Formal Design and Verification of Software (CFDVS) through Board of Research in Nuclear Sciences (BRNS) and in collaboration with IIT Bombay and Tata Institute of Fundamental Research (TIFR) in 1999. The Centre has contributed to several R&D programmes in formal verification and has taken up sponsored industrial projects from various government organizations like VSSC, ADA, DRDL and DRDO and also from high-profile private organizations like Intel, Microsoft Research, Texas Instruments, General Motors etc. CFDVS has benefited DAE in terms of research and development of advanced formal verification tools.

The laboratories are equipped with a number of personal computers, high-end servers, HPC data center and workstations. The current software resources include a number of public domain tools for formal specification and verification, advanced static analysis, dynamic analysis and testing tools (test-beds), modeling languages and related environments for real-time software supporting simulations and verification, hazard analysis tools and CASE tools and general programming environments. During the past 22 years, tools and techniques developed at CFDVS have been applied successfully to small and medium-sized problems, both from the academia and industry. This has demonstrated our ability to handle the technological challenges involved in addressing complex problems at the small to medium scale. CFDVS is currently focusing on automated techniques for larger real-life systems and to make the resulting technologies available to the end-user community in India. This can reap significant benefits in verification projects undertaken at DAE, ISRO, DRDO.

Ongoing Projects:

1. **FMSAFE A Network Centre for Formal Methods in Validation and Certification Procedures for Safety-Critical ICT Systems.**

1. **IMPRINT Project: Development of a remote healthcare delivery system early diagnosis, therapy, follow up and preventive care for NCDS cardio pulmonary**.

Centre for Urban Science and Engineering (C-USE)

The Centre for Urban Science and Engineering (C-USE) at IIT Bombay is an interdisciplinary Centre for research, teaching and skilled manpower development, with the primary mandate of improving urban quality of life. The Centre aims to combine science and technology with sustainable, equitable and human-friendly design to deliver innovative and holistic services to improve the lives of the rapidly urbanizing population in the developing world.

Academic Programmes: The Centre runs a PhD Programme offering specializations viz.,

- Planning and Design: Housing, Land use policies, Public Spaces, Risk Management

- Policy and Governance: Housing Economics, Health, Education, Employment, Environment
- Infrastructure: Buildings, Transportation and Land use, Urban water, Waste Management, Smart Energy
- Informatics: Citizen Science, Cyber-Physical Systems, Urban Knowledge, Geospatial Technologies

The overall on-roll PhD students in the year 2020-21 is 27.

The Centre started its MTech programme in Urban Systems in the academic year 2019. The aim of the programme is to take an interdisciplinary approach in teaching with greater emphasis on practical problem-solving relating to urban systems.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	05
No. of Post-Doc Fellows	-

	Students Intake	Degrees Awarded
MTech (Urban Systems)	08	-
PhD	06	06

R&D Activities: The research activities of the Centre focus on new products and solutions related to housing, transport, water management, energy efficiency, urban informatics, health, governance, urban poverty and citizen science while mitigating the effects of natural disasters and climate change. The Centre aims to establish links with various institutes within India and abroad that are addressing urban challenges. The Centre is actively involved in basic and applied research and consultancy and provides high quality technical advisory support through various R&D projects and consultancy to various organizations.

	Sponsored Projects	Consultancy Projects
New Projects	02	01
Ongoing	08	01
Completed	01	01

The Centre disseminates the knowledge gained from its high-quality research through training programmes and interacts with world-renowned personalities through workshops and conferences. During the year 2020-21, the Centre has conducted 3 workshops for academicians and field engineers. The Centre hosts research talks by researchers of international repute periodically.

The mission of the Centre is to be a globalized institution that would enable interactions among researchers, offer educational programmes, encourage faculty and student exchanges and help learn from diverse contexts with the aim of making cities of the world, especially the developing world, more livable.

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	01	01	14	16

Centre for Research in Nanotechnology & Science (CRNTS)

IIT Bombay is one of the leading institutions in the country for research in the area of Nanotechnology. IIT Bombay has recently consolidated its nanotechnology research activities through the formation of a Centre for Research in Nanotechnology & Science (CRNTS). The formation of this Centre has been made possible through a generous grant from the Department of Science & Technology (DST), Government of India.

Centre for Research in Nanotechnology & Science conducts fundamental and applied

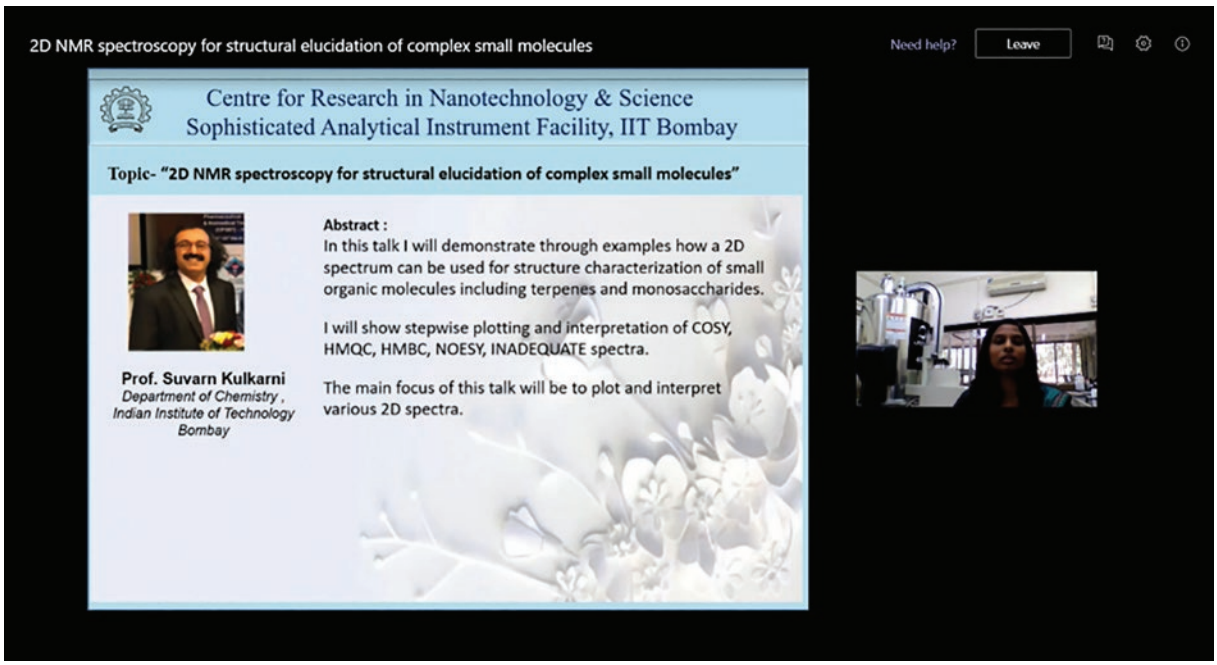
research with a focus on innovation in the field of nanosciences and nanotechnology. It caters to the interdisciplinary research applications in research to all IIT Bombay Departments/ Centres which include the Department of Chemistry, Department of Chemical Engineering, Department of Biosciences & Bioengineering, Department of Civil Engineering, Department of Earth Sciences, Department of Metallurgical Engineering & Materials Sciences, Department of Physics, Department of Electrical Engineering, Environmental Sciences and Engineering Department and Centre for Technology Alternatives in Rural Areas etc.

