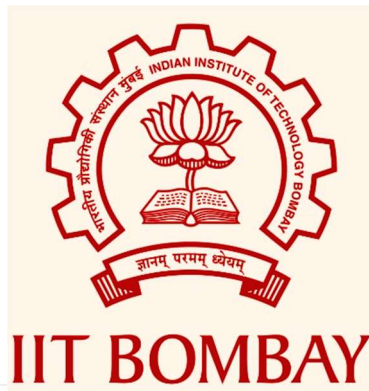




Department
Handbook 2022-23
Electrical Engineering



Disclaimer

The Institute Student Companion Program (ISCP) has acquired and presented the data in this handbook on the feedback compiled from the respective specialization seniors. Best efforts have been put to cater to relevant and useful information to you. We request you to exercise caution and wisdom while relying on this information. ISCP will not be held responsible for any inaccuracies in the document.

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1. About the Department

The Department of [Electrical Engineering \(EE\)](#) is one of the largest departments of IIT Bombay since its inception in 1958. The department has different academic programs with about 570 undergraduate and 730 postgraduate students. The department is equipped with the state of the art experimental and computational facilities for undertaking R & D and consultancy activities in various fields.

The EE department has a vibrant postgraduate program with a strong focus on research and development. The number of postgraduate students in EE is more than that of the undergraduate students and the department attaches a lot of importance to its master' students as they constitute the backbone of research and development.

The department offers MTech in six research areas/specializations:

- Communications Engineering (EE1)
- Control and Computing (EE2)
- Power Electronics and Power Systems (EE3)
- Electronic Systems (EE5)
- Integrated Circuit and Systems (EE6)
- Solid State Devices (EE7)

Faculty members of the department are recipients of many distinguished awards like the Shanti Swarup Bhatnagar Prize, Prof. K. Sreenivasan Memorial Award, Prof. SVC Aiya Memorial Award, and Dr. Vikram Sarabhai Research Award, Ram Lal Wadhwa Award, INAE Young Engineer Award, Alexander von Humboldt Fellowship, and many others.

Many faculty members are Editors of IEEE and other national and international journals. They are also Fellows of organizations like IEEE, IETE, INAE, IASc, NASI, and INSA.



2. Message from HoD

Welcome to the Department of Electrical Engineering of IIT Bombay!

Ours is one of the largest departments in the institute in terms of the number of faculty members, students enrolled, and research funding. The department has made rapid strides during the last decade in all spheres of education and research. Our undergraduate program has always been known to be one of the best engineering undergraduate programs in the country. We now emphasize post-graduate education and research in a significant way. In our department, Masters and Doctoral students outnumber undergraduate students today. Our sponsored research activities have multiplied several folds from 2000 to 2012, there has been a ten-fold increase in terms of sponsored research budget. The department has set up state-of-the-art research laboratories and centers such as the Center for Excellence in Nano electronics, the National Center for Photovoltaic Research and Education, Telecom Center of Excellence to name a few. We recognize that we have a tremendous role to play in driving our country's technology roadmap in the Electronics sector.

We provide a very informal atmosphere between faculty and students. EE department has always been known for creating an ambiance where scholarship flourishes. Faculty members of our department are not only engaged in cutting-edge technology research but are also very passionate about teaching. We pride ourselves on having persons with an exceptional academic backgrounds as our faculty colleagues. If you have a high academic standing (as demonstrated by high-quality publications and good academic pedigree), desire for student mentoring and teaching and would like to be part of our faculty, please write to us at fsc_convenor@ee.iitb.ac.in. Our department has an ambitious plan to further improve the quality and quantity of research that can make a difference as well as have an impact at the global level. We constantly look for bright, young

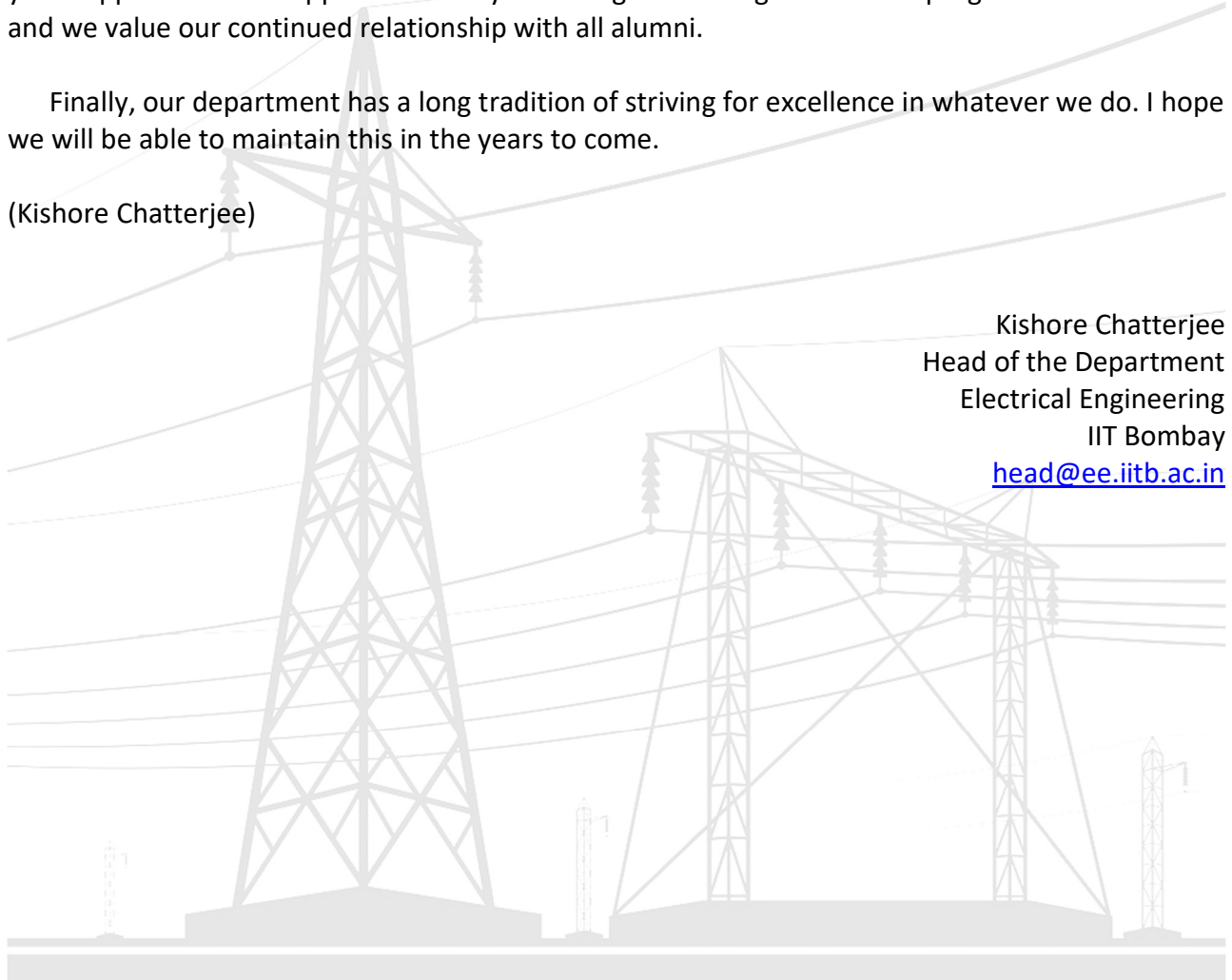
students who have a passion to participate in our research programs. If you are one of them, we would like to encourage you to apply for our Master's and Ph.D. programs. You may also have an opportunity to be part of a research group or team by joining some of the sponsored projects as Project Staff. As Project Staff, you may get an opportunity to do M. Tech. and Ph.D. in our department. Such positions may be advertised on our website from time to time and also on the website of the Dean of Research and Development (<http://www.ircc.iitb.ac.in>).

