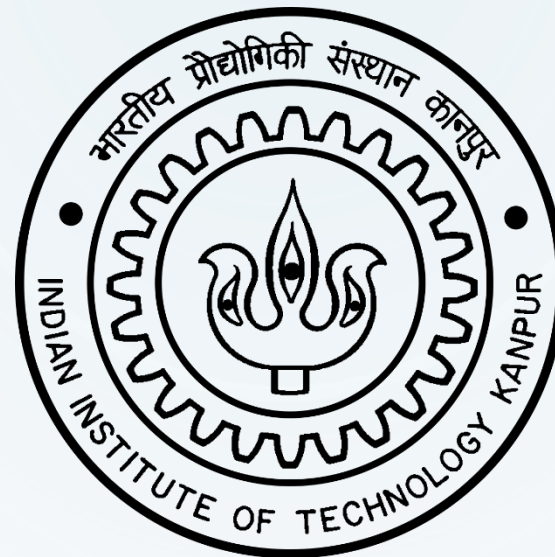


Department of Electrical Engineering



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 pass out each 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

Recent Notable Contributions

- Integrated Circuit design simulation software developed by YS Chauhan and team (2nd in the world after MIT). His student and PhD scholar Mr. Priyank Rastogi received the best paper award in IEEE CONECCT 2018.
- Two alumni are recipients of Marconi Award,
 1. Dinesh Bharadia - Man behind full duplex, a ground breaking research invalidating an assumption held since the birth of Wireless.
 2. Kartik Venkat - Applied concepts from Information Theory to improve the performance of state of the art ML Algorithms.
- Dr. Anurag Kumar, our alumnus is the current director of IISc Bangalore.
- Professor Dr. Ketan Rajawat, Department of Electrical Engineering has been awarded INSA Medal for Young Scientist for 2018.
- IITK-TCS robotics team reached to the podium finish at the Amazon Robotics Challenge 2017, Nagoya, Japan.
- Dr. Saptarshi Ghosh (Mentor: Dr. Kumar Vaibhav Srivastava) has been selected as one of the Young Scientist Awardee in 2nd URSI Atlantic Radio Science Meeting (AT-RASC).

Infrastructure - Labs and Facilities

Power Engineering Facilities:

- High Voltage Lab
- NaMPET Lab
- Networked Control Systems Lab
- Power Management Lab
- Power System Simulation and Research Lab
- Static Controller Laboratory
- Power Electronics for Renewable Integration(PERI) Lab

RF And Microwave Facilities:

- Microwave Circuits Lab
- Microwave Imaging and Material Testing (MIMT) Lab
- Antennas Lab
- Anechoic Chamber RFID Lab
- Microwave Metamaterial Lab

Photonics Facilities:

- Fiber and Quantum Optics Laboratory
- Optoelectronics and Nanofabrication Lab
- Quantum Photonics Lab
- Tomographic Imaging Lab

Microelectronics and VLSI:

- Semiconductor Device Fabrication Lab
- VLSI - EDA Lab
- Organic Electronics Processing and Characterization Lab
- Nano Lab

Signal Processing, Communications & Networks Facilities:

- Computer Vision Lab
- Mobile Communications Lab
- Multimedia Wireless Networks Lab
- Multimodal Information Processing Systems Lab
- Networks Lab
- Wireless Communications Coding and Cognitive Radio Lab
- Telematics Lab
- Signal Processing in Networks (SPiN) Lab
- Wireless Sensor Networks Lab

Control And Automation Facilities:

- Networked Control Systems Lab
- Intelligent Systems Lab
- Intelligent Informatics and Automation Lab

“Lads @ 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 Analyzer, FPGA, RTDS.

RF And Microwave Facilities

Software - Cadence, CST, HFSS13.0, NEC, Mapple, Matlab.

Equipment - VNA, DSO, Frequency Generator, Anechoic Chamber, Spectrum Analyzer.

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 Analyzer.