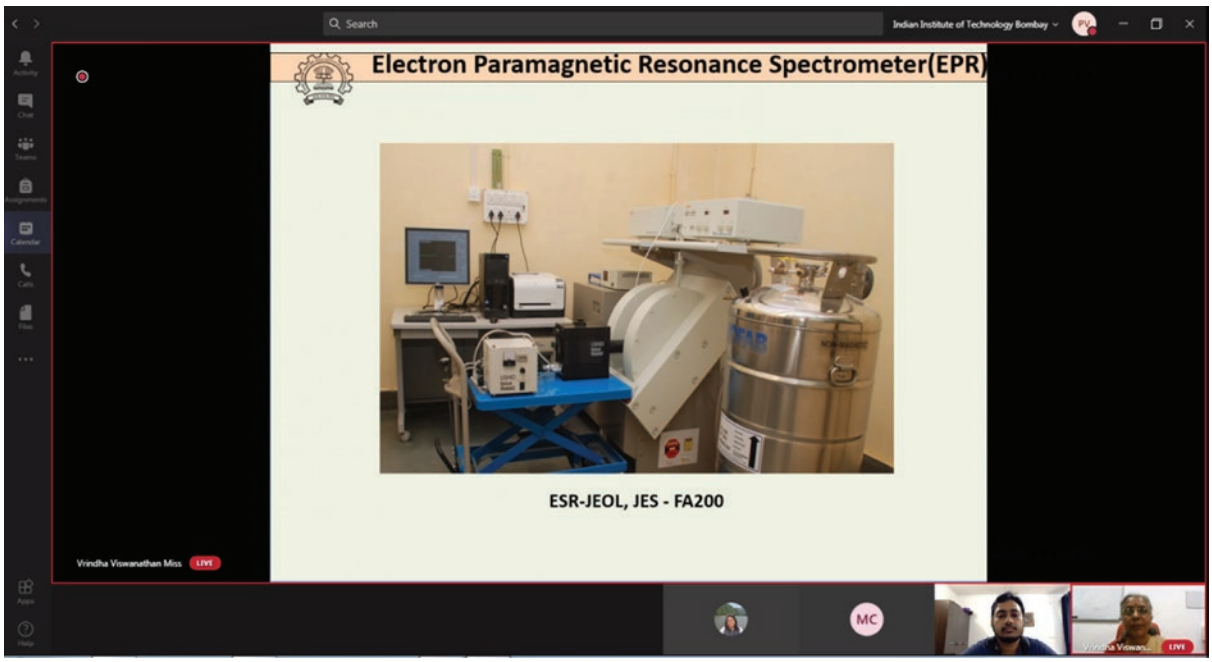
The Centre hosts Sophisticated Analytical Instrument Facility (SAIF), which houses a variety of major analytical instruments operated and maintained by a dedicated and qualified group of technical staff and students. This facility serves as an academic, research and scientific service provider and facilitator. It also supports inter-disciplinary academic and research activities by conducting regular workshop/ webinar and training programmes.

A wide range of analytical methods/ techniques for chemical/ material analysis/ testing/ characterization including qualitative and quantitative elemental, molecular/ compound analysis, structure determination, surface topographic studies, study of physical, optical and electrical properties of materials etc. are available to the users for helping them in their research work.

Around 1365 scientists and students utilized SAIF/ CRNTS facilities at IIT Bombay inspite of national wide lock down due to COVID-19 pandemic during the financial year 2020-21. 10,571 samples were analyzed from academic institutes, national labs as well as industries.

Webinar Glimpses:





Academic Programmes:

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	-
No. of Post-Doc Fellows	01

	Students Intake	Degrees Awarded
PhD	18	09

R&D Activities: The Centre is one of the leading interdisciplinary centres in the country for research in the area of Nanotechnology.

A Small Angle X-ray Scattering (SAXS) instrument is added to SAIF during the financial year 2019-20. The instrument allows the characterization of nano and micron-sized particles in gels, liquids and solids, and applications in various fields like pharmaceuticals, biology, chemical formulations, cosmetics etc.

	Sponsored Projects	Consultancy Projects
New Projects	-	03
Ongoing	02	-
Completed	-	01

Educational Technology

The Interdisciplinary Programme in Educational Technology (IDP-ET) at IIT Bombay started in the Institute in 2010-11. The IDP-ET conducts research in areas of pedagogies and tools for technology-enhanced learning. In addition to the Institute courses PhD and MTech programmes, the IDP-ET organizes short-term courses and MOOCs on effective teaching-learning with emerging technologies and educational research methods through CEP, NPTEL and IITBombayX. The faculty members, post-doctoral research scholars and PhD students of the IDP-ET play a significant role in the organization of international conferences. Faculty members carry out government and industry sponsored projects and provide consultancy.

Academic Programmes: The group offers a PhD and MTech programme in Educational Technology.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	06
No. of Post-Doc Fellows	01

	Students Intake	Degrees Awarded
PhD	10	02
MTech	08	-

R&D Activities: Several R&D activities were conducted keeping in mind the main research areas of the IDP-ET that comprised of Technology enhanced learning of Thinking Skills (TELoTS), Teacher Use of Educational Technology (TUET), Educational data analytics (EDA) and Emerge.

	Sponsored Projects	Consultancy Projects
New Projects	03	-
Ongoing	02	-
Completed	-	-

Major highlights

- ***Self-paced course on Online Teaching:*** The IDP-ET faculty and students created this course at the beginning of the lockdown to support instructors in moving towards teaching online. The course is structured as a website containing concepts, videos, information about tools, research-based recommendations and self-check questions with feedback. The website has received 23000+ visitors so far.

- ***Decade of EdTech:*** To commemorate the 10th year of the IDP-ET, several events such as research seminars by students and faculty, industry interactions and alumni interactions were conducted in online mode.

- ***EdTech Hackathon.*** IIT Bombay's first EdTech hackathon was organised by IDP-ET with a focus on sparking innovation by integrating research and best practices for designing contextually relevant technology-enhanced solutions for teachers and learners. 15 teams with a total of 51 participants from all over India joined in the virtual mode and collaboratively worked on problems related to one of the four given themes - *Learning everywhere, learning for everyone, learning without barriers and Learning for empowerment.* IDP-ET alumni from various parts of the world gave expert talks on designing effective EdTech products. During the competition, IDP-ET MTech and PhD students mentored the teams.

- ***EdTech Tulna:*** **Creation of quality standards**: The IDP-ET, in partnership with Central Square Foundation is engaged in a project, '*EdTech Tulna*' to create research-based quality standards for educational technology products in the Indian context. This project is the first of its kind in India.

- **ACM OCCE award for Sridhar Iyer**: Prof. Sridhar Iyer is the first recipient of the ACM Indian Outstanding Contribution to Computing Education (OCCE) award, 2020. This inaugural award is to recognize and respect outstanding contributions made by an individual to computing education while working in India. The citation for his award is: "For promoting computing education research in India through guiding PhD students, developing instructional materials for teachers, implementing outreach at scale and providing consultancy to EdTech industry".

- **ET@10**: The IDP-ET recently published a book titled '*ET@10*' to commemorate the decade-long journey of this program. The book attempts to feature the culture, practices and processes of this program, that collaboratively works towards achieving collective goals.

Faculty members participated in the various conferences/ symposia/ workshops/ seminars/ Massive Open Online Courses (MOOC)

organized for promoting a conducive learning environment. The various MOOC based programs included Designing Learner Centric; Designing Learner-Centric E-learning in STEM disciplines; Demystifying Networking; Learning Analytics Tools.

Faculty, post-doctoral research scientists and PhD research scholars participate as Reviewer for journals: ACM Transactions on Computing Education (ToCE), IEEE Transactions on Education (ToE), Educational Technology, Research & Development (ETR&D), International Journal of Distance Education Technologies (IJDET), Research & Practice in TEL (RPTEL), Interactive Learning Environments (ILE), Journal of Computers in Education (JCE), Cognitive Research: Principles and Implications, IEEE Transactions on Learning Technology (TLT), Journal of the Learning Sciences (JLS), Journal of Engineering Education (JEE); International program committee member for various conferences: Artificial Intelligence in Education (AIED 2021), International Conference on Computers in Education (ICCE 2020), International Conference on Computational Thinking Education 2017 (CTE 2018), International Conference on Advanced Learning Technology (ICALT 2021).

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	06	06

Industrial Engineering and Operations Research (IEOR)

Industrial Engineering and Operations Research (IEOR) at IIT Bombay is an interdisciplinary programme that offers PhD and MTech Degrees in IEOR and (MSc+PhD) Dual Degree in Operations Research. IEOR has a depth and breadth of capability that makes the programme unique in the country. The discipline offers a blend of theory, modelling and application, drawing from traditional as well as modern areas of operations research, together with a systems view derived from long-standing principles of industrial engineering. IEOR contributes significantly to achieve the goals of IIT through various activities, such as offering academic programmes, conducting continuing education programmes (CEP) and carrying out research projects of different types. IEOR also has a very vibrant alumni group.

