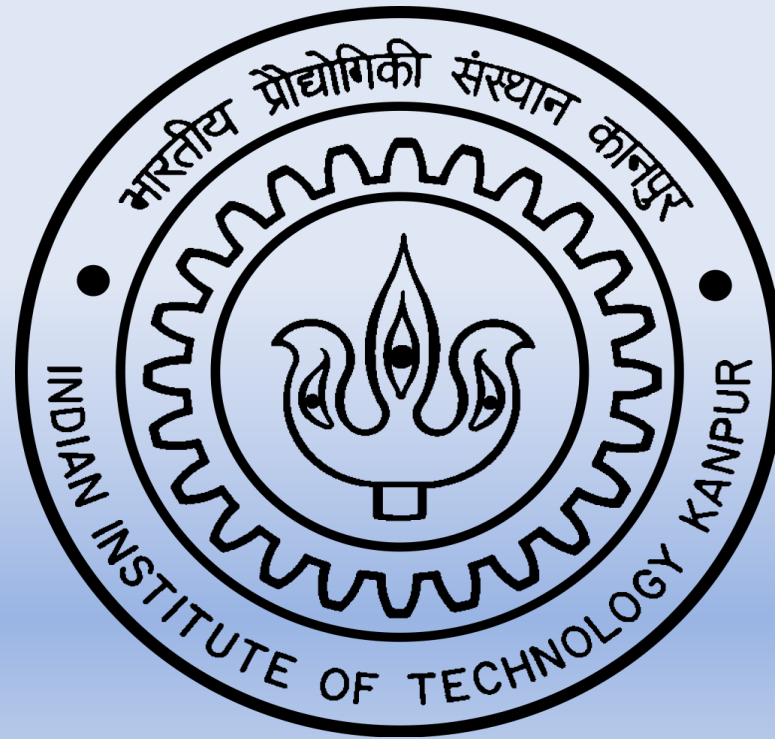


# Department of Electrical engineering



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 240 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

Our aim is 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 ,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 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
- 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 Vechicles(Uav)Aided Driver Assistance System

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 Microgrid

## 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 0.18micron 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

Deployment and Management of Brithaspati-3

Services Over NKN for Indian Academia

Development of Personalized and Performance Based E-Learning Tool for Existing E-Resources  
Application -Aware Image Quality Evaluation of Result Sensing Images  
Commercially Viable Professional Courses  
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

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 Films  
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 Fibre 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 amplifier  
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



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

# Contact us



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