Power Engineering

Software - PSPICE, Microchip, Altium, PSCAD, OPAL-RT, GAMS, RTDS, DIGSILENT

Equipment - Digital Oscilloscope, Frequency Analyzer, 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

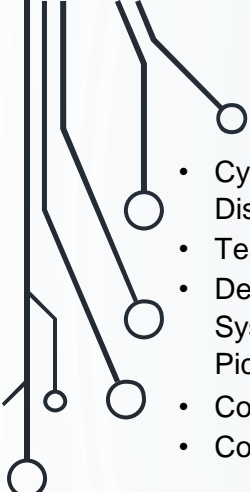
Power Engineering

- Electric Stress Control Using Filled Polymers
- Reconfigurable Distribution Networks
- Design & Development of Intelligent Electronic Transformer
- A Multi Dimensional Smart Energy Grids Analysis for Indian Scenario
- Adaptive Clustering for Decentralized Resilient Energy Management (ADREM)
- Technical Vetting of Electrical Estimates
- Development of Control Strategies for Grid Connected PV System Utilizing The Mppt and Reactive Power Capability
- Technical Vetting of Electrical Distribution Design of Alaknanda Enlcave
- Design and Development of Control and Protection for Hybrid Renewable Integration
- High Reliability DC-DC Converter for Integrating Battery with Low Voltage DC System
- Inspire Faculty Research Grant
- Study to Minimize Over Voltage and Inrush Current of The Transformers During Connecting of Grid Tied Solar PV Plant
- Design and Development of Gan Based Compact DC-DC Converter
- Design and Development of Smart Solar Inverter for Grid Primary Frequency Control with Droop Characteristics and Integrated DC Supply

- Optimal Power Architecture for Next Generation Datacenters
- Development of R&D Platform for Smart City Projects in The Indian Context
- Advanced Communication and Control for The Prevention of Blackouts (Accept) Stabilize Energy
- Use of Synchorphasors In Power System
- Load Modelling and State Estimation
- Use of Synchrophasor Data for Tuning of Power System Stabilizer and on-line Estimation of Generator Parameters
- Harmonic Compensation Using Distributed Solar PV Inverters


Control and Automation

- Facial Expressions Analysis and Emotions Recognition
- Control of Cyber-Physical Systems- Applications to Smart Grid and Formation of UAVs
- Multi Mobile Wireless Sensor Networks in Tracking and Surveillance A Condition Monitoring System With Multi Agent Mechanism for External Non Contract Smart Inspection of Buried Oil and Gas Pipelines
- Development of Unmanned Aerial Vehicles (UAV) Aided Driver Assistance System


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- Cyber-Physical Control of Grid Connected Photovoltaic Distributed Generation System
 - Teaching Learning Centre for Internet-of-Things
 - Development of an Autonomous Mobile Manipulator System for Ware-House Applications: Stowing and Picking
 - Condition Based Monitoring of Air Compressors and Motors
 - Cooperative Control for DC Micro grid

Microelectronics and VLSI

- Study of Electrodes In Organic Solar Cell for Efficiency and Reliability Improvement
- SMDP - C2SD
- Special Manpower Development Programme for Chips To System Design
- Modeling Advanced FDSOI for IC Design
- Hemt Modeling for Broad Temperature and Frequency Ranges
- Modeling and Simulation of III-V and Ge Transistors for Logic and Power Applications
- Characterization and Modeling of Gan Hemt for RF Applications
- Modeling of Advanced Bulk and Soi Mosfets
- Characterization and Modeling of Radiation Hardened Cmos Transistors for Space
- Integration and Enablement of 0.18 micron Rf-Soi Technology for Analog Mixed-Signal Applications

- 
- Ramanujan Fellowship
 - Application of Meta-Material Mushroom Structure for Realization of Planar Single/Triple Passband Filter for Significant Size Reduction
 - Photodiode Arrays for Near Infrared Detection and Tracking
 - Design and Development of Control and Protection for Hybrid Renewable Integration
 - Codes for Distributed Storage