Academic Programmes: IEOR offers PhD, MTech and (MSc+PhD) Dual Degree programmes, IEOR offers a range of courses in the areas of optimisation, stochastic models, simulation, statistics, machine learning, artificial intelligence, deep learning, supply chain, logistics, operations, service systems etc. The IEOR curriculum also includes computational labs that train students on various modelling and software tools that can help implement operations research theory and algorithms to solve practical problems.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	11
No. of Post-Doc Fellows	01

	Students Intake	Degrees Awarded
MTech	34	21
MSc (2 years)	-	08
MPhil	-	01
DD (MSc+PhD)	11	05
PhD	08	01
PGDIIT	-	03

R&D Activities: The core areas of research include theoretical and computational optimisation, convex optimisation, simulation modelling and analysis of complex systems, system dynamics methodology, probabilistic and stochastic models,

data analytics, machine learning, reinforcement learning, Markov decision processes, queueing theory, optimal control, game theory and networks, mathematical finance, logistics and transportation, railway operations and supply chain analysis.

	Sponsored Projects	Consultancy Projects
New Projects	02	-
Ongoing	15	01
Completed	-	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	12	24

Outreach programme:

Student Activities:

- Siddhartha Paul was awarded "Excellence in Ph.D. Research Award" 2020. His Doctoral thesis was on 'Medicine Supply Chain Management in Response to an Infectious Disease Outbreak', under the guidance of Prof Jayendran Venkateswaran.

- PMRF fellowship has been awarded to IEOR research scholars Khushboo Agarwal, Shiksha Singhal and Vartika Singh.

- Akash Saha's research has been featured in the latest issue of the ACR Newsletter for February 2021. The work is titled as 'Learning with Operator-valued Kernels in Reproducing Kernel Krein Spaces' under the guidance of Prof. P Balamurugan.

Systems and Control Engineering

The Systems and Control Group, formed in 1977, is a unique interdisciplinary programme in the country that offers postgraduate education in the broad area of Systems and Control.

Academic Programmes:

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	16
No. of Post-Doc Fellows	01

	Students Intake	Degrees Awarded
MTech	17	11
DD (MTech + PhD)	-	01
PhD	02	02
MS by Research	-	01

R&D Activities: The research focus of the core group is in the areas of nonlinear control, robotics, path-planning, embedded control, coordination of autonomous vehicles, multi-agent systems, sliding mode control and applications, fractional-order modelling and control, optimization and optimization-based control, stochastic processes, game theory, stochastic control, optimization, economics, information theory and combinatorial coding theory, Control theory, NMR spectroscopy, Nonlinear and geometric control, quantum information and control. In addition, research in the areas of process control, identification, behavioural theory, matrix computation and automotive control are being pursued by the associate faculty members.

The experimental lab at Systems and Control is geared towards introducing students to hardware and software that implement control theories learnt as part of coursework. A variety of setups based on mechanical, electrical and chemical principles are made available to the students for this purpose. As part of core coursework, all Masters' students are expected to understand modelling, communication, sensor calibration and control of hardware to accomplish different control objectives.

	Sponsored Projects	Consultancy Projects
New Projects	02	03
Ongoing	20	02
Completed	02	01

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	-	16	41

Centre for Policy Studies

The Centre was set up in 2016 to provide a fillip to the study of Public Policy. It was renamed in 2021 as Ashank Desai Centre for Policy Studies. The Centre for Policy Studies at IIT Bombay aims to produce scholars and practitioners who are equipped to engage in a critical study of public policy. The Centre's vision is to become a centre of excellence that facilitates evidence-informed and inclusive public policy and its mission is to encourage a sustained dialogue between academia and other policy stakeholders in order to promote evidence-informed and inclusive policymaking and analysis; and create capacity for policy studies in the country.

Academic Programmes: CPS offers a Doctoral programme and a Master's programme in Public Policy. During the academic year 2020-21, the Centre for Policy Studies worked on its mandate of creating space for core policy research as well as policy research in various specific research areas.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	04
No. of Post-Doc Fellows	02

	Students Intake	Degrees Awarded
PhD	16	-
MPP	22	-

CPS organized its unique and second annual Film Festival during March 3-6, 2021 put together by Prof. Prabhir Vishnu, Dr. Vidya Subramanian (Postdoctoral Fellow) and Uttara Purandare (PhD scholar) titled *Atelier: Talking Policy Through Cinema*. The objective of the film festival was to make students engage with various dimensions of policymaking as seen through the lens of cinema. Four films were shown during this Festival. During the year 2020-21, policy-relevant talks were conducted.

	Sponsored Projects	Consultancy Projects
New Projects	-	-
Ongoing	02	-
Completed	-	-

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	04	04	21

Climate Studies

The Interdisciplinary Programme in Climate Studies (IDPCS) was initiated at the Indian Institute of Technology Bombay, in January 2012, as one of the first doctoral programmes in India addressing research related to climate change. They increasingly apply a depth of expertise from their fields to address the complexity of climate change. The curriculum includes a set of courses on fundamental and applied topics that provide intellectual grounding for critical research, analysis and application. In near future, the IDP in Climate Studies is expected to emerge as an important knowledge and information resource to support national and state action responding to climate change.

The Interdisciplinary Programme in Climate Studies aims to achieve educational excellence through a doctoral curriculum of courses in two broad tracks of climate science and climate policy, supplemented by elective courses from a broad range of theoretical and practical topics.

No. of Total faculty (Assistant/ Associate/ Full Professors/ Adjunct/ {Visiting-teaching faculty})	-
No. of Post-Doc Fellows	01

	Students Intake	Degrees Awarded
PhD	18	05

R&D Activities: Ongoing research at IDP in climate studies cuts across the domains of climate science, vulnerability and adaptation and mitigation and policy. Investigations address improvement of model physics related to clouds, ocean mixing, aerosol processes, climate change detection and attribution, climate change impacts on cities and communities, adaptation and mitigation responses and the assessment of climate change policies and mechanisms. Research efforts are being propelled not only towards statistical downscaling but also in understanding the feedback from regional perturbations to synoptic scale circulations. Focus is being continued on regional factors - land use land cover change, dynamic vegetation, turbulent transport processes and regional aerosol emissions - to understand their feedback. Aerosol influences on high temperature extremes over India, aerosol-cloud interaction vis-à-vis cloud radiative forcing in the Indian region and aerosol influence on altering frequency, intensity and duration of rainfall extremes are being studied. Social vulnerability and risk to hydro-climatic extremes are being mapped for entire India. A risk index is being developed for coastal districts of India for understanding vulnerability and recovery of marine fishing population from extreme climatic events, by combining bio-physical stresses, such as cyclones, storm surge and tides and socio-economic contributors, such as lack of infrastructure, technology, finance, social nets and space. Integrated and composite vulnerability of coastal areas to climate change determined by exposure, physical, social, environmental and economic factors, or processes factors such as sea level rise, coastal erosion and acidification, along with environmental degradation, ecosystem loss and pollution on coastal communities and habitats are being assessed. A socio-ecological systems perspective is being designed to integrate pollution impacts, climate change related risks and hazards and anthropogenic environmental degradation to yield a contextual vulnerability assessment that can impact local level policy and decision making. Also, the positive/ negative impacts of climate and environmental policies on coastal vulnerability are being assessed. "Transformation" theory, conceptualization and operationalization of "emergent groups" for flood risk governance and integration of climate change uncertainties into adaptation strategies, constitute the three key innovations that are being used to convert climate change knowledge into local level adaptation and policy for flood risk mitigation. Detection, attribution analysis and modelling of hydroclimatic extremes are being studied. Dynamics of equatorial Indian Ocean are being studied using Modular Ocean Model. Decision support systems are being developed for studying technology options for sectors contributing to climate change by including technology attributes related to cost, life cycle impacts, technology readiness level and social acceptability. Dynamic models are being developed to study technology adaptation to address climate change. Long-term goals of IDPCS include the creation of a pool of multi-disciplinary climate researchers to serve the growing national need for climate change professionals. In the near future, IDPCS is expected to emerge as an important knowledge and information resource to support national and state action responding to climate change.

Publications:

	Books Published	Chapters in Books	Papers in Conference	Papers in Journals
Total	-	02	08	50

Outreach/ Publicity Activities:

IDPCS has launched its own official YouTube channel - https://www.youtube.com/c/idpinclimatestudiesiitbombay and Twitter handle - https://twitter.com/ClimateIITB for a strong social media presence and better reach. It also virtually held two summer/ winter schools, one webinar, two panel discussions, one participation in virtual fair for enhancing collaborations to reach a wider audience.

