Department of Electrical Engineering
Indian Institute of Technology Kanpur

MS(R) Admission
2024-25 Semester-I

Specializations
- Microelectronics and VLSI (MVLSI)
- Power Engineering (PE)
- RF and Microwaves (RF)
- Signal Processing, Communication and Networks (SPCOM)
- Control and Automation (CA)
- Photonics (PH)

Who can apply?
- Bachelor's degree in engineering or science (4 year program) in relevant discipline
- A valid GATE score for regular candidates (non-sponsored/non-project candidates)
  OR
- Graduates from IITs with a minimum 6.5 CPI and a minimum CPI of 8.0 in the last 2 years of BTech

Highlights
- Institute assistantship up to INR 12,400 per month
- Financial support for national and international conferences
- Prospects of working with top international universities/exchange programs
- Opportunities to work on cutting edge technologies, interdisciplinary areas, and relevant sponsored/consultancy projects
- Placement opportunities from leading multi-national industries
- Possibility to convert MS(R) to PhD programme

Important Dates
Application submission:
Mar 22, 2024 - Apr 11, 2024
Dates of interview/written test:
May 8, 2024 (hybrid-mode)

Important Links
Information and dates related to admission and interview are here
https://www.iitk.ac.in/ee/admissions

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Semiconductor design and manufacturing are complex and globalized processes, with VLSI & Embedded Design engineers working around the clock to bring new products to market. VLSI stands as a remarkable testament to human ingenuity and its profound impact in our daily lives.

One of the major factors leading to the remarkable development in the VLSI sector is the establishment of higher education institutions imparting knowledge across the country’s different states. Investing in education will significantly pay off in the future.

The department has state-of-the-art research labs and support facilities in Microelectronics and VLSI. The faculty’s research covers a wide spectrum, from fundamental studies to sponsored and consultancy projects, encompassing from circuit to device level, fostering interdisciplinary collaboration. Our research students are in high demand from top employers, who are eager to hire them for their skills and knowledge.
ABOUT US

The EE department at IIT Kanpur is among the institution’s original five departments established in 1960. The main aim of the Power Engineering group is to develop cutting-edge technology to achieve net zero carbon emissions to improve grid stability and resiliency in the presence of renewables. The research focus is also to develop techniques to foster e-mobility deployment. The research work also focuses on the development of new materials for insulation with advancements in technologies.

Awards

Our distinguished faculties have been awarded the POSOCO Power System Award, Young Engineer Award, IEEE fellowship, INAE fellowships, and INAE outstanding award and directorship of reputed institutes, and our students have been awarded a prestigious PMRF fellowship.

Alumnus

Alumnus from the power engineering group have secured PhD & PDF in reputed institutes such as Imperial College London, Iowa State University, etc., around the globe, they have secured jobs in MNCs such as GE, MathWorks, Intel, etc., and many have been placed in reputed IITs and other reputed institutes around the globe as an assistant professor.

PUBLICATIONS

In the past 5 years, more than 150 papers from various faculties and their research students were published in reputed journals.

PROJECTS

More than 30 fully funded projects are ongoing in departments in various streams. More information about these projects can be found on the Electrical Engineering Department IIT Kanpur website.
RF and Microwave Group at Department of Electrical Engineering, IIT Kanpur uniquely offers academic training and research expertise in RF and Microwave domain ranging from passive to active microwave circuits. Major group objectives include encouraging scientific exchanges amongst academia and industry within the field of RF and Microwave, providing research support, consultation for industry and other government organizations.

Research Labs
- Microwave Circuits Lab
- Microwave Imaging and Material Testing (MIMT) Lab
- Antenna Lab
- RFID Lab
- Microwave Metamaterial Lab
- mmWave Research Lab

Facilities and Resources
- Vector Network Analyzer
- Handheld VNA
- Signal Analyzer
- Spectrum Analyzer
- Analog Signal Generator
- Noise Figure Analyzer
- RF Amplifier
- Digital oscilloscope
- RF Dielectric Testing Facility
- Measurement of Dielectric Properties
- Microwave Imaging
- Non-destructive Testing
- Anechoic Chamber
- Antenna Measurement Facility
- EMI/EMC Test Facility
- PCB Fabrication Facility