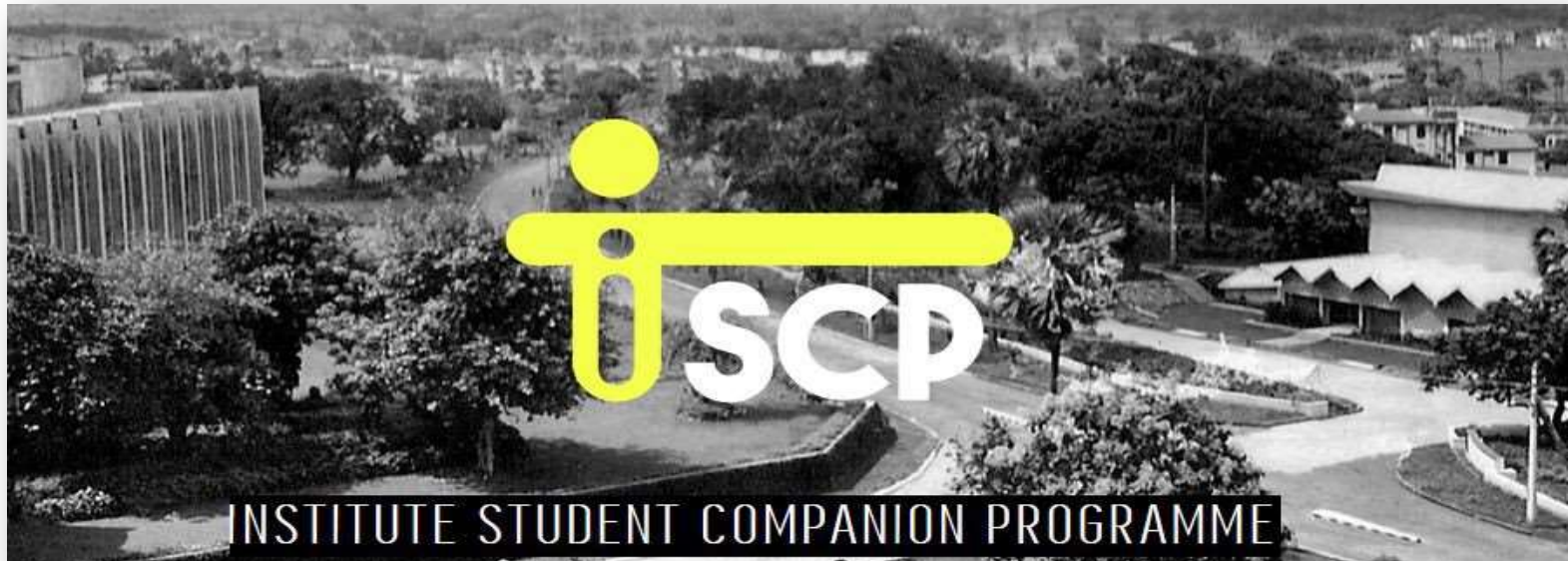
If you are an alumnus of the department and are reading this page, then it is now time to get in touch with us. Believe me, these are exciting times in the department and we would love to get your support. Alumni support has always been a great driving force in the progress of our institute and we value our continued relationship with all alumni.

Finally, our department has a long tradition of striving for excellence in whatever we do. I hope we will be able to maintain this in the years to come.

(Kishore Chatterjee)

Kishore Chatterjee
Head of the Department
Electrical Engineering
IIT Bombay
head@ee.iitb.ac.in





3. Message from ISCP

Dear new entrants,

Heartfelt congratulations for embarking on one of life's most memorable journeys - the journey of learning at IIT. On the behalf of our prestigious institute of IIT Bombay, team ISCP welcomes you aboard.

Give a pat on your shoulder for having achieved this feat. Your dedication, hard work, and perseverance brought you here, and we know that your experience will lead you towards great opportunities. We can guarantee that your time here on this colossal campus will be exciting and knowledgeable. A degree will just be a small portion of what you will be leaving this institute with. You will also leave with beautiful memories of late-night conversations, interesting wing cultures, and crazy birthday parties (oh you are going to miss those!!). You will have the opportunity to mingle in various clubs and societies where individuals strive to become experts in their fields and devote endless hours. As a result, there will be many chances to learn inside and outside the classroom. So, entering this new universe in itself presents both exhilaration and potential difficulties. This is where we will help you by providing the tips you need to handle these difficulties and enjoy your time at IIT Bombay.

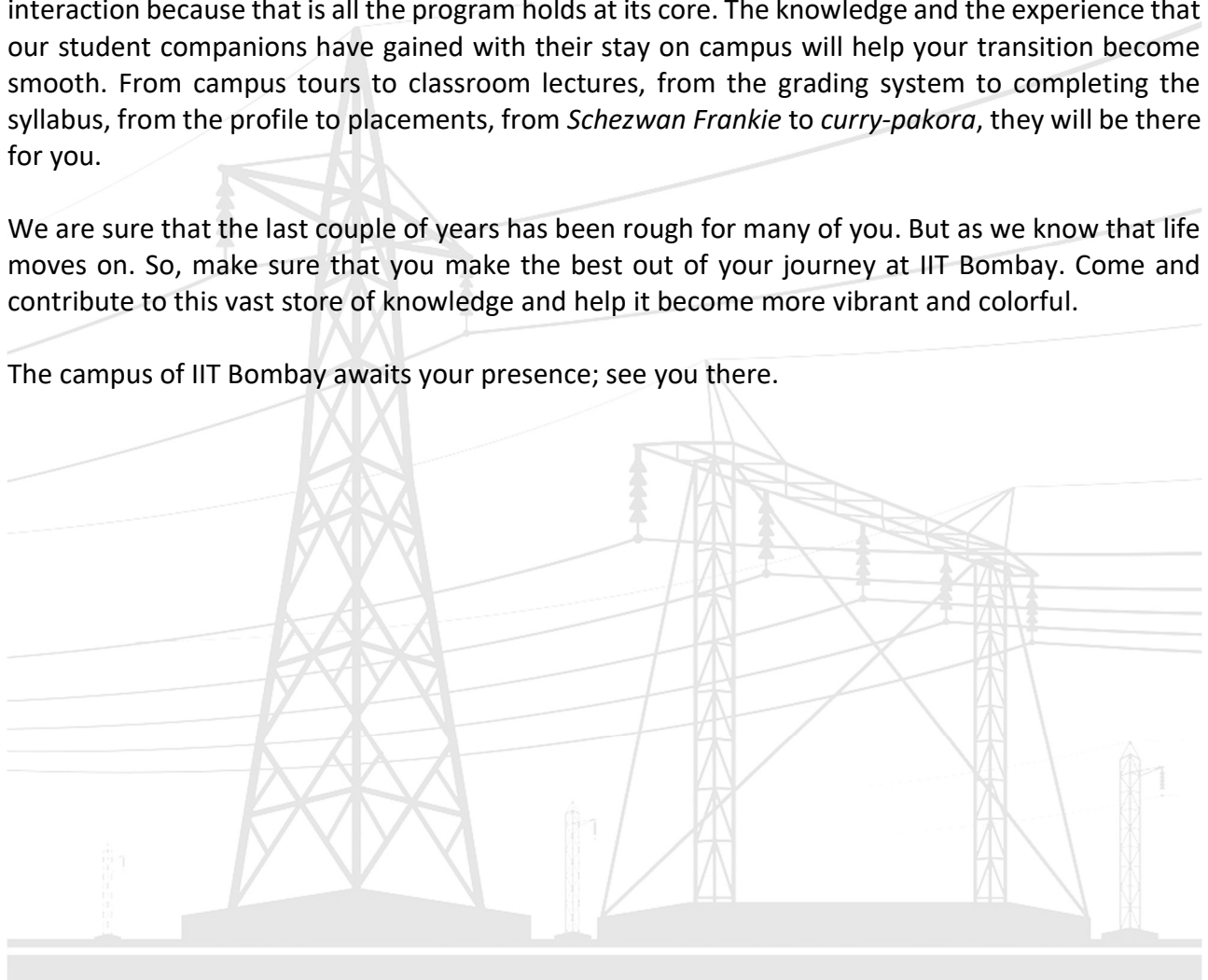
Now, you should be thinking what on earth is this ISCP? Institute Student Companion Programme (ISCP) is a student body with the primary objective of building a relationship of trust and comfort between the on-roll students and the incoming students of the PG programs. We are here to help you get familiar with the ways of IITB, guide you through your ups and downs, and make sure that each voice is heard. You will become part of a culture where people want to perfect their craft and thus work day in and day out. Various events are organized by the cultural, technical, and sports

clubs in the institute throughout the year. Managing these along with lectures might seem daunting at first, and hence, to help you with a world of problems, including these, we assign you a student companion.

The student companions are self-motivated volunteers who will genuinely want to help you in low and high tides as an act of giving back what they received from the program. You can rely on the team for any advice or information on anything you are venturing out into, whether it be academics or extracurriculars, any issues that you are facing, any support or requirements that you want to raise as a part of the student community. And last but undoubtedly not least just for regular interaction because that is all the program holds at its core. The knowledge and the experience that our student companions have gained with their stay on campus will help your transition become smooth. From campus tours to classroom lectures, from the grading system to completing the syllabus, from the profile to placements, from *Schezwan Frankie* to *curry-pakora*, they will be there for you.