7th Summer School in virtual mode (e-School on 'Climate Science and Policy') | 1

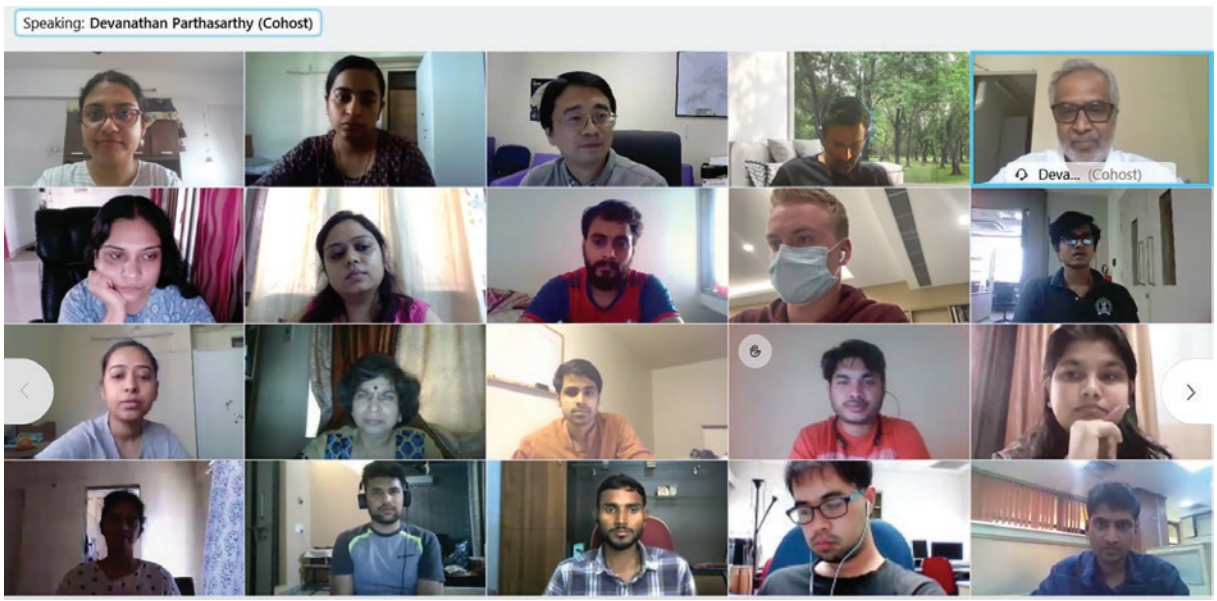
The Interdisciplinary Programme in Climate Studies (IDPCS), IIT Bomba y has been organizing an annual summer school since 2014 with the aim of orientating students from different Indian universities who are motivated to work in the field of climate studies.

The 7th summer school (alias e-School on Climate Science and Policy) was held from August 17-28, 2020 virtually this time owing to the ongoing pandemic, coordinated by IDPCS associated faculty Prof. Pradip Kalbar and Prof. Subimal Ghosh, Sheeba Sekharan and TA publicity team – Sindhuja Kasthala and Shrabani Tripathy.

Winter School 2020 — Adaptive Management of Floods in coastal wetlands in the context of a Changing Climate | 1

Conceived and coordinated by IDPCS Associate faculty member from CTARA, IIT Bombay, Prof NC Narayanan and Kerala Institute of Local Administration (KILA), a virtual winter school was organized on "Adaptive Management of Floods in the context of changing climate" with emphasis on the estuarine ecosystem of Kuttanad region, Kerala (December 7-12, 2020). This is part of the CANALPY initiatives of Centre for Technology Alternatives for Rural Areas (CTARA) and Centre for Policy Studies (CPS) in IIT Bombay. CANALPY (canalpy.com) is a joint initiative by IIT Bombay and KILA in Alappuzha, Kerala. CANALPY started as a Winter School involving 18 CTARA MTech students and 16 MTech Environmental Engineering students from SCMS College in Alleppey in December 2017. The major aim of CANALPY is to strengthen local governance by better analysis and improve engineering education by providing an informed understanding of problems and bringing accountability by engaging with academic institutions.

China-India Forum: Climate Policy & Governance is a webinar series being jointly organized by IDPCS seminar coordinator Prof. RAAJ Ramsankaran, IDPCS Former Convener Prof. D Parthasarathy and Sheeba Sekharan with The Chinese University of Hong Kong. The first talk in this series was virtually held on March 10, 2021, titled "Environmental Policy and Air Pollution in China: Governance and Strategy" by Prof. Yuan Xu, Associate Professor, Department of Geography and Resource Management, Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong. His talk mainly highlighted the climate mitigation policies in China to reduce GHG emissions, the role of its government using goal-centric governance and devolution as strategies to clean up air pollution and the challenges faced in implementing these policies. Full lecture video available on IDPCS YouTube channel: youtu.be/kPkbywvyEfY



Participants at webinar on China-India Forum: Climate Policy & Governance held on March 10, 2021

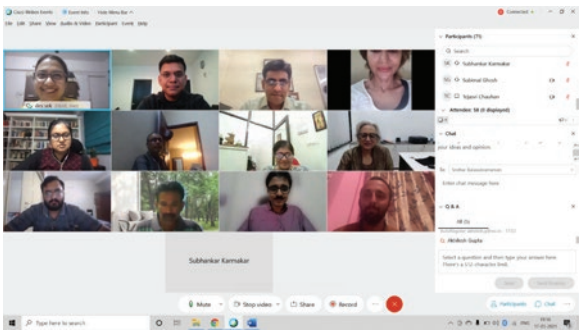
Poster on webinar China-India Forum: Climate Policy & Governance

Panel Discussion Series | 2

A panel discussion series was organized by IDPCS seminar coordinator Prof. RAAJ Ramsankaran, Convener Prof. Subimal Ghosh and Sheeba Sekharan and sponsored by the Department of Science & Technology (DST), Government of India, especially for climate researchers and climate entrepreneurship enthusiasts.

The first one was held virtually on March 17, 2021 on '**Scope for Technology Development & Entrepreneurship in Climate Studies'.** It was moderated by our faculty Prof. Chandra Venkataraman, Former IDPCS Convener and Prof. Sridhar Balasubramanian. Eminent panelists who were invited for the panel discussion included Dr. Akhilesh Gupta, DST, GoI; Mrs. Amita Sharma, Former Addl. Secretary, MHRD, GoI; Prof. Auroop R Ganguly, Northeastern University; Dr. Amir Bazaz, Indian Institute for Human Settlements; Mr. Jatin Singh, CEO, Skymet Weather; Dr. Aditi Mukherji, International Water Management Institute. The full discussion video can be found at our YouTube channel: youtu.be/FDqQrg5c9xg

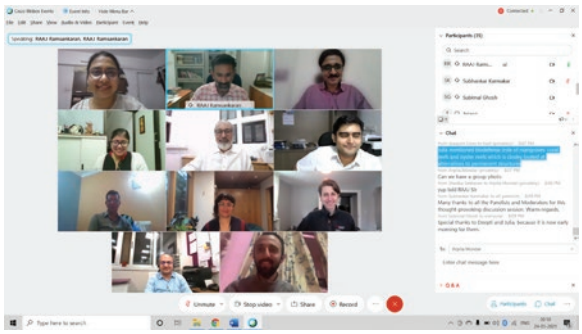
Panel discussion on 'Scope for Technology Development & Entrepreneurship in Climate Studies' Poster



Participants during the panel discussion on Scope for Technology Development & Entrepreneurship in Climate Studies held on March 17, 2021

The second panel discussion in the series was held on March 24, 2021 on 'Climate Resilient Engineering Design'. It was moderated by our associated faculty Prof. N C Narayanan and Prof. Arpita Mondal. Eminent panelists who were invited for the panel discussion included Dr. Bhanu Neupane, UNESCO; Dr. Jyoti Parikh, Integrated Research and Action for Development; Prof. Deepti Singh, Washington State University; Prof. Julia Hopkins, Northeastern University and Prof. Udit Bhatia, IIT Gandhinagar. The discussion video can be found at our YouTube channel: youtu.be/Zx_V-aJ3yTA.

