BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCES, PILANI, PILANI CAMPUS

Department of Electrical and Electronics/Instrumentation Engineering

Thrust/ Research Areas for Ph.D

INSTRUMENTATION & CONTROL:

Sensor and transducers design, Virtual Instrumentation, Artificial Intelligence Techniques in Measurements, Signal Processing, Robotics, and Process Modeling & Control. Intelligent control systems based on neural networks and fuzzy logics, genetic algorithm Modeling and analysis of dynamical systems, Linear control, Digital control, adaptive control, nonlinear control, robust control, optimal control, Control of under-actuated systems, Estimation techniques for dynamical systems. Sensors and signal conditioning, Industrial measurements, process modelling control, Biomedical instrumentation, analysis instrumentation, Advanced control, Electrical & electronics measurements, Robotics & Industrial automation, Intelligent control techniques, Emerging technologies

COMMUNICATION ENGINEERING, NETWORKS

Advanced Digital communication , Wireless & Mobile Communication Networks, Aircraft, Satellite, Deep space Communication, Coding Theory and Practice, Cognitive radio (CRs), Digital and Analog communication, Information theory, Photonics, computer networks, network security, mixed signal system design, electronic system design, optoelectronics, applied signal processing, fibre optical communication, antenna engineering, radar systems & applications, microwave engineering, FPGA& ASIC Implementations Of Communication Systems, Advanced Digital Communication And Data Networks, Telecommunication Switching And Networks, Virtual Private Networks, Optical Communication & Networks, Wireless & Mobile Communication Networks, Coding Theory And Practice, MIMO Systems And Wireless Sensor Network. Satellite Communication, Satellite Positioning, Multimedia / Video Communication, Image Processing, Computer Networks, Network Security, Mobile communication and networks, Applied Signal Processing, Random Signal Analysis, Remote Sensing, Photonics Spectrum Sharing, Underwater acoustic communication, Underwater wireless sensor networks, Emerging technologies.

RF, MICROWAVE, ANTENNA DESIGN & WIRELESS SYSTEMS:

Electromagnetic theory, Computational Techniques For Electromagnetics, Wave Scattering And Propagation, Development Of Novel Materials For Antennas, Antenna Analysis And Design, Microwave sources, Microwave measurements, Metamaterials Structures, Scattering Cross Section And Antenna Measurements, Computer Visualization, RF And Microwave Systems,

MMIC, EMI, And EMC. Microwave Engineering, Radar, Transmission Lines, Waveguides , Radiation, Radio And Microwave Communications, Wireless Communications, systems and networks , Mobile communication and network, Advanced Gigahertz And Terahertz Microwave Technologies, Fibre Optics & Optoelectronics, Satellite Communication , Remote Sensing, RFID, Communication Satellite design , spectrum sharing , Emerging technologies etc.

POWER SYSTEMS & ELECTRICAL ENGINEERING, RENEWABLE ENERGY, SMART GRIDS:

Power System analysis, Distributed Generation, Deregulation, Advanced Power Systems, Renewable Energy, Hybrid Renewable Electric System, Design Development, Optimization, Simulation, Testing and Standardization, Smart Grid Technologies, Power System Operation & control and applications of Artificial Intelligence techniques to these areas. Dynamics and transient analysis of power systems, Vehicular Electronics, Emerging technologies.

POWER ELECTRONICS AND DRIVES:

Electrical Machines And Their Health Monitoring, Soft Switching Converter Technologies, Transformer And Motor Design, DSP Based Control Of Electric Drives, , Hybrid ~~Electric~~ Vehicles, Adjustable speed drives, Control strategies for high performance drives, Utility Applications Of Power Electronics (FACTS), Control & Instrumentation For PE System, Power Quality, HVDC And Applications Of AI Techniques To These Areas. Power Devices Microelectronics And Selection, Distribution Apparatus And Configuration, Multilevel inverters, PWM techniques for converters and inverters, Emerging technologies.

EMBEDDED SYSTEMS:

Embedded Intelligence: Smart Devices And Environments, Safety Critical Embedded Systems Resource Management And Optimization Techniques In Embedded Systems, Real time Systems, Smart Body Ware Sensors, Embedded Systems In Biomedical Field, automobile engineering, Simulation And Modeling For Embedded Systems, Computer/ processor Architecture, Networked Embedded Applications, FPGA And ASIC Implementation of systems, Hardware Software Co-Design,   Computer Networks, Pervasive, Reconfigurable   And Embedded Computing , Real Time Systems, Fault Tolerant System Design, Underwater wireless sensor networks, Robotics , Software defined Radio, Emerging technologies

MICRO/ NANO ELECTRONICS

Microsystems and Nanosystems, Circuit Simulation and Modeling and characterization of Micro/ Nano electronic Devices, RF Microelectronics, FPGA and ASIC design, VLSI Design, Analog & Digital IC design, Memory Design, Electrostatic discharge protection, Advanced Analog and Mixed Signal Design, Verification, System On Chip Design, System in Package,

VLSI Test and Testability, Low power VLSI design, VLSI Architecture, Advanced VLSI design, Advanced VLSI Architecture, CAD for IC design. MEMS and NEMS design, Fault Tolerant System Design, Applications of VLSI DESIGN, Packaging Technology, PCB design, Emerging technologies

ELECTRONIC MATERIALS, DEVICES, AND TECHNOLOGY:

Materials And Devices For Electronic, Photonic, Bio-Electronic And MEMS Applications: Amorphous And Crystalline Silicon, Compound Semiconductors, Thin Films, Ferroelectric And Piezo-Electric; Smart Materials, Development Of Novel Device Structures And Manufacturing Methods, Physics And Modeling Of Devices, Device And Material Characterization, Physics And Modeling Of semiconductor Devices, Optoelectronics and Optical Communication, Detectors, Semiconductor Lasers, IC Fabrication Technology issues, BJT, MOSFET process flow, CMOS and NMOS technologies, 3-dimensional integrated circuits, Submicron fabrication issues, Emerging Nanoelectronics, Spintronics technology, MEMS fabrication, Semiconductor and dielectric material research for IC technology, Mixed Signal and RF technology, Silicon on Insulator technology, Recent trends and Advanced technologies.

DIGITAL SIGNAL PROCESSING:

Advanced Digital Signal Processing, DSP & Image Processing Algorithms and architectures, Data compression, Statistical Signal Processing, Speech Processing, Acoustic signal processing, Music signal processing, Hardware and Software systems for signal processing, Image processing, Applied signal processing, Multimedia applications, Processor Architecture, Biomedical signal processing, Remote Sensing, Robotics, Software defined Radio, Emerging technologies