We are sure that the last couple of years has been rough for many of you. But as we know that life moves on. So, make sure that you make the best out of your journey at IIT Bombay. Come and contribute to this vast store of knowledge and help it become more vibrant and colorful.

The campus of IIT Bombay awaits your presence; see you there.



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Graduation is just a beginning
PGAC

4. Message from Academic Council

Welcome Freshers!

We all have gone through a lot in these past couple of years, so firstly congratulations to all of you for securing admission to one of the prestigious institutes in the country. IIT Bombay provides the best exposure to its students in all aspects, both academically as well as nonacademically. The skills you develop here, and the interactions you have with people here will stay with you throughout your life. Postgraduation demands something additional compared to graduation, more time, more effort, more determination, and a ton of dedication. For meeting these primary requirements, often we find ourselves in a daunting situation.

To make your stay at IIT Bombay convenient, the institute has established the PGAC (Post Graduate Academic Council). Any technical necessity, any placement-related assistance, any research queries or any academic grievances, you can always reach out to us. Each department has its AURAA (Academic Unit Representative of Academic Affairs), whom you can approach directly in case you find any difficulties. Wishing you all a convenient and productive IIT journey!

Regards,

Mohit Meena,
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+91 8006080474

Institute Masters Representative (2022-2023)

Post Graduate Academic Council (PGAC)

imr@iitb.ac.in





5. Lab Facilities

1. **Wadhvani Electronics Laboratory (WEL)** (3rd Floor, EE Building)

Professor In-charge - Prof Siddharth Tallur

Relevant Specializations - for all specializations in EE

The WEL houses all the major electronics hardware activities of the Electrical Department at IIT Bombay



2. Signal Processing and Instrumentation Lab

(1st Floor, EE Building)

Professor In-charge - Prof. P C Pandey

Relevant Specializations - EE1, EE5

This lab focuses on research in the areas of speech signal processing, bio-medical signal processing & instrumentation, electronic instrumentation, and embedded system design

3. Integrated Systems Laboratory

(1st Floor, Electrical Annex Building, Opposite to EE main building)

Professor In-charge - Prof. Jayanta Mukherjee, Prof. Maryam Shojaei Baghini

Relevant Specializations - EE1, EE5, EE6, EE7

Embedded system solutions are developed here. Primarily design and test of passive and active RF and circuits are done



4. Lab

(5th floor, Girish Gaitonde (GG) building)

Relevant Specializations - EE5, EE6, EE7

The prime focus areas of the lab are system design, prototyping and evaluation starting from sensor/transducer interfacing to full system development and network of sensor nodes.



5. Applied Integrated Micro Systems (AIMS) Laboratory

(1st Floor, Electrical Annex Building, Opposite to EE main building)

Professor In-charge - Prof. Siddharth Tallur

Relevant Specializations - EE5, EE6, EE7

AIMS lab works on innovative instrumentation for impactful measurements. The research areas include sensor systems, and hybrid integrated microsystems, studying their underlying physics to leverage such platforms for high-resolution sensing applications.

6. Photonics and Quantum Enabled Sensing Technology (P-Quest) Laboratory

(2nd Floor, EE Building)

Professor In-charge - Prof. Kasturi Saha

Relevant Specializations - EE1, EE7

P-Quest lab works on exploring precision metrology and sensing using novel interdisciplinary research in fields like nano-photonics, classical and quantum information processing and life sciences, to develop practical quantum devices via design and experimentation, thus connecting quantum theory to engineering applications.

7. VLSI Design Lab

(5th Floor, Girish Gaitonde (GG) Building)

Relevant Specializations - EE5, EE6

The VLSI Design Lab hosts all major VLSI CAD Vendor tools and their licenses. A few major tools in frequent use are Synopsys, Cadence, Mentor, Agilent, Magma, Xilinx, etc. The main research focus is on the area of analog and digital design. In addition to courses, this lab also hosts accounts for different courses that require hands-on experience with tools. For different projects and their tape-out, there is the availability of a high-performance computational server to speed up the simulations.



8. Signal Processing and Artificial Neural Networks (SPANN)

(3rd Floor, EE Building)

Professor In-charge - Prof. V.M. Gadre

Relevant Specializations - EE1

The major areas of research that are pursued in SPANN Lab include Wireless Communications, Sensor Networks, Image Processing, and Signal Processing.

9. Information Networks Laboratory

(2nd Floor, EE Building)

Professor In-charge - Prof. Prasanna Chaporkar, Prof. Abhay Karandikar

Relevant Specializations - EE1

Group members of the lab are pursuing research in the field of 4G and 5G cellular technologies, with an emphasis on inter-working with non-3GPP Wireless Local Area Networks (WLANS).

10. Texas Instruments Digital Signal Processing Lab (TIDSP)

(3rd Floor, EE Building)

Professor In-charge - Prof. V.M. Gadre

Relevant Specializations - EE1, EE5

TIDSP laboratory was set up in the EE Department to support DSP hands-on projects at the undergraduate and postgraduate levels. DSP-specific hardware and software support is provided by Texas Instruments (TI) itself.



11. Fiber-Optics Communication Lab

(2nd Floor, EE Building)

Professor In-charge - Prof. Kumar Appaiah, Prof. Joseph John

Relevant Specializations - EE1, EE5

This lab is dedicated to pursuing research mainly in the area of optical fiber communication (SM, MM, FM), plastic optical fiber, and fiber sensing.

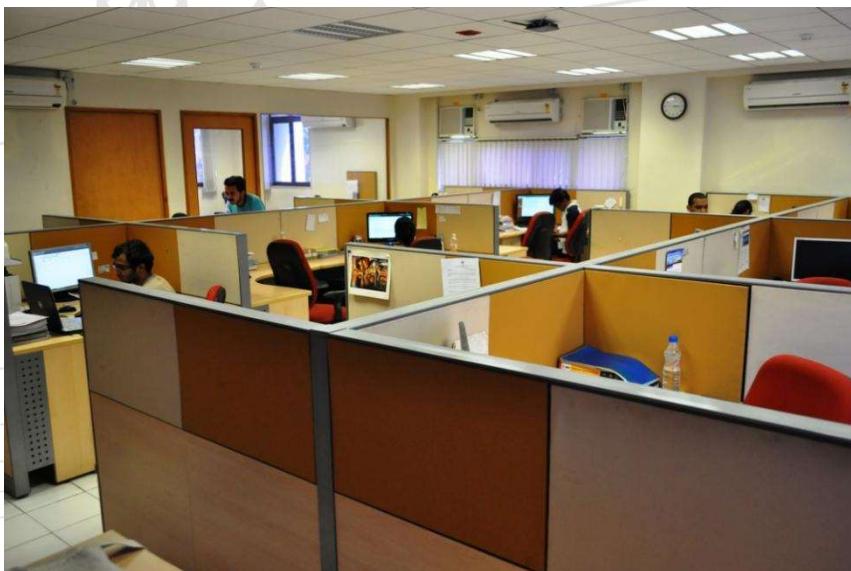
12. Bharti Centre for Communication

(2nd Floor, EE Building)

Professor In-charge - Prof. D. Manjunath, Prof. Bikash Kumar Dey

Relevant Specializations - EE1

The Bharati Centre for Communication is a center to generate fundamental knowledge in telecommunication and allied systems. The Vision of the center is to be an internationally recognized contributor in moving the frontiers of knowledge through research and education, to keep technology practice in focus and to educate for innovation and leadership.

**13. Vision and Image Processing**

(1st Floor, EE Building)

Professor In-charge - Prof. Rajbabu Velmurugan

Relevant Specializations - EE1, EE2, EE5

This lab is dedicated to Deep Learning, Computer vision techniques. The major projects currently undertaken are related to Haptics, Biometrics, Image segmentation, super-resolution, Anomaly detection, and surveilling related problems. This lab consists of more than 23 GPU, and a high-performance computer to work on the mentioned techniques

14. PC Lab

(1st Floor, EE Building)

Professor In-charge - Prof. JayaKrishnan Nair

Relevant Specializations - For all specializations in EE

PC Lab provides general computing facilities to students of Electrical Engineering and Reliability Engineering. Both Windows and Linux machines are present in the lab. Also, a load-balanced server (Sharada) is available for heavier computational use. Software packages like MATLAB, Lyx, Scilab, Spice, Ansys, Sequel, Grace, etc. are installed on Sharada. You can use them for your (academic) work. Standard Linux/Unix packages, such as LaTeX, MySQL, etc are also available.