Panel discussion on 'Climate Resilient Engineering Design' Poster

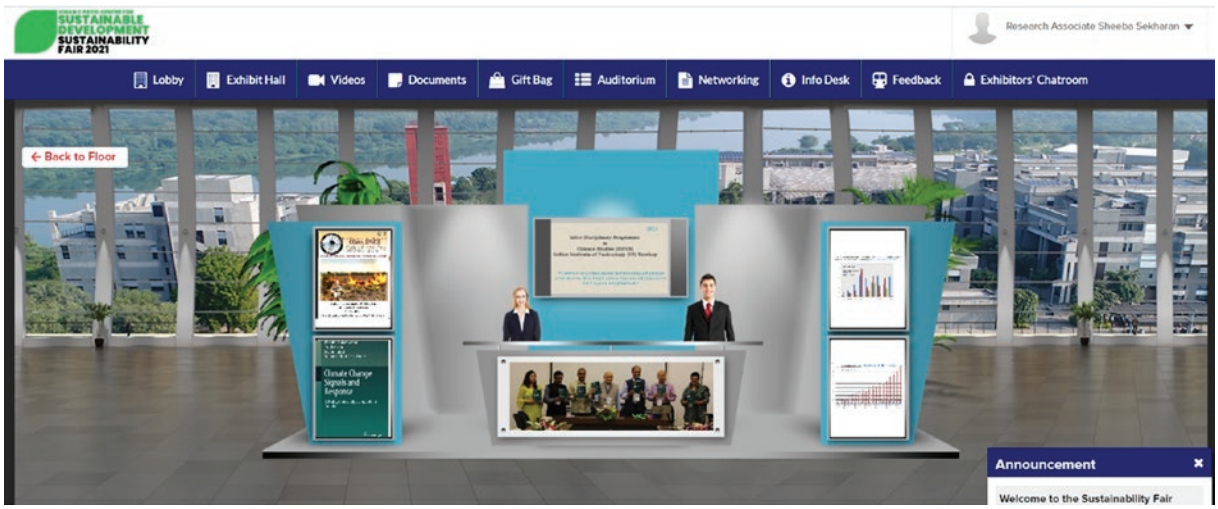


Participants during the panel discussion on Climate Resilient Engineering Design held on March 24, 2021

Participation in virtual Fair | 1

The 3rd Annual Sustainability Fair 2021, themed on renewable energy and water resources, was organized by Dr. Kiran C Patel Centre for Sustainable Development, IIT Gandhinagar (https://kpcsd.vfairs.com) virtually on March 26, 2021. The Fair featured interactive sessions with renowned speakers including Magsaysay Award Winner Mr. Rajendra Singh, Tarun Bharat Sangh; Dr. Kalanithy Vairavamoorthy, International Water Association and Dr. Ashok Das, SunMoksha. It hosted virtual exhibitions by regional and national industries and organizations working on renewable energy, water and other sustainability issues. It was essentially a virtual networking event for sustainability professionals, enthusiasts and experts.

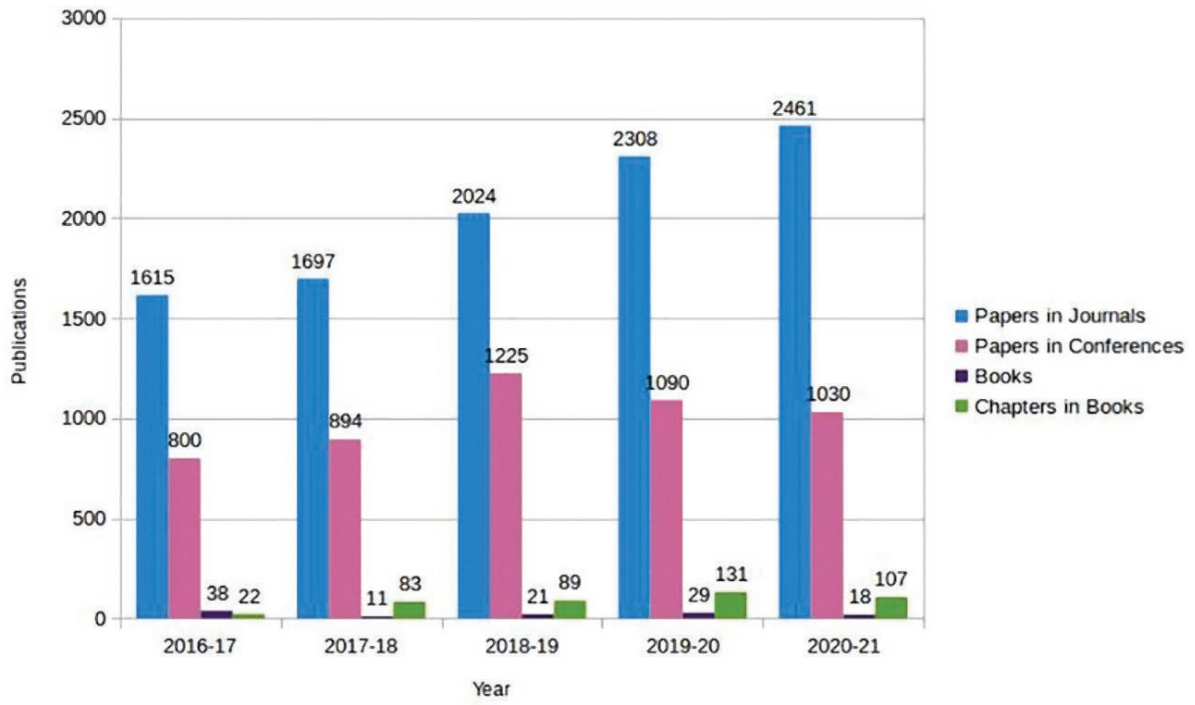
IDPCS, IIT Bombay was also invited to set up its virtual booth and was represented by Prof. Vikram Vishal (IDPCS Associated Faculty from Department of Earth Sciences), Shrabani Tripathy and Sheeba Sekharan.



IDPCS, IIT Bombay - Virtual booth

PUBLICATIONS

The number of publications by faculty members of IIT Bombay are steadily increasing. From 1615 papers published in national and international journals during the year 2016-17, the total number of papers published in 2020-21 has increased by 846 papers in mere five years, taking the total number of papers published to 2461. Similar trends can be observed for the papers presented and chapters in books published authored by the Institute's faculty, in the graph given below:



Year	Papers in Journals	Papers in Conferences	Books	Chapters in Books
2016-17	1615	800	38	22
2017-18	1697	894	11	83
2018-19	2024	1225	21	89
2019-20	2308	1090	29	131
2020-21	2461	1030	18	107

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(from 27.10.2020)

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Director

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(Up to July 14, 2020)

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(From July 15, 2020)

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Dy. Director
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(Research & Development)

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Dean (Administrative Affairs)
(Up to August 2, 2020)

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(from August 3, 2020)

Dr. R. Premkumar
Registrar

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Chairman of Each Institute (Ex-Officio)

Chairman of Each Institute (Ex-officio) Kharagpur	2	Shri Sanjiv Goenka, Chairman, BoG, IIT Kharagpur (Chairman, RP-Sanjiv Goenka Group pvt. Ltd., Kolkata)	Member
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Kanpur	5	Dr. K. Radhakrishnan (from 19.02.2019) , Chairman, BoG, IIT Kanpur, Kanpur – 208 016 (Former Chairperson, Space Commission/ Secretary, Dept. of Space and former Chairman, ISRO)	Member
Delhi	6	Dr. R. Chidambaram Chairman, Board of Governors, IIT Delhi (Former PSA to the Government of India, DAE-Homi Bhabha Chair Professor Bhabha Atomic Research Centre, Trombay, Mumbai- 400085) New Delhi – 110 016	Member
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Bhubaneswar	9	Dr. Rajendra Prasad Singh, Chairman, Board of Governors, (Former Chairman & Managing Director, Power Grid Corporation and Independent Director, Azure Power Global Ltd.) IIT Bhubaneswar, Bhubaneswar (Odisha)	Member
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Jodhpur	12	Dr. R. Chidambaram, Chairman, BoG, IIT Jodhpur, Jodhpur. (Rajasthan) (Former PSA to the Government of India, DAE-Homi Bhabha Chair Professor Bhabha Atomic Research Centre, Trombay, Mumbai- 400085)	Member
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Mandi	14	Prof. Prem Vrat, Chairman, BoG, IIT Mandi, Mandi (H.P.) (Retired Professor of IIT Delhi) & Founder Director, IIT Roorkee, New Delhi)	Member
Patna	15	Mr. Anand Deshpande, Chairman, Board of Governors, Indian Institute of Technology Patna (Bihar) (Founder, Chairman & Managing Director, Prsistent Systems Inc. Pune)	Member
Ropar	16	Dr. K. Radhakrishnan Chairman, Board of Governors, Indian Institute of Technology Ropar (Punjab)	Member
Varanasi	17	Dr. Kota Harinarayana, Chairman, Board of Governors, Indian Institute of Technology (BHU), Banaras Hindu University, Varanasi -221 005 (U.P) (Former Scientist DRDO & Former Vice Chancellor, Hyderabad University, Bangluru (Karnataka))	Member