Signal Processing, Communications & Networks

- BSNL Telecom Centre of Excellence
 - Joint Target Detection and Localization Algorithms for Mimoradar Systems
 - Qualcomm Wireless Short Course
 - Cooperative Communication In Cellular Networks Protocol Design and Performance Analysis
 - Device To Device (D2D) Communications for LTE-Advanced Cellular Networks
 - Cross-Layer Optimization Techniques In Video Streaming Over Wireless Fading Networks
 - Inspire Faculty Research Grant
 - Space Time Trellis Coding (Sttc)/Turbo Coding Based Robust Satellite Image Processing And Communication
- 

- Development Of Commercial Package For Restoration Of Old Films And Videos
- Virtual Full-Duplex Relaying For Cellular Networks Using Half-Duplex Relays
- Application -Aware Image Quality Evaluation of Result Sensing Images
- National Conference on Communications (NCC)

RF and Microwaves

- Application of Meta-Material Mushroom Structure for Realization of Planar Single/Triple Passband Filter for Significant Size Reduction
- Microwave Active Remote Sensing of Buried Objects
- Microwave Imaging & Remote Sensing of Concealed Objects
- Develop A Compact Microwave Sensor for Characterization of Radomes and Dielectric Signature Detection of Materials In 3g and 4g Ism Bands
- Microwave Imaging & Material Testing Project
- Development of Microwave Sensor System for Humanitarian Technology Applications
- Design of Compact Multi-Band Multi- Polarized Antennas for Wireless Communication Systems
- High Power Device Analyzer, Enhancement of Existing Vna, Time-Resolved Correlation Measurement, Power Electrics, Antenna Positioner System

- Microwave Metamaterial Absorbers
- BSNL Telecom Centre of Excellence

Photonics

- Fluorescence Diffuse Optical Tomography for Grading of Dysplasia In Cervical Cancer Progression
- Rte-Tomography Based Cloud Monitoring
- Quantum Key Distribution Using Magneto-Optic Interactions In Epitaxial Garnet Film
- Electro-Optic and Magneto-Optic Interaction Based High Speed Quantum Key Distribution
- Development of Frequency Coded Quantum Key Distribution Solutions Suitable for Development On 25 Km Fiber Optic Links
- Photodiode Arrays for Near Infrared Detection and Tracking
- Integrated Nanophotonic Devices Operating at Room Temperature
- Multi Component Signal Analysis Method in Digital Holography for Precision Metrology
- High Throughput Surface Characterization Using Coherent Optical Imaging

Academic Courses

- Analog/Digital VLSI Circuits
- Compact Modelling
- Solid State Devices
- Semiconductor Device Modelling
- Organic Electronics
- IC Fabrication Technology
- Microelectronics – I
- Microelectronics- II
- Digital Electronics
- Semiconductor devices technology
- Low noise amplifiers
- Linear Integrated Circuit Design
- Introduction to VLSI design
- Basics of Modern Control Systems
- Linear Stochastic Dynamic Systems
- Digital Control
- Mathematical Methods in Control Systems
- Neural Networks
- Control of Cyber Physical Systems
- Control System Analysis
- Advanced Control Systems
- Transducers and Instrumentation
- 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
- Control System Analysis
- Power Systems
- Power Electronics
- Electrical Machines
- Power Generation
- Fundamentals of HV ENGG & LABORATORY Techniques

Academic Courses

- 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
- Signals Systems and Networks
- Digital Signal Processing
- Principles of Communication
- Communication Systems
- Communication Skills
- Advanced Digital Signal Processing
- Communication System Engineering
- Fiber Optic Systems
- Computational Electro-Magnetics
- Advanced Engineering Electromagnetics
- Smart Antennas for Mobile Communications
- Finite Element Method
- Monolithic Microwave ICs
- Microwave Measurements and Design
- Electromagnetic Interference and Compatibility Techniques
- Electromagnetic Theory
- Microwaves
- Antennas and Propagation
- Radar Systems
- Radio Astronomy
- Optical Communications
- Optical Coherent Imaging
- Quantum Wave Phenomenon
- Network Analysis & Switching
- Photonics



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