Faculty Members
- Prof. Animesh Biswas
- Prof. A. R. Harish
- Prof. M. Jaleel Akhtar
- Prof. Kumar Vaibhav Srivastava
- Prof. Raghvendra Kumar Chaudhary
- Prof. Nagaditya Poluri

https://www.iitk.ac.in/ee/rf-and-microwaves
Signal Processing and Communications Group (SPCOM)
Department of Electrical Engineering,
IIT Kanpur

SPCOM Faculty

- Aditya K Jagannatham PhD (University of California San Diego)
  - 6G/ 5G Technologies: OTFS, IRS, THz, V2C, Massive MIMO, mMIMO, NOMA, Machine Learning, Deep Learning

- Abhishek K Gupta PhD (University of Texas at Austin)
  - 6G and Beyond Wireless, Vehicular Networks, THz and Molecular Communication, Machine learning for Wireless, Quantum Communications

- Roht Budhiraj PhD (Indian Institute of Technology Madras)
  - Design of 5G+/6G Cellular Systems and Technologies - hardware and algorithms, Machine Learning For Wireless Communications

- Ketan Rajawat PhD (University of Minnesota)
  - Optimization Algorithms, Trajectory Optimization of UAVs, Computational Cardiology

- Yatindra PhD (Indian Institute of Technology Madras)
  - Peer to Peer networks, Optical Networks and switching, Digital Switching Systems, Distributed software systems

- Vipul Arora PhD (Indian Institute of Technology Kanpur)
  - Machine Learning for Audio Processing, speech recognition, music information retrieval, generative AI

- Abhishek K Chaturvedi PhD (Indian Institute of Technology Kanpur)
  - Wireless Communications, massive MIMO, 5G and beyond systems

- Subrahmanya Swamy Peraru PhD (Indian Institute of Technology Madras)
  - Wireless Networks, Machine Learning, Probabilistic Graphical Models

- Nishchal Verma PhD (Indian Institute of Technology Delhi)
  - Intelligent Data Mining Algorithms/Applications, Health Monitoring, Intelligent Fault Diagnosis Systems, ML Algorithms, Computer Vision, Bioinformatics, ML Interface, UAV

- Subrahmanya PhD (University of Notre Dame, USA)
  - Error Control Coding, Machine Learning for Wireless Communications, Molecular Communications, Sequence Design, Therahertz Communications, Multiple Access for 5G and Beyond, D2M

- K Vasudevan PhD (Indian Institute of Technology Madras)
  - Digital communications Coherent & non-coherent receivers, Synchronization, Channel estimation, Diversity techniques

- Rajesh M. Hegde PhD (Indian Institute of Technology Madras)
  - Sensor Array/Multi Channel Signal processing, Microphone array signal processing/Beamforming, Speech and Audio Coding and Recognition, Federated Learning for Edge and Fog Networks

- Nikunj A Bhangat PhD (University of Houston)
  - Neural & Bio-signal processing, Medical Instrumentation, Brain-machine interfaces, Functional Electrical Stimulation, and Healthcare Informatics.

- Naren Nish PhD (IIT Bangalore)
  - Tomographic imaging/tracking algorithms, Dynamic, shape and multimodal tomography, Functional biomedical imaging, satellite based remote sensing, Battlefield surveillance.

- Washim Uddin Mondal PhD (Indian Institute of Technology Kharagpur)
  - Reinforcement Learning (Sample Complexity, Algorithm Design), Game Theory (No-Regret Nash Equilibria, Multi-Agent Learning, Data-driven Resource Allocation and Scheduling in Wireless (5G/6G) and Optical Networks

- Tushar Sandhan PhD. (Seoul National University, South Korea)
  - Computer vision, Machine learning, Robotics, Biomedical Signal processing radar, Wi-Fi optical, EM-mm waves

- Koteeswar Rao Jerrypothula PhD (Nanyang Technological University (NTU), Singapore)

Research Projects at Glance

- D2M: Direct to Mobile for Next Generation Broadcasting
- Analysis of Tera-hertz networks in presence of scatterers and blockages
- Semantic communications for cyber-physical systems
- Transceiver design of 6G systems,
- OTFS Radar, Joint Radar Communication, Integrated Sensing and Communication
- Research and Development of Wireless Technologies for 5G+/6G Cellular system
- Next Generation Wireless Research and Standardization on 5G and Beyond
- Navigation Systems for air, land, sea and subsea vehicles;
- Ballistic Computation Systems for firearms
- Realizing Large-Scale Swarms, Trajectory Optimization Algorithms for Onboard Processing, Path planning for UAVs and ground vehicle
- Federated Learning in Computer Vision