IIT (ISM) Dhanbad	18	Prof. Prem Vrat, Chairman, Board of Governors, IIT (ISM) Dhanbad (Retired Professor of IIT Delhi) & Founder Director, IIT Roorkee, New Delhi)	Member
IIT Dharwad	19	Shri Vinayak Chatterjee, Chairman, Board of Governors, IIT Dharwad (Co-Founder & Chairperson Feedback Infra Services Pvt. Ltd.)	Member
IIT Palakkad	20	Shri Ramesh Venkateswaran Chairperson, Board of Governors, Palakkad (Visiting Faculty, Indian Institute of Management (IIM), Banngluru)	Member
IIT Jammu	21	Shri Sharad Kumar Saraf Chairperson, Board of Governors, IIT Jammu (Chairman and Managing Director, Technocraft Group of Industries, Mumbai)	Member
IIT Bhilai	22	Shri Krishnamurthi Venkataramanan Chairperson, Board of Governors, IIT Bhilai (Former Managing Director and CEO, Larsen and Toubro Limited (L&T))	Member
IIT Goa	23	Secretary (HE), MoE, Department of Higher Education, Chairman, Board of Governors, IIT Goa	Member
IIT Tirupati	24	Secretary (HE), MoE, Department of Higher Education, Chairman, Board of Governors, IIT Tirupati	Member
Director of Each Institute (Ex-officio)			
Kharagpur	25	Prof. V. K. Tewari Director, IIT Kharagpur, Kharagpur – 721 302	Member
Bombay	26	Prof. Subhasis Chaudhuri Director, IIT Bombay, Mumbai – 400 076	Member
Madras	27	Prof. Bhaskar Ramamurthi, Director, IIT Madras, Chennai – 600 036	Member
Kanpur	28	Prof. Abhay Karandikar, Director, IIT Kanpur, Kanpur – 208 016	Member
Delhi	29	Prof. V. Ramgopal Rao, Director, IIT Delhi, Hauz Khas, New Delhi – 110 016	Member
Guwahati	30	Prof. T. G. Sitharam, Director, IIT Guwahati, Guwahati – 781 039	Member

Roorkee	31	Prof. Ajit Kumar Chaturvedi, Director, IIT Roorkee, Roorkee – 247 667	Member
Bhubaneswar	32	Prof. R.V. Raja Kumar, Director, IIT Bhubaneshwar, Samantapuri (Rear side of Hotel Swosti Plaza), Jaydev Vihar, Bhubaneswar – 751 013, Odisha	Member
Gandhinagar	33	Prof. Sudhir K. Jain, Director, IIT Gandhinagar, Vishwakarma Govt. Engg. College (VGEC) Campus, Chandkheda, Visat-Gandhinagar Highway, Ahmedabad – 382424	Member
Hyderabad	34	Prof B. S. Murty, Director, IIT Hyderabad, Ordnance Factory Estate, Yeddumailaram – 502205, Andhra Pradesh	Member
Jodhpur	35	Prof. Santanu Chaudhury Director, IIT Jodhpur, IIT Rajasthan Camp Office Jodhpur – 342 011	Member
Indore	36	Prof. Nilesh Kumar Jain, Director, IIT Indore, Institute of Engineering and Technology, DAVV Campus, Khandwa Road, Indore – 452 017	Member
Mandi	37	Prof. Ajit Kumar Chaturvedi (Director, IIT Roorkee), Director, IIT Mandi, PWD Rest House, 2nd Floor, Near Bus Stand, Mandi – 175 001. (Himachal Pradesh)	Member
Patna	38	Prof. Pushpak Bhattacharyya, Director, IIT Patna, Govt. Polytechnic, Pataliputra's Colony, Patna – 800 013	Member
Ropar	39	Prof. Rajeev Ahuja, Director, IIT Ropar, Nangal Road, Rupnagar, Punjab – 140 001	Member
Varanasi	40	Prof. Pramod Kumar Jain Director, Indian Institute of Technology (BHU), Varanasi – 221005 (UP)	Member
Dhanbad	41	Prof. Rajiv Shekhar, Director, Indian Institute of Technology (IIT) (ISM), Dhanbad, Jharkhand– 826004	Member
Tirupati	42	Prof. K.N. Satyanarayana, Director, Indian Institute of Technology Tirupati, Andhra Pradesh– 517506	Member

Palakkad	43	Prof. P. B. Sunil Kumar, Director, IIT Palakkad, Kerala 678557	Member
Goa	44	Prof. B. K. Mishra Director, IIT Goa, Goa, 403401	Member
Bhilai	45	Prof. Rajat Moona Director, IIT Bhilai, Chhattisgarh 492015	Member
Dharwad	46	Prof. Seshu Pasumarthy Director, IIT Dharwad, Karnataka 580011	Member
Jammu	47	Prof. Manoj Singh Gaur Director, IIT Jammu, Jammu & Kashmir 181 221	Member
Chairman, University Grants Commission (Ex-officio)	48	Prof. Dhirendra Pal Singh Chairman, University Grants Commission, Bahadurshah Zafar Marg, New Delhi – 110 002	Member
Director-General, Council of Scientific & Industrial Research (Ex-officio)	49	Dr. S. C. Mande, Director General (DG) of Council of Scientific & Industrial, Research (CSIR), Government of India, Anusandhan Bhawan, 2, Rafi Marg, New Delhi – 110 001	Member
Chairman of the Council of the Indian Institute of Science, Bangalore (Ex-officio)	50	Dr. P. Rama Rao, Chairman, Governing Council of IISc. Bangalore, (and Former Vice Chancellor, University of Hyderabad, Balapur, Hyderabad 50005) Indian Institute of Science Campus, Bangalore – 560 012	Member
Director of the Indian Institute of Science, Bangalore (Ex-officio)	51	Prof. Govindan Rangarajan, Director, Indian Institute of Science, Bangalore – 560 012	Member

To represent the Ministry concerned with Technical Education (Nominee of the Central Government)	52	Dr. Rakesh Ranjan, Additional Secretary (TE), Ministry of Education, Department of Higher Education, Shastri Bhawan, New Delhi	Member
To represent the Ministry of Finance (Nominee of the Central Government)	53	Secretary (Expenditure), Ministry of Finance, Department of Expenditure, North Block, New Delhi – 110 001	Member
To represent any other Ministry (Nominee of the Central Government)	54	Secretary, Department of Information Technology, Electronics Niketan, CGO Complex, Lodhi Road, New Delhi – 110003	Member

Nominee of the Visitor Council for Technical Education (AICTE)	55	Prof. Anil D. Sahasrabudhe, Chairman, All India Council for Technical Education (AICTE), 7th Floor, Chanderlok Building, Janpath, New Delhi – 110 001	Member
Nominees of the Visitor (minimum three) (maximum five)	56	Prof. H.C. Verma, Department of Physics, IIT Kanpur, Kanpur, Uttar Pradesh	Member
	57	Prof. Shreepad Karmalkar, Professor, Department of Electrical Engineering, IIT Madras, Chennai – 600 036	Member
	58	Dr. V. K. Tewari, Professor & Former Head, (Machinery Systems, Ergonomics & Safety Agricultural and Food Engineering Department & Rural Development Centre, IIT Kharagpur, Kharagpur - 721302 (WB)	Member
	59	Dr. G. Satheesh Reddy, Scientific Advisor to Raksha Mantri and Director General, Missiles and Strategic Systems, Distinguished Scientist, DRDO	Member
	60	Prof. Vikram M. Gadre, Department of Electrical Engineering, IIT Bombay, Powai, Mumbai 400076	Member
Three Members of Parliament (Two from Lok Sabha) (One from Rajya Sabha)	61	Mr. Kunar Hembram, Hon'ble Member of Parliament (Lok Sabha), Vill. Kanyadoba, P. O. and P. S. Jhargram, Distt. Jhargram – 721507, West Bengal.	Member
	62	Mr. Lavu Sri Krishna Devarayalu, Hon'ble Member of Parliament (Lok Sabha), 10, Western Court Annexel New Delhi - 110001	Member
	63	Shri Prabhat Jha, Hon'ble Member of Parliament (Rajya Sabha), C-501, Swaran Jayanthi Sadan, Dr. Bishamber Dass Marg (Near R.M.L), New Delhi-110001	Member
	64	Mr. Amit Khare, Secretary (Higher Education), & the current Chairperson, BoG of six new IITs at Tirupati, Jammu, Goa, Dharwad, Bilai-Durg and Palakkad Ministry of Education, Department of Higher Education, Shastri Bhawan, New Delhi	Member
	65	Ms. Darshana M. Dabral, Joint Secretary & Financial Advisor (JS&FA), Department of Higher Education, New Delhi	Member