**15. Digital Audio Processing Lab**

(1st Floor, EE Building)

Professor In-charge - Prof. Preeti Rao

Relevant Specializations - EE1, EE5

This lab is based on the application of signal processing in the analysis of speech and audio. Research activities are related to spoken language assessment, music content analysis, measuring the goodness of instruments like Tabla, segmentation of instruments in the music concert, and other application of speech and audio processing.

16. Communication Lab

(1st Floor, EE Building)

Professor In-charge - Prof. Shalabh Gupta

Relevant Specializations - EE1, EE5, EE6

Communication Lab primarily focuses on cutting-edge research in the area of High-speed Communication Links. It can further be divided into different domains like High-speed Links using Optical Communication, Silicon Photonics, SerDes (Serialiser and Deserialiser) Links, RF Circuits, and Millimetre-wave Circuits and Systems.

17. Networking Lab

(2nd Floor, EE Building)

Professor In-charge - Prof. D. Manjunath

Relevant Specializations - EE1

The work in the Networking lab deals with the theoretical aspects of queuing theory, sensor networks, applications of stochastic approximation, software routing, etc.

18. Microwave and Antenna Lab

(3rd Floor, EE Building)

Professor In-charge - Prof. Girish Kumar

Relevant Specializations - EE1

Microwave Lab is involved in research work in the area of RF Systems, Electromagnetic Waves, and Antenna Design. Primary research work is being done in different fields like Microstrip Antenna, Microwave Integrated Circuits, and Broadband Antennas.

19. TTSL-IITB Centre of Excellence in Telecommunications (TICET)

(2nd Floor, EE Building)

Professor In-charge - Prof. Abhay Karandikar

Relevant Specializations - EE1

TICET focuses on state-of-the-art research in telecom relevant to Indian Service Providers in general and Tata Teleservices Limited (TTSL) in particular with special emphasis on rural wireless applications and connectivity. The research activities in this lab are related to Quality of Service and resource allocation in wired/wireless networks, TV White Space, and its potential for affordable broadband access in India, Frugal 5G, and rural broadband research and standardization.

20. Medical Deep learning and AI Lab (MeDAL)

(1st Floor, EE Building)

Professor In-charge - Prof. Amit Sethi, Prof. Manoj Gopalkrishnan

Relevant Specializations - EE1

This lab is dedicated to solving real-world problems in the areas of medical imaging, radiology, and pathology using deep learning architectures. This lab houses high-end computing facilities to work with large-scale data (Gigapixel images) to solve various computer vision problems. The research group has collaborated with various hospitals and universities.



21. Information Systems and Radios (ISR) Lab

(2nd Floor, EE Building)

Professor In-charge - Sibi Raj Pillai

Relevant Specializations - EE1

Information Systems and Radios (ISR Lab) facilitates research broadly in information theory and Radar Technology. Current research undertaken is wind-profiling algorithm for MST radars, GNSS Receiver Development, Information theoretical limit for Digital and Analog Hybrid communication, and Minimum energy transmission scheme for packetized transmission.

22. Computer Architecture and Dependable Systems Lab (CADSL)

(2nd Floor, Electrical Engineering Annex)

Professor In-charge – Prof. Virendra Singh

Relevant Specializations - EE5, EE6

Areas of research are - Advanced and futuristic architecture and systems including compiler and operating system support for architecture, An advanced dependable system including formal verification and VLSI testing and Computer-Aided Design of VLSI and hardware accelerator.

23. High-Performance Computing Lab (HPC)

(4th Floor, Girish Gaitonde Building)

Professor In-charge - Prof. Sachin B Patkar

Relevant Specializations - EE1, EE2, EE5, EE6

Areas of research Our research is aimed at addressing future applications and implementations of high-end parallel and reconfigurable computing especially for Electrical Engineering related problems. Projects range from accelerating circuit simulation for digital, RF, and power electronics, stereo imaging and Machine Learning on reconfigurable hardware, Network-on-Chip for Distributed Computing, and Crypt-analysis.

24. Control and Computing Laboratory

(2nd Floor, EE Building)

Relevant Specializations - EE2

Some of the research interests are Differential games, Formation control and consensus in Quad-rotors, Pursuit-Evasion games, Multi-agent systems and Co-operation control, Hamiltonian systems, Stability of switched systems, Differential algebraic equation and singular LQR problem, Passivity and KYP lemma, Automatic control theory, Data estimation and filtering, nD-Systems, Graph, and Metroid decompositions, etc.



25. Applied Power Electronics Laboratory

(Ground Floor, EE Building)

Professor In-charge - Prof. Vivek Agarwal

Relevant Specializations - EE3

Non-Conventional Energy-Modelling the steady-state and dynamic characteristics of the PV, Fuel cell and wind energy sources, Power converter topologies for standalone and grid-connected PV, FC, and wind systems, Maximum Power Point Tracking Schemes, Microgrid Power Quality



26. Power Anser Lab

(2nd Floor, EE Building)

Professor In-charge - Prof. Shreevardhan A. Soman

Relevant Specializations - EE3

Power Anser Labs was set up in April 2007 in collaboration with TCS. The association aims at leveraging research outputs into full-fledged software products, primarily in the form of web services, which can be used by power utilities.

27. Power Systems Laboratory

(Ground Floor, EE Building)

Professor In-charge - Prof. Anil Kulkarni

Relevant Specializations - EE3

Fully Functional scaled-down model of 2 Area 4 machine system used for demonstration of power system dynamic phenomena i.e. frequency, voltage dynamics, the effect of controllers like AVR, FACTS, and HVDC converters (variable impedance, voltage source, and line-commutated converters) with digital control.

28. Simulation Centre for Power Electronics and Power System

(Ground Floor, EE Building)

Professor In-charge - Prof. Himanshu Bahirat

Relevant Specializations - EE3

The simulation center for PEPS conducts workshops for people from different colleges and industries to train them on software that is crucial for power electronics and power system applications. This lab has different software like Matlab, PSCAD, PSIM, DigSilent, and SaberRD. This lab accommodates its software server. The models of power electronics and power system components are implemented on this software that is available on the website of the simulation center.

29. National Centre for Photovoltaic Research and Education

(3rd Floor, Annex Building)

Professor In-charge - Prof. B. G.Fernandes

Relevant Specializations - EE3

The broad objectives of NCPRE are to provide R&D and education support for India's ambitious 100 GW solar mission. The Centre is involved in both basic and applied research activities. These research activities include silicon solar cell fabrication and characterization, new materials for PV devices, energy storage and batteries for PV, development of power electronic interfaces for solar PV systems, and module characterization and reliability.



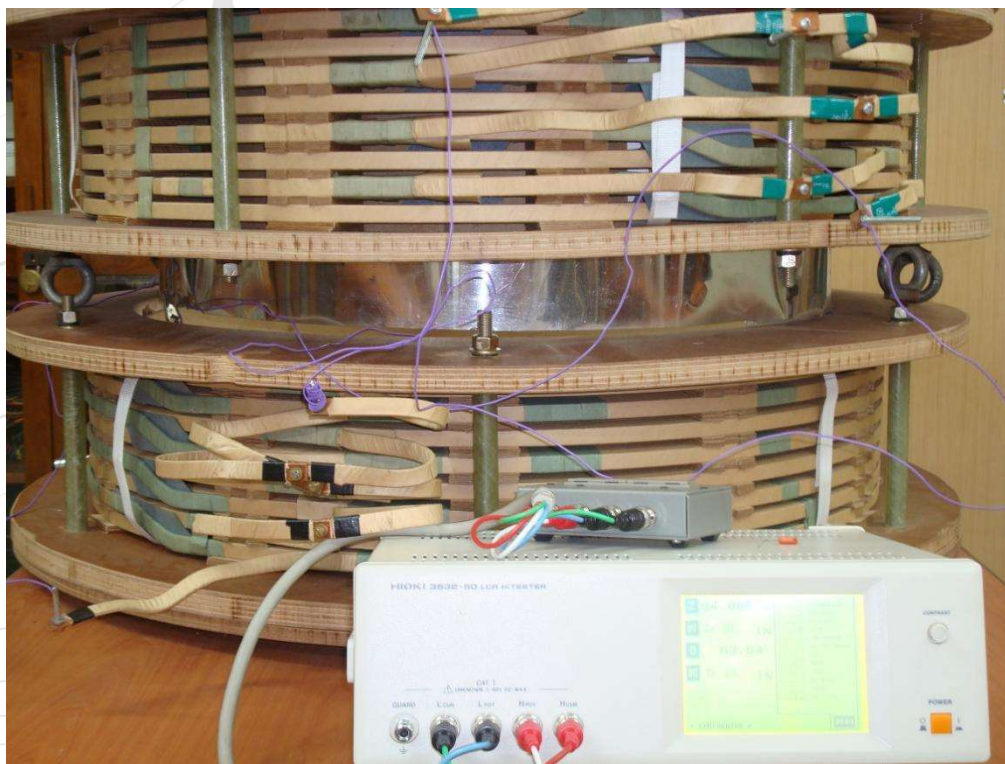
Si solar cell team displaying solar cells fabricated at NCPRE fabrication lab

30. Insulation Diagnostics Lab*(2nd Floor, EE Building)*

Professor In-charge - Prof. S. V. Kulkarni

Relevant Specializations - EE3

This laboratory has a 100 kV ac / 140 kV dc set up along with a partial discharge measurement setup. The academic activities include giving exposure to undergraduate and postgraduate students about various high voltage engineering aspects. Study of corona inception voltage for various electrode arrangements, and demonstration of frequencies radiated by corona are some of the experiments conducted as part of academic activities.