- Development of Fuzzy Rule based Gaussian Regression Model for Generating Future Images
- Underwater computer vision
- Application projects in space, nuclear and defense sectors.
- Visual human interfaces
- Functional biomedical imaging with fluorescence optical and photoacoustic tomography,
- Satellite based remote sensing of the atmosphere
- Biomedical image processing, AI in agriculture
- Cardiac digital twin
- Studying cognitive similarity of music using deep embeddings and behavioral studies with applications in music search and pedagogy
- Applications of graph neural networks for combinatorial problems in communication networks
- Brihaspati4: Peer to Peer networks-based systems
- Complex-valued Neural Networks for Computer Vision

Website: https://iitk.ac.in/ee/signal-processing-communications-n-ws
Dr. Ramprasad. Potluri
Research Interests: Practical applications of control theory, multi-motor coordination, electric vehicles (EVs), energy efficient low-pollution EVs.
https://home.iitk.ac.in/~potluri/

Dr. Abhilash Patel
Research Interests: Dynamics and control of nonlinear systems, systems and synthetic biology, robust control theory, wide-area control.
https://home.iitk.ac.in/~apatel/

Dr. Nishchal K. Verma
Research Interests: Intelligent algorithms, machine learning, computer vision, smart grid, intelligent agents, brain computer interface and fuzzy controllers.
https://www.iitk.ac.in/idea/

Dr. Tushar Sandhan
Research Interests: Signal processing, computer vision, reinforcement learning, machine learning, robotics, communication systems.
https://home.iitk.ac.in/~sandhan

Dr. Twinkle Tripathy
Research Interests: Guidance and control of autonomous vehicles, robotics and study of opinion dynamics in social networks.
https://sites.google.com/view/twinkletripathy/home

Dr. Laxmidhar Behera
Research Interests: Intelligent control, quantum learning system, cognitive modelling, cognitive robotics, physics of complex systems, brain-computer interface.
https://home.iitk.ac.in/~lbehera/

Dr. Abhilash Patel
Research Interests: Dynamics and control of nonlinear systems, systems and synthetic biology, robust control theory, wide-area control.
https://home.iitk.ac.in/~apatel/

Dr. Soumya Ranjan Sahoo
Research Interests: Analysis of nonlinear systems and control, cooperative control and application to robots and microgrids.
https://home.iitk.ac.in/~srsahoo

Dr. Tushar Sandhan
Research Interests: Signal processing, computer vision, reinforcement learning, machine learning, robotics, communication systems.
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Dr. Twinkle Tripathy
Research Interests: Guidance and control of autonomous vehicles, robotics and study of opinion dynamics in social networks.
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Light plays a critical role in our lives and the recent advances in photonics have enabled several revolutionary technologies. Fast internet, high resolution displays and cameras in our smartphones, virtual reality glasses, biomedical diagnostic tools, sensors, secure quantum communication, quantum computers, and the list goes on. The photonics group in the department of Electrical Engineering at IIT Kanpur has been pushing the frontier of photonic research and education with excellent state of the art facilities as well as industrial and academic collaborators across the globe.

**FACULTY**
- PROF. G RAJSHEKHAR
- PROF. SHILPI GUPTA
- PROF. PRADEEP KUMAR K
- PROF. NAREN NAIK
- PROF. Y N SINGH
- PROF. RITURAJ
- PROF. DEBDATTA RAY

**RESEARCH AREAS**
- BIOMEDICAL OPTICS
- FIBER-OPTIC COMMUNICATION
- NANOPHOTONICS
- QUANTUM CRYPTOGRAPHY
- OPTICAL NETWORKING AND SWITCHING SYSTEMS
- SILICON PHOTONICS
- REMOTE SENSING AND BATTLEFIELD SURVEILLANCE

**COLLABORATIONS**
- CNRS
- Indian Space Research Organization (ISRO)
- Defense Research and Development Organization (DRDO)
- Indian Institute of Technology Kanpur (IITK)
- Defense Communication Agency (DCA)

[Link to Photonics Program](https://iitk.ac.in/ee/photonics)