Members of the Board of Governors

Nominated by Visitor	Dr. Pawan Goenka, MD and CEO, Mahindra & Mahindra, Mahindra Towers Dr. GM Bhosale Marg, Worli, Mumbai - 400 018	Chairman
Ex-officio	Prof. Subhasis Chaudhuri, Director, IIT Bombay, Powai, Mumbai – 400 076	Member
Council Nominees (Four)	Dr. Rakesh Ranjan, Additional Secretary, Ministry of Education (TE), 118-C, Shastri Bhawan, New Delhi - 110015	Member
	Mr. Sharad Kumar Saraf, Chairman & Managing Director, Technocraft Industries (India) Ltd., Technocraft Group, Bombay, Technocraft House, A-25, MIDC, Marol Industrial Area, Road No. 3, Opposite ESIC Hospital, Andheri (East) Mumbai – 400 093	Member
	Prof. Aniruddha B. Pandit, U.G.C. Professor, Department of Chemical Engineering, Institute of Chemical Technology Bombay, Matunga, Mumbai - 400019	Member
	Prof. Paresh K. Joshi, Room 106 NIUS Building, Homi Bhabha Centre for Science Education, TIFR, V.N. Purav Marg, Mankhurd, Mumbai -400088	Member
MAHARASHTRA State Nominee	Secretary, Higher & Technical Education Government of Maharashtra, Mantralaya, Mumbai – 400 032	Member
DADRA & NAGAR HAVELI State Nominee	Shri Praful K. Patel Administrator, U.T. of Daman & Diu and Dadra & Nagar Haveli, Silvasa - 396 230	Member
Senate Nominee	Prof. P. V. Balaji Department of Biosciences and Bioengineering, IIT Bombay, Mumbai - 400 076	Member
Senate Nominee	Prof. S. C. Patwardhan Department of Chemical Engineering IIT Bombay, Mumbai - 400 076	Member
Ex-officio	Dr. R. Premkumar Registrar, IIT Bombay Powai, Mumbai – 400 076	Secretary

Members of the Finance Committee

Dr. Pawan Goenka, [MD and CEO, Mahindra & Mahindra, Mahindra Towers GM Bhosale Marg, Worli, Mumbai.]	Chairman
Prof. Subhasis Chaudhuri Director, IIT Bombay, Powai, Mumbai – 400 076	Member (Ex-officio)
Dr. Rakesh Ranjan, Additional Secretary, Ministry of Education (TE), Department of Higher Education, Government of India, Shastri Bhavan, New Delhi – 110 015	Member
Mr. V. B. Aras, B2-1101, Mahindra Eminente, Near Patkar College, S. V. Road, Goregaon (West) Mumbai – 400 062	Member
Ms. Darshana M. Dabral, Joint Secretary & Financial Advisor, Ministry of Human Resource Development, Department of Higher Education, Technical Section-1, Government of India, Shastri Bhavan, New Delhi – 110 015	Member
Prof. P. M. Mujumdar Dy. Director (Finance & External Affairs), IIT Bombay, Powai, Mumbai – 400 076	Member
Dr. R. Premkumar Registrar, IIT Bombay, Powai, Mumbai – 400 076	Secretary (Ex-officio)

Members of the Building and Works Committee

Prof. Subhasis Chaudhuri Director, IIT Bombay, Powai, Mumbai – 400 076	Chairman
Superintending Engineer, Office of the Supdt. Engineer, Mumbai Central Circle-1, CPWD, 5th Floor, Pratishtha Bhavan, 101 MK Road, Mumbai – 400 020	Member
Superintending Engineer, Mumbai (P.W.D) Circle 25 Murzban Road, Fort, Mumbai – 400 001	Member
Mr. K. Srinivas, Head, Architectural & Civil Engg. Division, BARC, North Site, Trombay, Mumbai – 400 085	Member
Ms. Uma Adusumilli Chief, Planning Division Mumbai Metropolitan Region Development Authority (MMRDA) 6th Floor, MMRDA New Building, Bandra Kurla Complex, Mumbai – 400051	Member
Prof. B.V.S. Viswanadham Dean (Infrastructure Planning & Development), IIT Bombay, Powai, Mumbai – 400 076	Member
Dr. R. Premkumar, Registrar, IIT Bombay Powai, Mumbai – 400 076	Member-Secretary (Ex-officio)

Heads of Departments

Prof. Sudarshan Kumar (from May 16, 2020)
Prof. Avijit Chatterjee (up to May 15, 2020)
Aerospace Engineering

Prof. Rohit Srivastava
Biosciences and Bioengineering

Prof. Madhu Vinjamur (from 12.05.2020)
Prof. R. D. Gudi (up to 11.05.2020)
Chemical Engineering

Prof. Anindya Datta
Chemistry

Prof. Deepankar Choudhury (from 30.03.2021)
Prof. T. I. Eldho (up to 29.03.2021)
Civil Engineering

Prof. Umesh Bellur
Computer Science and Engineering

Prof. Santanu Banerjee (from 08.05.2020)
Prof. H.S. Pandalai (from 28.01.2020)
Earth Sciences

Prof. Kishor Chatterjee (from 11.01.2021)
Prof. B.G. Fernandes (up to 10.01.2021)
Electrical Engineering

Prof. Ragan Banerjee
Energy Science and Engineering

Prof. Suparna Mukherji
Department of Environmental Science and Engineering

Prof. Kushal Deb (from 22.06.2020)
Prof. Pushpa Trivedi (up to 21.06.2020)
Humanities and Social Sciences

Prof. K. Suresh Kumar
Mathematics

Prof. Sreedhara Sheshadri (from 01.07.2020)
Prof. B.P. Puranik (up to 30.06.2020)
Mechanical Engineering

Prof. K. Narasimhan
Metallurgical Engineering and Materials Science

Prof. Uma Shankar (from 28.12.2020)
Prof. K.G. Suresh (up to 27.12.2020) Physics

Heads of Centres

Prof. Anil Kottantharayil
Centre for Research in Nanotechnology and Science and SAIF

Prof. Alok Porwal (from 02.11.2020)
Prof. J. Adinarayana (up to 01.11.2020)
Centre of Studies in Resources Engineering

Prof. G. Sivakumar
Centre for Formal Design and Verification of Software

Prof. Sudarshan Kumar (from 16.05.2020)
Prof. Avijit Chatterjee (up to 15.05.2020)
Centre for Aerospace Systems Design and Engineering

Prof. Anand B. Rao (from 19.16.2020)
Prof. S. B. Agnihotri (up to 18.06.2020)
Centre for Technology Alternatives in Rural Areas

Prof. Sharad Bhartiya
Computer Centre

Prof. Sridhar Iyer
Centre for Distance Engineering Education Programme

Prof. K. V. Krishna Rao (from 22.06.2020)
Prof. Pradipta Banerjee (up to 21.06.2020)
Center for Urban Science and Engineering

Prof. Shishir K. Jha
Centre for Policy Studies

Prof. K. Narasimhan
Centre for Excellence in Steel Technology

Heads of Schools

Prof. Phani Tetali
IDC School of Design

Prof. S. Narayan Rao (from 17.06.2020)
Prof. S. Bhargava (upto 16.06.2020)
Shailesh J. Mehta School of Management

Prof. B. Ravi
Desai Sethi School of Entrepreneurship

Convenors of Interdisciplinary Programmes

Prof. Jayendran V
Industrial Engineering and Operations Research

Prof. B. Bandyopadhyay
Systems and Control Engineering

Prof. Sridhar Iyer
Education Technology

Prof. Subimal Ghosh (from 18.12.2020)
Prof. D. Parthasarthy (up to 17.12.2020)
Climate Studies

