Department of
Electrical Engineering

Indian Institute of Technology Kanpur

About EE

- Indian Institute of Technology Kanpur
- Widely recognized to be a pioneer in Electrical Engineering education in India
- It offers B. Tech, M. Tech, MS by research, dual-degree i.e. B. Tech. + M. Tech., and PhD programs
- A total of 42 highly qualified faculty who are among the best in the world in their areas of interest
- Around 250 students, selected through examinations like GATE,JEE will be passing out this year

The research interests of the faculty members encompass a wide gamut of sub-disciplines of Electrical Engineering. Collaboration with faculty members from other disciplines, both within and outside the institute, is encouraged. The research activity of the department includes fundamental research, sponsored and consultancy projects, and is carried out with active participation of the students, faculty, staff and research engineers.

"The largest multidisciplinary department"

Infrastructure - Labs & Facilities

- Power Engineering Facilities:
  - High Voltage Laboratory
  - NaMPET Laboratory
  - Networked Control Systems Laboratory
  - Power Management Laboratory
  - Power System Simulation and Research Laboratory
  - Static Controller Laboratory
  - Power Electronics for Renewable Integration(PERI) Lab
- RF And Microwave Facilities:
  - Microwave Circuits Laboratory
  - Microwave Imaging and Material Testing (MIMT) Laboratory
  - Antennas Laboratory
  - Anechoic Chamber RFID Laboratory
  - Microwave Metamaterial Laboratory
- Photonics Facilities:
  - Fibre and Quantum Optics Laboratory
  - Optoelectronics and Nanofabrication Laboratory
  - Quantum Photonics Laboratory
  - Tomographic Imaging Laboratory
- Microelectronics and VLSI:
  - Semiconductor Device Fabrication Laboratory
  - VLSI - EDA Laboratory
  - Organic Electronics Processing and Characterization Lab
  - NanoLab
- Signal Processing, Communications & Networks Facilities:
  - Computer Vision Laboratory
  - Mobile Communications
  - Multimedia Wireless Networks Laboratory
  - Multimodal Information Processing Systems Laboratory
  - Networks Laboratory
  - Wireless Communications Coding and Cognitive Radio Laboratory
  - Telematics Lab
  - Signal Processing in Networks (SPiN) Lab
  - Wireless Sensor Networks Lab
- Control And Automation Facilities:
  - Networked Control Systems Laboratory
  - Intelligent Systems Laboratory
  - Intelligent Informatics and Automation Laboratory

"Labs @ IITK aim to equip the students with the latest technologies"

Software and Equipment Used

- Signal Processing, Communications & Networks:
  - Software – CVX , C/C++ , Python, Simulink , Mathematica .
  - Equipment - Digital Oscilloscope, Frequency Analyser, FPGA, RTDS.
- RF And Microwave Facilities:
  - Software - Cadence, CST, HFSS13.0, NEC, Mapple.
  - Equipment - VNA, DSO, Frequency Generator, Anechoic Chamber, Spectrum Analyser.
- VLSI & Microelectronics
  - Software - Xilinx, Mentor Graphics, Cadence, ICCAP, HSPICE, Sentaurus TCAD, Silvaco TCAD.
  - Equipment – FPGA kits (Spartan 3E, Virtex2Pro, etc.), Spin Coater, Vacuum Annealing System, Agilent Semiconductor Characterization System, Spectrum Analyser.
- Power Engineering
  - Software - PSPICE, Microchip, Altium, RsCAD.
  - Equipment - Digital Oscilloscope, Frequency Analyser, FPGA, RTDS.
- Control & Automation:
  - Software - Visual Studio, Eclipse, Arduino programming.
  - Equipment – Arduino Platform Boards, Microsoft Kinect for Image Processing.
- Interdisciplinary Software:
  - Matlab, GNU Octave, OPAL RT, RSCAD, PSSE, Android R, NS3, ROS, Scilab, LabVIEW.
- Interdisciplinary Hardware :
  - Odroid, Raspberry Pi, Arduino, LIDAR.