**31. Power Electronics Design Centre (PEDC)***(Ground Floor, EE Building)*

Professor In-charge - Prof. B. G. Fernandes

Relevant Specializations - EE3

The Power Electronics Research Lab has the equipment, instruments, and computational facilities for research in power electronics, machines and drives, renewable energy field (photo-voltaic and wind) and their power conditioning and interconnection with the grid, power Converter topologies for grid-connected and standalone PV and wind system, MPPT Schemes, Machine design, BLDC motor,

MultiLevel Inverter, DC Microgrid.

32. Electrical Machines Lab

(Ground Floor, EE Building)

Professor In-charge - Prof. B. G. Fernandes

Relevant Specializations - EE3

This undergraduate teaching laboratory has electric motor-generator sets, measuring instrumentation, and power electronic drives. Students are exposed to concepts of machine characteristics and control through lab experiments.

33. Stochastic Systems Lab

(4th Floor, GG Building)

Professor In-charge - Prof. Nikhil Karamchandani, Prof. Sharayu Moharir, Prof. J K Nair

Relevant Specializations - EE1, EE5

Description: In our lab, we focus on resource allocation for modern communication systems. Few are caching in distributed networks, Age of Information aware scheduling for IoT devices, and coded caching.

34. Advanced Integrated Circuits and Systems Lab (aiCAS Lab)

(1st Floor, EE Building)

Professor In-charge - Prof. Rajesh Zele

Relevant Specializations – EE1, EE5, EE6 (IC design, embedded system design, and MEMs-based sensors/circuit development)

Research at the aiCAS lab focuses on the areas of high-performance Analog, RF, Mixed-signal IC design, and Embedded Systems design. State-of-the-art hardware and software tools are used for developing integrated circuits using both RF-Analog and Digital design flow. The lab is equipped with measurement instruments required for the post-silicon validation of ICs. Integration of electronic components on PCB for verification and product (hardware-software) co-development is enabled with the help of dedicated staff.





6. Faculty members and their interests

EE1: Communication Engineering

Prof Abhay Karandikar

Control and Performance Modelling of Wireless Networks, Quality of Service and Resource Allocation in Wired/Wireless Networks, Next Generation Wireless Network Protocols (related to 802.16m, LTE-Advanced, and 4G Standards), Co-operative Relay and Self Organizing Network, Carrier Ethernet, and Mobile Backhaul, Rural Wireless Network.

Prof Amit Sethi

Computational pathology, Medical image analysis, Deep Learning, Machine learning, Computer vision, Image processing, Signal processing.

Prof Vikram M. Gadre

Communication and signal processing, with emphasis on multi-resolution and multi-rate signal processing, especially wavelets and filter banks: theory and applications.

Prof Preeti Rao

Speech and Audio Signal Processing, Music Information Retrieval

Prof Bikash Kumar Dey

Information Theory, Coding Theory, Wireless communication

Prof D. Manjunath

Distributed computation in sensor networks and distributed optimization for network resource provisioning.
Random geometric graph models for wireless networks and stochastic coverage processes.
Queueing system models for wireless networks.
Self-tuning mechanisms for optimal resource allocation in computer systems.
Internet: Pricing, Quality of Service, Traffic Engineering.
Traffic Measurement and Performance Monitoring.
Performance Modeling, Stochastic Processes, and Queueing Theory.
Optical Networks: Design and Algorithms for Traffic Engineering.
Packet Switches: QoS provisioning Architectures and Analysis.

Prof Gaurav S Kasbekar

Modeling, design and analysis of wireless networks, Network Security, Game-theoretic and economic aspects of spectrum allocation and Device-to-Device networks, Networking of Internet of Things (IoT) nodes, Design and implementation of wireless sensor networks, Interference management and resource allocation in cellular networks

Prof Jaykrishnan U Nair

Online learning, Uncertainty management in smart power grids, Communication networks, Network economics

Prof Kumar Appaiah

Signal processing for communication; Fiber Optics; Wireless Communication.

Prof Manoj Gopalkrishnan

Algorithms in nature; Information processing in networks; Reaction networks; Neural networks; Evolution; Game theory; Deep learning; Information geometry; Thermodynamics of information; Quantum Information.

Prof Nikhil Karamchandani

Networks, Communications, and Information Theory; Online/active learning including multi-armed bandits, sequential testing, etc.; Algorithms for edge computing / caching systems; Coding for communication/computation; Graphs - theory and algorithms

Prof Rajbabu Velmurugan

Signal processing: Statistical estimation, target tracking; Speech and audio processing: Speech enhancement, source separation; Image processing, video analysis, and computer vision applications; Joint audio-visual signal processing; Efficient hardware for signal processing: edge-computing

- [Prof Saravanan Vijayakumaran](#) Cryptocurrency and Blockchain Technologies, Cryptography, digital communication
- [Prof Sibi Raj B Pillai](#) Information Theory of Networks, Stochastic Modeling, and Resource Allocation, Wireless Communication, Signal Processing for Radar, Information Inheritance in Biological Systems, Error Correction Codes
- [Prof Sharayu Moharir](#) Modeling and the design of scalable resource allocation algorithms for large networks, including content delivery networks, communication networks, and social networks. Machine learning, specifically multi-arm bandit problems motivated by resource allocation problems.
- [Prof Prasanna Chaporkar](#) Resource Allocation and scheduling in wired/wireless networks, Optimization and control of stochastic systems, Distributed systems and algorithms.
- [Prof Subhasis Chaudhuri](#) Image Processing, Machine Learning, Pattern Recognition, Haptics
- [Prof Satish Mulleti](#) Sampling theory, Sub-Nyquist sampling, Finite rate of innovation signals, Compressive sensing, spectral estimation, application of signal processing techniques for biomedical imaging, blind deconvolution, and calibration, sparse arrays, radar signal processing, machine learning.
- [Prof Shabbir Merchant](#) Signal Processing, Image Processing, Wireless Communication, IoT, Machine Learning
- EE2: Control and Computing**
- [Prof Debraj Chakraborty](#) Optimal Control, Linear Systems, Optimization, Differential Games, Game Theory
- [Prof Dwaipayan Mukherjee](#) Multi-agent Systems, Consensus, Formation Control, Control Theory, and Robust Control
- [Prof Debasattam Pal](#) Distributed parameter systems, algebraic analysis, optimal control.
- [Prof Harish K. Pillai](#) Control theory, Systems theory, Multidimensional systems, Numerical and computational methods, Coding theory, Optimization techniques, Electromagnetics

Prof Madhu N. Belur

Control theory, dissipative systems, graph theoretic methods, decentralized control, behavioral theory control, Fault diagnosis

Prof Shrikrishna V. Kulkarni

Transformers: Design, Analysis and Diagnostics, Electromagnetic and Coupled Field Computations, Power Engineering: Distributed Generation, High Voltage Engineering: Insulation Design/Diagnostics

Prof Vivek Shripad Borkar

Emeritus

Prof Virendra R. Sule

Cryptology: Block and Stream Ciphers, Public Key Algorithms, Boolean Cryptanalysis, Nonlinear Finite State Systems, Feedback Control.

