भारतीय
प्रौद्योगिकी
संस्थान
काशी हिन्दू विश्वविद्यालय

IIT

INDIAN
INSTITUTE OF
TECHNOLOGY
BANARAS HINDU UNIVERSITY

Information Brochure
(2019-2020)

Power Electronics

About Us:

Power electronics as a subject is a hybrid of power engineering, analog electronics, semiconductors, devices and control systems. Electrical energy in itself is not usable until it is converted into a tangible form of energy such as motion, light, sound, heat etc. In order to regulate these forms of energy Power Electronics Converters are required. It is literally impossible to list all the applications of power electronics today, it has penetrated almost all the fields where electrical energy is in the picture.

Prof. Ranjit Mahanty (Ph.D IIT-BHU Varanasi)
Professor, Department of Electrical Engineering
Areas of Interest:
Power Electronics, Multilevel Inverters, Z-source Inverters, Interleaved Hybrid converter, DC Microgrid.

Dr. Rajeev Kumar Singh (Ph.D IIT Kanpur)
Associate Professor, Department of Electrical Engineering
Areas of Interest:
Energy Storage System and Optimal Bidirectional Battery Chargers, Modeling , simulation, and control of Power Electronics System, Power Electronics for the Hybrid Renewable AC/DC micro-grid, Modeling and control for Point-of-load's, EV/PHEV interface with renewable energy and grid.

Dr. Vivek Nandan Lal (Ph.D IIT Kanpur)
Associate Professor, Department of Electrical Engineering,
Areas of Interest:
Modelling, design and control of Grid Connected Solar PV system, Renewable Energy Sources, ANN application in Power Forecasting and Power Electronics, Electrical Power Distribution System

Dr. Santosh Kumar Singh(Ph.D. University of Cambridge, UK)
Associate Professor, Department of Electrical Engineering
Areas of Interest:
Power Electronic converter topologies, Silicon carbide converters, Electric Drives, Hybrid electric vehicles, Multiport Permanent magnet generators, Renewable energy integration and applications

Dr. Kalpana Chaudhary(Ph.D IIT-BHU Varanasi)
Associate Professor, Department of Electrical Engineering
Areas of Interest:
Power Electronics; Electrical Machines and Drives; Satellite Solar Power Station; Switched Reluctance Motor for Electric Vehicle Application; PMBLDC Motor; MPPT techniques for Photovoltaic Energy Conversion; Wireless Power Transmission; Renewable energy Generation

Dr. N. K. Swami Naidu(Ph.D IIT Delhi)
Assistant Professor, Department of Electrical Engineering
Areas of Interest:
Power Electronics, Renewable Energy Integration to the grid, Smart Grid, Power Electronic Drives, Power Quality, Hybrid Energy Storage Systems.

Courses Offered:

1. Power Electronic Converter-I
2. Power Electronic Converter-II
3. Advanced Power Electronic Converters
4. Power Semiconductor Devices
5. AI Applications in Power Electronics
6. Solar and Wind Power Technologies
7. Control Techniques in Power Electronics
8. Design of Power Electronic Converters
9. Smart Grid
10. Simulation of Power Electronic Converters
11. Power Semiconductor Controlled Drives
12. Special Topics in Power Systems: FACTS and Distribution Automation

Lab Facilities:

1. **Undergraduate Lab**
2. **Simulation Lab**
3. **Research Lab**

1. **PCB Printing Machine**: It is used to Print High Quality circuit boards.
2. **Grid Simulator**: It is used for grid connection/integration with the developed converter under advanced protection conditions.
3. **Opal-RT**: It is the PC/FPGA-based real-time simulators,used for Hardware-in-the-Loop (HIL) of testing equipments and for Rapid Control Prototyping system to design.
4. **Soldering and De-soldering Station**: It is used for fine work of prototype development on PCB.
5. **Advanced Equipments**: Power supplies(AC & DC), Frequency Response Analyzer(**FRA**), PV Emulator, Mixed Domain Oscilloscope, Power Analyzer, **DSO, FPGA** Board, **DSP** Board etc.
6. **Solar PV Trainer**