Academic Projects

- Power Engineering
  - Electric Stress Control Using Filled Polymers
  - Experimental Characterization and Numerical Modelling of Charge Transport In Synthetic Polymers Used For Electrical Insulation Under Low And High Applied Voltages
  - Reconfigurable Distribution Networks
  - Development of MRI Compatible Nerve Stimulator To Understand The Underlying Mechanism In Neuron Modulation
  - Setting Up Real Time Digital Simulation Facility For Advance Research In Power and Control
  - A Multi Dimensional Smart Energy Grids Analysis for Indian Scenario
  - Adaptive Clustering For Decentralized Resilient Energy Management (ADREM)
  - Smart Multi Terminal DC Grid For Autonomous Zero Net Energy Building
  - High Voltage System', 'Microwave, Photonics And Communication', Robotics, 'Control And Vision‘
  - High Reliability DC-DC Converter For Integrating Battery With Low Voltage DC System
  - Advanced Communication and Control For The Prevention of Blackouts (ACCEPT)
  - Optimal Power Architecture For Next Generation Data-centers
  - Development of R&D Platform For Smart City Projects In The Indian Context Stabilize Energy
  - Use of Synchrophasors In Power System Load Modelling And State Estimation
- Control and Automation
  - Study on Personal Drone Benefit For Driver Assist
  - Control of Cyber-Physical Systems- Applications To Smart Grid and Formation of UAVs
  - Multi Mobile Wireless Sensor Networks In Tracking and Surveillance
  - Computational Intelligence Theories Applications and Future Directions
  - Path Tracking Control of Four Wheel Drive Four Wheel Steer Electric Vehicle
  - Cooperative Control For DC Micro grid
- Photonics
  - Fluorescence Diffuse Optical Tomography For Grading of Dysplasia In Cervical Cancer Progression
  - Quantum Key Distribution Using Magneto-Optic Interactions In Epitaxial Garnet Films

- Electro-Optic And Magneto-Optic Interaction Based High Speed Quantum Key Distribution
- Photodiode Arrays For Near Infrared Detection and Tracking

- RF and Microwave
  - Application of Meta-Material Mushroom Structure For Realization of Planar Single/Triple Passband Filter For Significant Size Reduction
  - Adaptive And Reconfigurable Multiband, Multimode And Multifunction Monolithic Millimeter-Wave Integrated Circuits (MMICs) Technologies For 5G Wireless Communications
  - Planar High Gain Antennas Based on Electromagnetic Band Gap Concept
  - Design of Compact Multi-Band Multi-Polarized Antennas For Wireless Communication Systems
  - Microwave Meta-material Absorbers
  - Microwave Active Remote Sensing of Buried Objects
  - Microwave Imaging & Remote Sensing of Concealed Objects
- Microelectronics and VLSI
  - Study of Electrodes In Organic Solar Cell For Efficiency and Reliability Improvement
  - SMDP-C2SD
  - Modeling Advanced FDSOI for IC Design
  - HEMT Modeling For Broad Temperature And Frequency Ranges
  - Industry Oriented Device Modeling For Smart-Power Integrated Circuits
  - Unified Compact Model of Advanced CMOS Structures
  - Analog and RF Bulk CMOS Compact Model
- Signal Processing, Communications & Networks
  - Joint Target Detection and Localization Algorithms For Mimo RADAR Systems
  - Device To Device (D2D) Communications For LTE-Advanced Cellular Network
  - Signal Processing Assisted Network Monitoring
  - Novel Strategies For Source-Node Localization In Mobilead-Hoc Sensor Networks
  - Music-Group Delay Based Source Localization And Tracking Over Spherical Arrays
  - Development of Commercial Package For Restoration of Old Films and Videos
  - Deployment of Brihaspati ERP
  - Deployment and Management of Brithaspati-3 Services Over NKN for Indian Academia
  - Development of Personalised and Performance Based E-Learning Tool For Existing E-Resources
  - ERP-Mission

Academic Courses

- Analog/Digital VLSI Circuits
- Compact Modelling
- Solid State Devices
- Semiconductor Device Modelling
- Organic Electronics
- IC Fabrication Technology

- Basics of Modern Control Systems
- Linear Stochastic Dynamic Systems
- Digital Control
- Mathematical Methods in Control Systems
- Neural Networks
- Control of Cyber Physical Systems

- Simulation of Modern Power Systems
- Advanced Power System Stability
- Electric Power System Operation and Management
- Fundamentals of Electric Drives
- HVDC transmission and Flexible AC Transmission Systems
- Power Electronics Applications in Power Systems

- Optical Communications
- Optical Coherent Imaging
- Quantum Wave Phenomenon
- Network Analysis & Switching
- Photonics

- Fiber Optic Systems
- Computational Electro-Magnetics
- Advanced Engineering Electromagnetics
- Smart Antennas for Mobile Communications
- Finite Element Method
- Monolithic Microwave ICs
- Microwave Measurements and Design

- Mathematical Structures of Signals and Systems
- Mathematical Methods in Signal Processing
- Statistical Signal Processing
- Image Processing
- Introduction to Signal Analysis
- Video Signal Processing
- Representation and Analysis of Random Signals
- Detection and Estimation Theory
- Speech Signal Processing
- Digital Switching
- Digital Communication Networks
- Convex Optimization in Signal Processing

Contact us

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