Prof Debanjan Bhowmik

Nanomagnetism and Spintronics, Neuromorphic Computing, Quantum Machine Learning

EE3: Power Electronics and Power Systems**Prof Anil Kulkarni**

Power System Dynamics and Control, Application of Power Electronics to Power Systems, Renewable Energy Systems, Wide Area Measurement Systems

Prof Anshuman Shukla

Multilevel converters and Modulation and control of power electronic converters, Power electronics applications in power systems (FACTS, HVDC, custom power devices, etc.), Renewable Energies and Energy storage, Control of electric drives, Hybrid and solid-state circuit breakers and current limiters

Prof Anupama Kowli

Power System Planning, Operations and Control, Electricity Markets and Economics of Electric Power Grids, Demand-side Management, Demand Response and Flexible Loads, Smart Grids, and its Enabling Technologies and Mechanisms, Policy and Regulation for Electric Power Grids.

Prof Baylon G. Fernandes

Inverter topologies for VAR compensation, Power electronic interface for non-conventional energy sources, Permanent magnet machines for wind power generation, Switched reluctance machines for electric vehicle application.

Prof Himanshu J. Bahirat

Renewable Energy Sources, Grid Integration of Renewable Energy, Offshore Wind Energy, Transients in Power Systems, DC Power Systems, DC Wind Farms, Multi-terminal DC Networks, Circuit Breakers, Power Electronics

Prof Kishore Chatterjee

Utility friendly converter topologies, Power factor correction techniques, STATCOM, Switched-mode rectifiers, Electronic ballast Power evacuation from solar photovoltaic systems, BLDC motors, Microgrids, Chargers for Electric Vehicles

Prof Mukul C. Chandorkar

Power Electronics, System Emulation, Static Compensation, Motor Drives

Prof Shiladri Chakraborty

Power Electronics for Renewable Energy and Transportation Electrification, High-Frequency-Isolated Converters, Multi-Physics and Multi-Objective Converter Design

Prof Shreevardhan A. Soman

Power system analysis, computation, and economics, Power system Protection

Prof Shrikrishna V. Kulkarni

Transformers: Design, Analysis and Diagnostics, Electromagnetic and Coupled Field Computations, Power Engineering: Distributed Generation and Smart Grids, High Voltage Engineering: Insulation Design/Diagnostics

Prof Vivek Agrawal

Power conversion: New converter topologies, High-frequency link power conversion, ZCS-ZVS configurations, Switched Capacitor DCDC converters, Power quality issues: Power factor correction techniques, Static VAR compensation, Active filters

EE5: Electronic Systems**Prof Joseph John**

Analog and Digital Circuits, Optical Fiber Communications, Indoor Optical Wireless Systems, Modern Electronic Systems and Instrumentation.

Prof Laxmeesha Somappa

Analog, Digital & Mixed-Signal IC Design, Biomedical Circuits & Systems, Neuromodulation System on Chips, Finite rate of Innovation & Sub-Nyquist Sampling, Compressed Sensing, Sensor Interface Circuits & Sensor networks

Prof Prem C Pandey

Speech and Signal Processing, Biomedical Signal Processing and Instrumentation, Electronic Instrumentation, Embedded Electronic System Design

Prof Sandip Mondal

The physics and technology of semiconductor devices, Neuromorphic Engineering for Artificial Intelligence, Materials &

devices for brain-inspired computing, Flexible electronics using cost-effective solution-processed semiconductor and dielectrics, Integrated circuits, and system design with emerging CMOS devices, Quantum Technologies with Quantum Dots (QDs) and Nanoparticles (NPs) based devices

Prof Siddhartha P. Duttagupta

Microelectronics, Micro/Nano Sensor Technology Optimization and Application, Sensor Integrated Electronic Circuits and Systems Design

Prof Siddharth Tallur

Embedded Systems and Sensors, Digital Systems and Signal Processing, Photonics and Frequency Control, Microsystems and MEMS, Ongoing projects: GaN HEMT based biosensors, electrochemical sensors for water quality monitoring, acoustic and electromagnetic techniques for corrosion monitoring, elastomer vibration sensor systems for machine health monitoring

Prof Sachin Patkar

Combinatorial optimization: Matroid Theory, Submodular Functions, Linear/Integer programming, Network Flows. High-Performance Computing: FPGA-based accelerated computing, GPU-based acceleration, High-Performance Circuit Simulation, Algorithms Design and Analysis, Graph Theory, Geometric Design and Graphics, Software/Hardware Development Projects

EE6: Integrated Circuit and Systems

Prof Madhav P. Desai

VLSI Circuits and Systems, VLSI design and design automation, Graph theory and combinatorics

Prof Maryam Shojaei Baghini

Circuit & system design and integration for intelligent sensing, processing, and problem-solving, Analog/Mixed-signal VLSI design (AI/ML domain circuits and systems, LV, LP and LE for healthcare, bio-inspired circuits and systems, I/O, highly-precise circuits & systems, instrumentation, energy harvesting, and more applications)
3. MEMS/NEMS and Technologies for Sensing, Integrated circuits and system design with emerging devices, Energy harvesting, and power management circuits & systems, RF integrated circuit design for various applications, High-speed data transmission and interconnects, Analog aspects of digital circuits, VLSI design, and embedded system

Prof Jayanta Mukherjee

RF VLSI Design, Antenna Design, Biomedical IC Design, Testing and Characterization, Analog VLSI, Digital VLSI, Noise Modeling

Prof Rajesh H. Zele

RF, Analog, Mixed-Signal Integrated Circuits/System-on-Chip (SOC) design, Wireless Sensor Networks for IoT applications, High-performance ADC and DAC design, Circuits and Systems for Machine Learning.

Prof Shalabh Gupta

High-speed CMOS analog/RF/mm-wave integrated circuits and systems, Optical fiber communication systems, Microwave photonics / ultrafast data conversion using photonics, Beamforming antenna systems, Signal processing for these systems

Prof Virendra Singh

Computer Architecture Processor architecture and microarchitecture, VLSI Testing, Fault-tolerant computing, Robust design and architectures, Self-healing system design, SoC/NoC design and test, Post Silicon Debug, High-level synthesis, Formal verification

Prof Deepak Jain

Specialty Optical Fibers and waveguides, Modelling, Fabrications and applications, Light Sources, lasers, supercontinuum sources, and single-photon sources, Compound Semiconductors, Semiconductor Photonics, Photonics Integrated Circuits

EE7: Solid State Devices**Prof Anil Kottantharayil**

CMOS device physics, design, and modeling, Materials for advanced CMOS devices, CMOS device physics, design and modeling, Materials for advanced CMOS devices, and Electrical characterization.

Prof Apurba Laha

III-Nitride semiconductors and heterostructures: Growth using Molecular Beam Epitaxy, III-Nitride Nanowires: Growth and Devices, Optoelectronics devices such as Green Laser Diode, UV LED for water purification, and medical application, Oxide-based electronics: Epitaxial rare earth oxides (high-K dielectrics) on III-Nitride substrates for MOSHEMT application, Physics of nanostructure growth, Solid-phase epitaxy of semiconductor and oxide materials, Encapsulated solid phase epitaxy, Molecular Beam epitaxy, Mismatch epitaxy.

Prof Bhaskaran Muralidharan

Computational nanoelectronics, spintronics, nanoscale energy conversion. <http://www.ee.iitb.ac.in/bmwebpage>

Prof Kasturi Saha

Nanophotonics, Quantum optics, Magnetometry, Colour centers in

diamond

Prof Mahesh B. Patil

Circuit simulation, particle swarm optimization, and applications, real-time simulation, use of circuit simulation in pedagogy

Prof Narendra S Shiradkar

Reliability of solar cells, modules and systems, PV Performance Monitoring, Design for reliability, Techniques for PV Power Plant Inspection and Monitoring, Power Electronic Device reliability.

Prof Pradeep R. Nair

Nanoscale devices for energy and healthcare applications., Semiconductor device physics and reliability., Micro-Electro-Mechanical Systems (MEMS).

Prof Saurabh Lodha

CMOS process integration and device physics, Materials and processes for advanced CMOS devices, Metal-semiconductor interfaces.