IEEE Transactions/ Journels-

1. Enhanced high gain switched LC Z-source inverter at low duty region.
2. Embedded Dual Switched-Capacitor Based Continuous Input Current Switched-Inverter for Renewable Energy Application.
3. Harmonic Minimization in Three-Phase Hybrid Cascaded Multilevel Inverter Using Modified Particle Swarm Optimization.
4. Transformerless Hybrid Converter with AC and DC outputs and Reduced Leakage Current.
5. Switched-Boost Modified Z-Source Inverter Topologies with Improved Voltage Gain Capability.
6. Single-phase high voltage gain switched LC Z-source inverters.
7. Interleaved hybrid converter with simultaneous DC and AC outputs for DC microgrid applications.
8. Quadratic boost derived hybrid multi-output converter.

IEEE/IET Conferences-

1. Transformerless Minimum Phase Interleaved Hybrid Converter with Low Leakage Current.
2. A Family of Enhanced Voltage Gain Switched-Boost Impedance-Source Inverter Topologies for Renewable Energy Resources.
3. Selective Harmonic Elimination and Capacitor Voltage Balancing in Hybrid Cascaded Multilevel Inverter Using Model Predictive Control.
4. Reduced Voltage Stress Thirteen-Level Extended Switched Capacitor Multilevel Inverter.
5. Three Phase Quasi Z Source Inverters with Multiple AC Outputs.
6. Steady State Analysis of High Gain Interleaved Boost Converter at Different Operating Regions for Universal Line PFC Applications.
7. Analysis of Single-Phase Modified Quasi-Switched Boost ZSI and Extended Quasi-Switched Boost ZSI.
8. Two Stage Integrated On-Board Charger for EVs.
9. Design and Analysis of a Modular Magnetically Coupled Quadratic Boost Topology with a Damping Network for DC Microgrid.

Sponsored Research Projects-

1. **Title :** Mix-Energy-Source Electric Vehicle Charging System Design and its Impact

   on Indian Smart-distribution-grid.

   Funding Agency : DST, India

   Status : Ongoing

2. **Title** : A Hybrid Renewable AC/DC Distributed Generation for Low Power Applications.

   Funding Agency : IIT (BHU)

   Status : Completed

3. **Title** : A Versatile Bidirectional Optimal Battery Charger

   Funding Agency : DST, India

   Status : Completed

4. **Title :** Switched Reluctance Motor Drives for Transportation

   Funding Agency : IT BHU

   Status : Completed

Message from Prof. Incharge:

It gives me immense pleasure to extend you a most cordial invitation to participate in the Campus Recruitment Programme of the Indian Institute of Technology (BHU), Varanasi. With an increasing thrust being placed on Institute-Industry Interaction, it is my sincere belief that your esteemed organization and IIT (BHU) Varanasi will stand to gain immensely from this symbiotic relationship.

Our Institute holds the pride of place being pioneer in the field of engineering and technical education in this country and has a glorious heritage. We have been continuously ranked amongst the elite by all peers and stakeholders. Our constant pursuit of excellence has made our institute a focal point in technical education for students and faculty members alike. Admissions to the institute take place through the reputed Joint Entrance Examination (JEE) and Graduate Aptitude Test in Engineering (GATE).

At this institute, we take utmost care to groom our students according to the needs of the industry. We seek to open frontiers of knowledge and reveal new horizons of change to broaden mindset and to create positive attitude in our students. Our students receive industrial exposure by their frequent industrial visits. Besides, our undergraduate students undergo an eight-week training during summer vacation in reputed industries/institutions/organizations (in India as well as abroad) as part of their academic requirements.

We would be most delighted to host you for campus recruitment and beyond. I am looking forward to a mutually beneficial relationship,

Professor **Anil Kumar Agrawal**
Training & Placement Officer, IIT (BHU) Varanasi

Past Recruiters:

EATON
TATA STEEL
Mercedes-Benz
TATA MOTORS
Sloki SOFTWARE TECHNOLOGIES
BOSCH
RELAXO
Honeywell
MathWorks
TATA CONSULTANCY SERVICES
TEXAS INSTRUMENTS

Placement Team:

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