SUMMARY OF ACCOUNTS

CONSOLIDATED ACCOUNT BALANCE SHEET AS AT 31/03/2021

(Amount in Rupees)

Particulars	Schedule	Current Year 2020-2021	Previous Year 2019-2020
SOURCES OF FUNDS			
CORPUS / CAPITAL FUND	1	3,34,91,01,548	2,99,45,52,577
DESIGNATED / EARMARKED / ENDOWMENT FUNDS	2	9,66,32,55,603	7,18,74,59,239
CURRENT LIABILITIES AND PROVISIONS	3	24,04,61,20,850	24,92,19,98,626
TOTAL (A)		**37,05,84,78,001**	**35,10,40,10,442**
APPLICATION OF FUNDS			
FIXED ASSETS			
TANGIBLE ASSETS	4	4,60,83,30,464	4,64,92,67,888
INTANGIBLE ASSETS	4	19,90,22,978	14,65,42,360
CAPITAL WORKS-IN-PROGRESS	4	12,20,57,95,811	11,46,12,87,475
INVESTMENTS FROM EARMARKED / ENDOWMENT FUNDS	5	2,46,02,83,330	93,77,71,761
INVESTMENTS OTHERS	6	2,75,00,00,000	2,75,00,00,000
CURRENT ASSETS	7	12,26,11,61,782	10,34,22,41,985
LOANS, ADVANCES AND DEPOSITS	8	2,57,38,83,636	4,81,68,98,973
TOTAL (B)		**37,05,84,78,001**	**35,10,40,10,442**
SIGNIFICANT ACCOUNTING POLICIES	24		

INCOME & EXPENDITURE FOR THE YEAR ENDED 31/03/2021

(Amount in Rupees)

Particulars	Schedule	Current Year 2020-2021	Previous Year 2019-2020
INCOME			
Academic Receipts	9	1,01,29,66,009	1,02,11,39,779
Grants/Subsidies (Irrevocable Grants Received)	10	6,27,99,17,403	6,41,88,66,000
Income From Investments	11	88,13,97,611	92,10,78,878
Interest Earned	12	93,45,146	37,21,489
Other Income	13	4,24,582,277	64,67,59,989
Prior Period Income	14	5,17,769	18,79,185
Total (A)		**8,60,87,26,215**	**9,01,34,45,320**
Expenditure			
Staff Payments and Benefits (Establishment Expenses)	15	5,45,99,53,513	5,73,66,68,346
Academic Expenses	16	1,09,52,61,162	1,10,28,04,876
Administrative And General Expenses	17	98,37,24,035	1,45,34,99,774
Transportation Expenses	18	38,43,655	56,26,452
Repairs & Maintenance	19	22,62,25,044	41,96,04,630
Finance Costs	20	11,07,26,935	7,85,53,868
Other Expenses (Write Off)	21	8,12,436	46,73,511
Prior Period Expenses	22	66,94,268	4,39,29,376
Depreciation	4	79,70,05,342	66,35,52,900
Total (B)		**8,68,42,46,390**	**9,50,89,13,733**
Balance Being Excess of Income Over Expenditure (A-B)		-7,55,20,175	-49,54,68,413
Adjusted from Capital Fund (Depreciation)		79,70,05,342	66,35,52,900
Adjusted from Capital Fund (Write off)		8,12,436	46,73,511
Transfer to HEFA		41,00,00,000	41,50,00,000
Transfer to Capital Fund (3 -C)		54,25,66,925	0
Transfer to General Reserve - Main Account		-69,75,99,707	-71,07,86,902
Transfer to IRCC Fund		29,55,79,682	36,49,38,055
Transfer to General Reserve - Donation Account		17,17,50,703	10,76,11,558
Balance Being Surplus/(Deficit) Carried to Corpus/Capital Fund		-69,75,99,707	-71,07,86,902
Significant Accounting Policies	23		
Contingent Liabilities and Notes On Accounts	24		

Note: Value of Rs. 69,75,99,707/- is arrived at after adding deficit of Rs. 20,58,985/-(recurring) and Rs. 69,55,40,722/- acturial value provision in r/o Leave Encashment, Gratuity and Pension

RECEIPT AND PAYMENTS FOR THE PERIOD FROM 01/04/2020 TO 31/03/2021

(Amount in Rupees)

RECEIPTS	Amount In Rs.	PAYMENTS	Amount In Rs.
I. Opening Balances		**I. Expenses**	
a) Cash Balances	2,94,492	a) Establishment Expenses	3,53,28,82,016
b) Bank Balances		b) Academic Expenses	89,77,94,846
i. In Current accounts	40,25,44,005	c) Administrative Expenses	67,18,00,394
ii. In Deposits accounts	-	d) Transportation Expenses	38,30,838
iii. Savings accounts	15,261	e) Repairs & Maintenance	26,70,40,043
II. Grants Received		**II. Payments against Earmarked/ Endowment Funds**	2,99,100
a) From Government of India	8,61,96,17,403		
b) Grant in aid due in 2018 - 2019 received in 2019 - 2020	45,00,00,000		
c) From State Government	-		
d) From Other sources (details)	-		
III. Academic Receipts		**III. Payments against Sponsored Projects/Schemes**	1,34,11,36,246
a) Fee from Students	84,73,49,252		
b) Other Receipts from Students	9,06,94,820		
c) All India Entrance Examination Receipts	21,97,64,813		
IV. Receipts against Earmarked/ Endowment Funds	2,82,66,941	**IV. Payments against Sponsored Fellowships/Scholarships**	19,32,35,820
V. Receipts against Sponsored projects/Schemes	2,41,88,82,832	**V. Investments and Deposits made**	
		a) Out of Earmarked/Endowments Funds	1,37,86,269
		b) Out of own funds (Investments - Others)	
VI. Receipts against sponsored Fellowships/Scholarships	49,85,16,169	**VI. Term deposits with Scheduled Banks**	22,92,73,95,724
VII. Income on investments from		**VII. Expenditure on Fixed Assets and Capital Works - in - Progress**	
a) Earmarked/Endowment Funds		a) Fixed Assets	1,08,68,26,886
b) Other investments		b) Capital Works - in - Progress	58,99,39,174

RECEIPTS	Amount In Rs.	PAYMENTS	Amount In Rs.
VIII. Interest received on		**VIII. Other Payments including statutory payments**	1,69,75,12,209
a) Bank Deposits	1,11,98,80,506		
b) Loans and Advances			
c) Savings Bank Accounts			
IX. Investments encashed	20,07,73,81,781	**IX. Refunds of Grants**	
X. Term Deposits with Scheduled Banks encashed	0	**X. Deposits and Advances**	
		a) Advances account	54,55,85,254
		b) Refundable Deposits	7,38,50,394
		c) Recoverable Deposits	13,85,000
XI. Other income (including Prior Period income)	0	**XI. Other Payments**	
a) Continuing Education programme	0	a) Grants from other organisations	22,35,62,322
b) Miscellaneous Receipts	10,89,54,161	b) Sundry Creditors	6,12,35,570
c) Guest House receipts	2,29,32,470	c) Loan - Inter Department	
		d) Surplus transfer to Endowment	
		e) Other Payments -main account	82,34,93,216
		f) Other Payments -IRCC account	12,34,37,409
		g) Other Payments -Donation account	1,99,90,90,257
XII. Deposits and Advances		**XII. Closing balances**	
a) Advances account	3,14,49,747	a) Cash in hand	1,51,151
b) Refundable account	10,75,04,312	b) Bank balances	
c) Recoverable Deposits		I. In Current Accounts	1,14,78,37,063
		II. In Savings Accounts	13,843
		III. In deposits Accounts	0
XIII. Miscellaneous receipts including Statutory receipts	17,87,79,936		
a) Other Adjustable Accounts	8,15,35,434		
XIV. Any Other Receipts			
a)Grants from other Organisations	1,00,25,67,636		
b) Sundry Debtors	14,47,46,179		
c) Loan - Inter Department	0		
d) Other Receipts - Main account	45,82,07,439		
e) Other Receipts - IRCC account	1,82,188		
f) Other Receipts - Donation Account	1,31,30,53,266		
TOTAL	**38,22,31,21,045**	**TOTAL**	**38,22,31,21,045**

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