Prof Souvik Mahapatra

Electrical characterization, modeling, and simulation of micro/nanoelectronic devices, NBTI/PBTI and Hot carrier degradation in MOSFETs, High-k gate dielectrics, Advanced CMOS device reliability, Flash EEPROMs - Floating gate, SONOS/SANOS & Metal Nanoparticles, Reliability of CMOS Logic and NAND Flash Memory Devices, Device to Circuit framework for reliability

Prof Dipankar Saha

Microelectronics New Device Physics Semiconductor Spintronics Spin injection, transport, and detection in III-V systems Device Reliability, Device Physics, Semiconductor Heterostructures, LED and lasers, RF transistors, Transport in reduced dimension system, Femtosecond spectroscopy

Prof Swaroop Ganguly

Physics and technology of nanoscale devices, Spin-based devices and circuits, Energy-conversion devices

Prof Subhananda Chakrabarti

III-V Compound semiconductor materials growth and characterization, Optoelectronic Devices of interest include quantum dot photodetectors and Solar cells, III-V device integration on germanium, II-VI (ZnO and ZnMgO) materials and devices

Prof Udayan Ganguly

Memory materials, technology and device (e.g. Flash, Resistance RAM, Ferroelectric RAM, etc.) for standard memory and neuromorphic/AI applications, Silicon-based advanced computing devices technology, physics and modeling (e.g. FinFET, SOI FET, etc.) for standard logic and neuromorphic/AI applications, Neuromorphic

/ AI computing - algorithms, circuits based on novel devices for neurons and synapses.

[Prof Ashwin A. Tulapurkar](#)

Spintronics, Physics of nano-devices, Spin-current induced magnetization switching, RF properties of spintronic devices, Noise, Thermoelectric effects





7. SWC, Gender Cell, and SC/ST Cell

Student Wellness Centre (SWC) is an integral part of the IITB campus. After securing admission at the Institute and starting your stay here, you may feel that a lot of parameters around you are different. There are a few issues that almost everyone in the Institute faces initially like academic concerns, social (family and peer) pressure, etc., leading to feelings of loneliness, low confidence, anxiety, stress, anger, and sadness, to name a few. So, if you ever feel the need we are always here for you. You can find all the contact information on **SWC** [here](#).

IITB Gender Cell (GC), previously known as women's cell, has been in existence since 2002. In recognition of the Institute's belief that its employees and students have a right to be treated with dignity and respect, the Cell works proactively towards developing a safe and secure environment for employees and to ensure that all students may gain their education without fear of prejudice, gender bias, hostility or sexual harassment. The IITB GC inquires into complaints of sexual harassment through its Internal Complaints Committee (GC-ICC). The GC and GC-ICC strive to work towards an egalitarian environment where men and women are afforded equitable treatment and equality of opportunity conducive to their professional growth. You can find all the contact information on **GC** [here](#).

SC/ST student's cell addresses academic and non-academic issues and complaints received from students in reserved categories. The institute strives to maintain an environment where all communities can participate in academic and research activities without any sort of discrimination concerning caste or creed. To maintain such an atmosphere, the SC/ST students cell is responsible for sensitizing the campus community about the importance of having diversity. The cell aims to ensure that anti-discrimination laws in the context of race/caste/creed are followed in letter and spirit. [SC/ST Cell](#)



8. EE PLACEMENTS

Some of our major recruiters:

Qualcomm

TEXAS
INSTRUMENTS

Google

Micron®

MEDIATEK

ENPHASE.

SAMSUNG

intel®

SONY

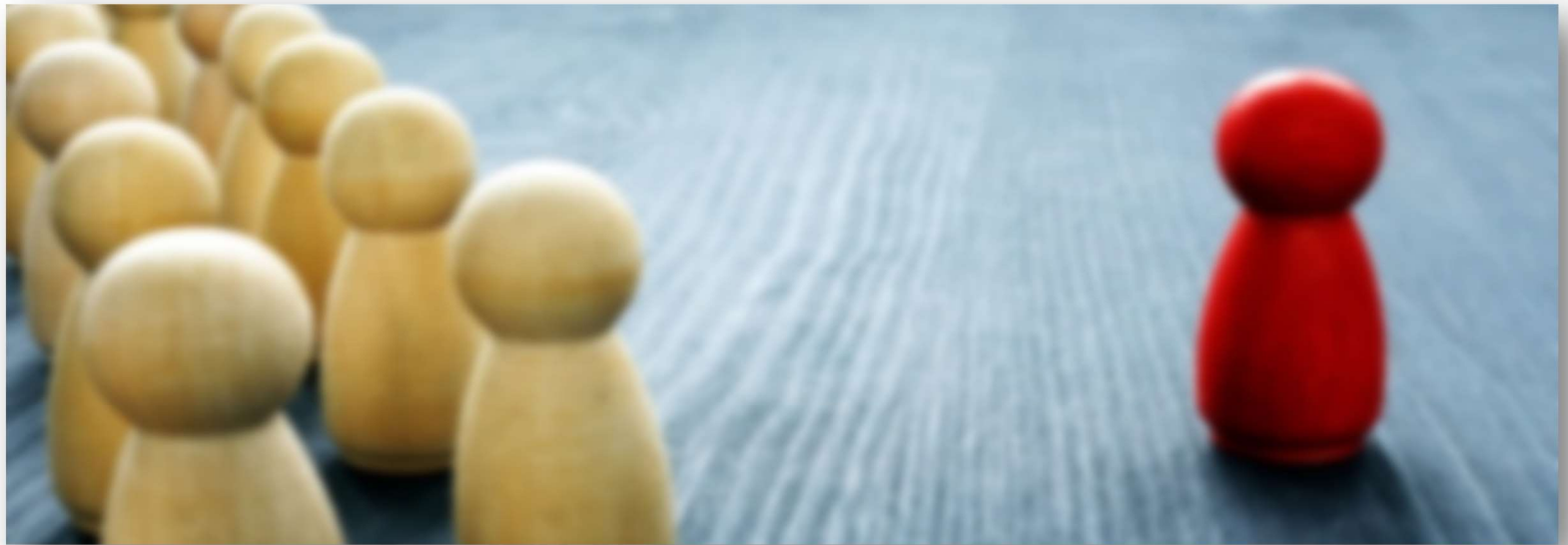
apple

tsmc

MathWorks

Selected students

Shivali Bhatnagar	shivalibhtnagar001@gmail.com	Samsung Research Institute Bangalore	EE1
Priyanka Bansal	bpriyanka994@gmail.com	NXP Semiconductors	EE1
Anurag Dixit	203070019@iitb.ac.in	Bajaj Auto	EE2
Siddhesh	203070023@iitb.ac.in	Kotak	EE2
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Renuka	rinkeedewangan25@gmail.com	Intel	EE3
Harsh paryani	hparyani23@gmail.com	Texas instruments	EE5
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Varshit Areti	varshitareti@gmail.com	Texas Instruments	EE6
Anant Kumar	anantkmr859@gmail.com	Samsung Semiconductors	EE6
Voma Anvesh	vomaanvesh99@gmail.com	Google Hardware	EE6
Vattigunta Satish Reddy	satishreddyvattigunta@gmail.com	Texas instruments	EE7
Korlakota Suneel Kumar	suneelkumar.k2020@gmail.com	Intel	EE7



9. Department Representatives

EE Student Association:

Posts relevant to a fresher MTech Student are mentioned here.

For more information about EESA visit the [EESA website](#)

Council and PGAC Members



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 Representative for Academic
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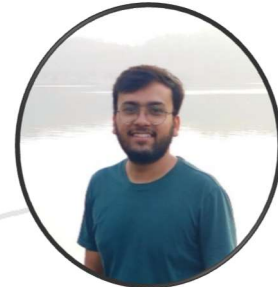
Department Placement Coordinators



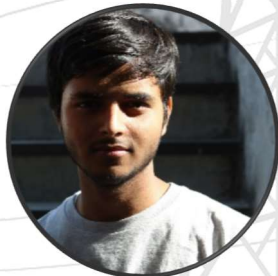
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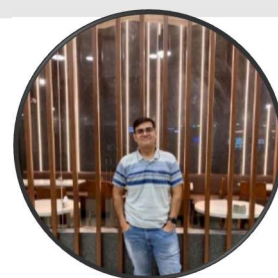
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*Welcome to IIT
Bombay!*

10. Important Links and Downloads



Following are the links you should check out:

1. Dept. website: <https://www.ee.iitb.ac.in/web>
2. ISCP website: <https://gymkhana.iitb.ac.in/~scp/scp/index.html>
3. Computer Center: <https://www.cc.iitb.ac.in/>
4. Clubs at IITB: <http://www.iitb.ac.in/en/activities/student-clubs>
5. Cultural IITB: <https://cultural-iitb.org/>
6. Sports IITB: <https://gymkhana.iitb.ac.in/~sports/>
7. SWC IITB: <https://www.iitb.ac.in/swc/en>
8. Gender Cell: <https://gendercell.iitb.ac.in/index.php>
9. Emergency Contact Number: <https://www.iitb.ac.in/safety/en/emergency-contact-number>
10. EE Office mail: eeoffice@ee.iitb.ac.in
11. PC Lab: admin@ee.iitb.ac.in sysad@ee.iitb.ac.in
12. Education Loan: <http://www.iitb.ac.in/newacadhome/sbiindex.jsp>

Survival Tools:

1. MYBYK Application

IITB has a relatively large campus. Having a bicycle will reduce time and effort. Whether you want to ride a cycle to the hostel or use it to commute within your campus, whenever you need a bicycle.

Check for the available cycle at the nearest mybyk point in the app. Just unlock using this app and commute within the campus and pedal your way to a healthy life. Also, you can rent any cycle from any mybyk point and finish your ride at any mybyk point.

Download Link: <https://play.google.com/store/apps/details?id=in.greenpedia.mybyk>

2. Insti App

It is a single platform of IITB, where you can get almost all the information. An app of the insti, for the insti, and by the insti, connect all the aspects of one's insti life, weaving around hostels, academics, co-curricular activities, and recreation. It helps you navigate through the IIT Bombay Campus, get you information about Ongoing and upcoming events, Different clubs in the institute, everything about the Placement Cell (Companies, Job profiles, last year's placement records, etc.) many more. One can also register any complaint regarding any issue and can give suggestions.

Download Link: https://play.google.com/store/apps/details?id=app.insti&hl=en_IN

3. Institute map

InstiMap is a searchable map of the campus, specially designed for first-time visitors and new entrants to find their way around IIT Bombay with ease. It is available on instiApp - an Android App that helps you navigate the various events on IIT Bombay Campus.

It is available at: <https://insti.app/map>

4. m-Indicator

This app contains the Local Train Timings of Mumbai and also details the local train routes for IIT Bombay. One can also find the various bus routes and the bus numbers on this app.

Download Link:

<https://play.google.com/store/apps/details?id=com.mobond.mindicator>

5. SHIRU CAFÉ

Order your free drink in the app. Launch the app and tap the drink you would like to order.

Download

Download Link:

<https://play.google.com/store/apps/details?id=jp.co.enrission.shirucafe>

6. OpenVPN

OpenVPN is the official VPN application for Android developed by OpenVPN, Inc. It is an open-source VPN convention permitting secure online access from highlight points totally for nothing. OpenVPN has explicitly accumulated a ton of consideration, somewhat because of its open-source nature; however, generally, it's free. With OpenVPN, you can create a virtual network that securely connects computers over existing networks by encrypting all of the data in transit. This encryption ensures that you can use an OpenVPN tunnel over the public internet, and no one can intercept the data in the tunnel. IITB internal sites can be accessed and connected using this VPN. It helps you use the online services of IITB remotely. It includes using heavy software like MatLab, Cadence, etc. and also helps in downloading or accessing research papers that are not accessible from outside campus.

Download Link:

https://play.google.com/store/apps/details?id=net.openvpn.openvpn&hl=en_IN

7. SAFE APP

SAFE (Smart Authenticated Fast Exams) is a utility provided by IITB for conducting exams, quizzes, and tests in online mode in a secure, cheating-less, and hassle-free manner. It helps the course instructor to evaluate the marks of exams conducted via a paperless method. It can be downloaded from the google play store (not available on the App store). It is also used for marking attendance.

Features:

- a) Attendance Marking
- b) Subjective and Objective Exams
- c) Paper-free services for instructor

Process of SAFE:

- 1) Instructor creates course room on SAFE
- 2) Instructor uploads exam on the SAFE server
- 3) Students download the exam paper
- 4) Instructor provides Login Code
- 5) Exam starts on time, and in case of Internet connection disruption at the time of submitting, the exam gets submitted locally.
- 6) After an internet connection establishes, the exam gets submitted and can be evaluated by the professor.

Download Link:

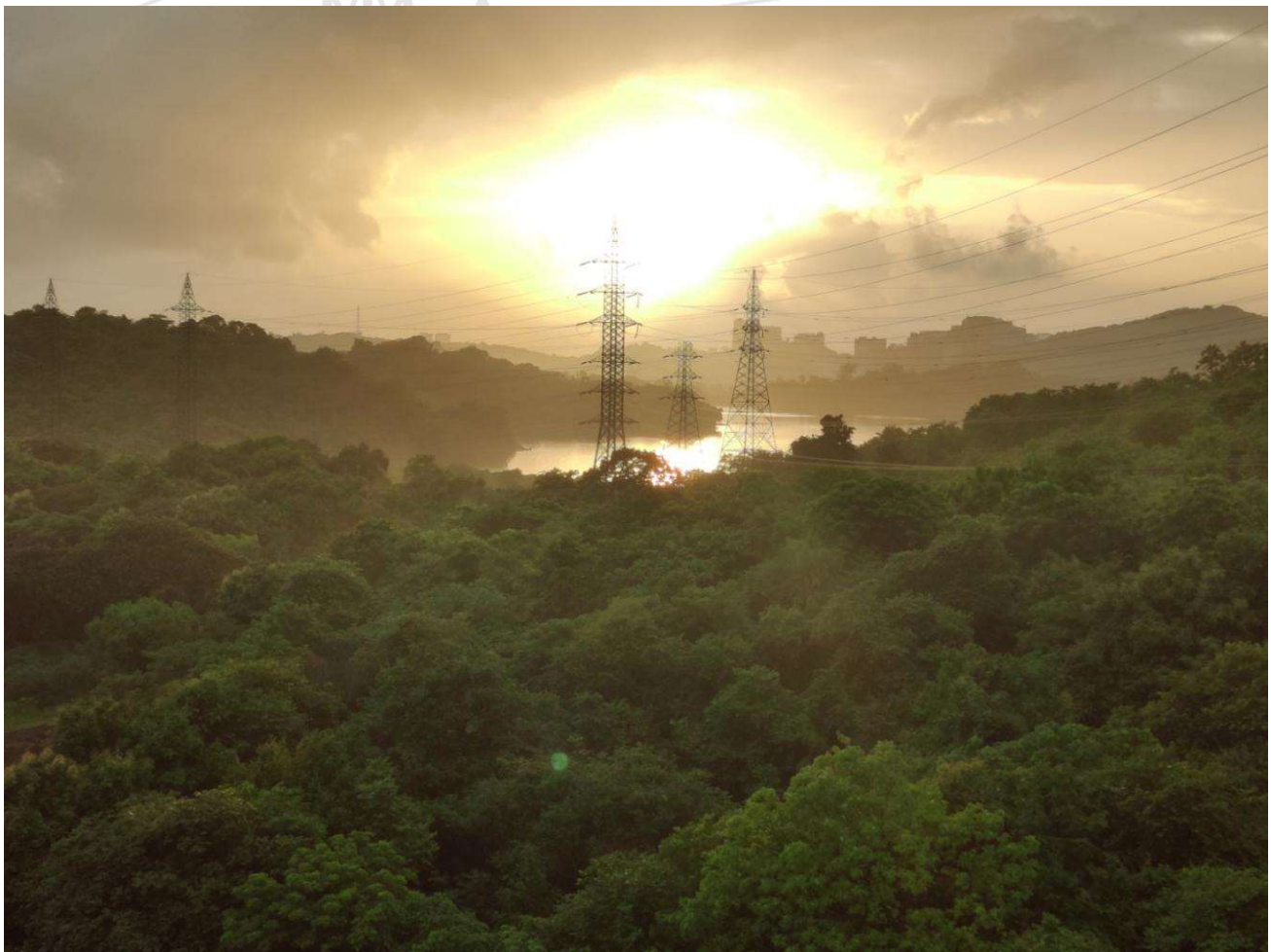
https://play.google.com/store/apps/details?id=com.iitb.cse.arkenstone.safe_v2&hl=en_IN&gl=US

8. Moodle

"MOODLE" stands for "Modular Object-Oriented Dynamic Learning Environment." MOODLE is a learning platform designed to provide educators, administrators, and learners with a single robust, secure, and integrated system to create personalized learning environments and experiences. Thousands of educational institutes use it to provide an organized interface for E-learning. MOODLE is a free web-based open-source course management system (CMS). MOODLE allows you to create web pages with information about a particular course and share resources between teachers and students. The MOODLE system encourages collaborative learning, providing functionality that makes it easy for a student to collaborate.

It is a platform that acts as a medium between students and course instructors where the instructor provides the study material, lecture pdf, etc. It is used for conducting online quizzes, both subjective and objective. The instructor also uses it for accepting submissions of assignments, mid-sem, and end-sem exams, where the submission can be of .pdf, .zip, .rar, .mp4, .mp3 forms, or any other that the course instructor wants.

It is available at: <https://moodle.iitb.ac.in>



Sameer Hill IITB

11. Insti Map



Our CAMPUS !

