



## Broad Areas of Research

**Department of Civil Engineering:** Environmental Engineering, Structural Engineering, Geotechnical and Transportation Engineering, Transportation Engineering, Geotechnical Engineering, Construction Management and Sustainable Construction, Water Resources,

**Department of Instrumentation & Control:** Sliding mode control, Vehicle Technology, image Processing process control, Chemical & gas sensors, Smart sensors, Analytical instruments, Robotics & control, process control, Medical Robotics, Robust Control, Power electronics, Power converts & its control, Battery management system, Biomedical Control, power converters, signal processing & extraction, Renewable energy control, process control, Precision Automation.

**Department of Electronics & Telecommunication Engineering:** Artificial Intelligence and Machine Learning, Renewable Energy, Robotics and Automation, Biomedical Engineering, Nanotechnology Cyber security, Robust control, ADAS ,Automotive control, Artificial Neural Network, Power Electronics, Smart sensor design, Soft engineering, Design, Analysis and Control, Electric Vehicles Control and Computing: Optimal Control and Optimization, Power Electronics for Nonconventional Energy, VLSI Design Sources, Evolutionary Algorithms, Augmented Reality and Virtual Reality, Multidimensional Signal Processing, Wireless Communication, Multimedia Communication, Underwater Communication,, Cloud and Edge Intelligence, Microelectronics, Antenna & RF Technologies, Real Time Vehicular Systems, IoT and Applications.

**Department of Metallurgy and Materials Engineering:** Development of anode materials for Solid oxide fuel cell, Valorisation of slag/Ash, Agricultural waste utilization and Biochar development, Development of water filter to improve boiler efficiency, Sensor materials for precision agriculture, Polymeric materials, plastic waste management, nanomaterials and their synthesis, nano composites, advanced composites, composites for electronic, tribological, biomedical, aerospace and automobile application etc, Alloy synthesis, Cryogenic treatment, Tribology of materials, Energy materials, E-waste management, Powder Metallurgy, Powder Metallurgy, 3 D Printing, Thermo-mechanical Treatment, Corrosion and Surface Protection, Material Design and Property Optimization.

**Department of Planning:** Urban and Regional Planning, Architecture, Town & Country Planning.

**Department of Mechanical Engineering:** MEMS, Dynamics, Vibration, Condition Monitoring, CFD, IC Engines, Alternative Fuels, Compliant Mechanism, Micro Manufacturing, AIML, Industrial Engineering, CAD/CAM, FEA, Biomaterials, Micro Machining, Laser Machining, Acoustics, Laser Welding, Design Engineering, Tribology, Reliability Engineering, Maintenance Manufacturing Management, Forming Processes,

Machine and Optimization, Rapid Prototyping, Composite Materials, Fracture Mechanics, Design Engineering.

**Department of Electrical Engineering:** Renewable Energy System, Applied Control Systems, Power Electronics, Optimization, Power System Analysis and Optimization, Renewable Energy, Power System Stability, Electrical Power Distribution Systems: Operations, Control and Optimization, Renewable Energy, Power Electronics, Power System, Power Electronics, E Mobility, Electrical Vehicles, Electrical Machines and Drivers, Power Electronics.

**Department of Manufacturing Engineering and Industrial Management:** Micro Manufacturing, Condition Monitoring, Reliability Engineering, Electrical Discharge Machining, Friction Stir Welding, Manufacturing, CAD/CAM, Reverse Engineering, Additive Manufacturing, ERP, Computer Aided Inspection, Biomedical Device Development, Design for Manufacturing, Smart Manufacturing, Manufacturing Science and Engineering, Condition Monitoring, Manufacturing, Robotics, Manufacturing Engineering, Metrology and Quality Control, Application of AI in Manufacturing, Micromanufacturing, Electrochemical Micromachining, Micro machining of advanced Materials, New Product Development, Design for Manufacturing, Biomedical Device Development, Smart Manufacturing, Industry 4.0, Technologies in Manufacturing, DT, IoT, AM, Cps, MaaS/EaaS Mechatronics, Robotics and Manufacturing Automation, Supply Chain and Logistic Management, Production and Operations Management, ERP, Production and Industrial Engineering, Manufacturing Science and Engineering, Micromachining, Maintenance Engineering & Tribology, Non-conventional Manufacturing, Product Design and Prototype.

**Department of Computer Science and Engineering:** AI and Image Processing, Machine Intelligence, Neural Networks, AI and Data Science; Cloud, networking, security, Cloud virtualization, VM management, Cloud Security, Digital Forensics on Operating System, Cloud, Network etc, Network security, Fog (Edge) Computing, Federated Learning, Network Function Virtualization (NFV), IoT; Data mining, Machine Learning, Big Data Analytics, Deep Learning, Database Design, Algorithms, Any other project/idea from students with mutual discussion; Network Security, cryptography/ Cloud Security, Block Chain, Digital Forensics, IDS, Cloud Security; Natural Language Processing, Text Mining, Deep Learning, NLP + Security, Industry based project, Any Idea from students, can be worked out in collaboration if found suitable; Data Privacy, Cyber and Information Security, Blockchain, Machine Learning, Deep Learning, Data Analytics, Security in Web services, Mobile application development, Blockchain Technology, Machine or Deep learning approaches for solving problems in Cyber Security domain, Bioinformatics, any other topic of mutual interest can be decided after discussion with students; Cloud Computing, Data Security, Robotics & AI, Data Mining, Cloud Computing, Data Security, Robotics & AI, Data Mining; Information and Cyber Security, Artificial Intelligence in Security, Web Application Security, Wireless and Mobile Security; Parallel and Distributed Computing, Deep Learning using GPU Architecture, Multicore memory system performance issues; Cloud & Big Data Analytics, Data Pipeline, Cloud platform selection application based, Workflow analysis of cloud based application; Machine learning for data Analytics, Data mining algorithms for IOT data analytics, Optimization of

Machine learning algorithms, Any idea in domain of Internet of things; Machine Learning / Deep Learning, Computer Network, Data Analytics; Machine learning, Natural Language Processing.

**Industrial and Product Design:** Environment friendly and sustainable product development, Applications of IoT in product development, Product/Process development of farm mechanization, Product Development for e-mobility, battery thermal management, etc, Use of AI/ML in enhancing product performance and capability, Development of micromachined heat exchangers for electronic cooling, Development of MEMS based Sensors for industrial, agricultural and domestic products, Development of devices for condition monitoring of plant, machinery, equipment, transportation systems and civil structures.

**Integrated Vehicle System:** Design and development of auxetic structures with heterogeneous materials, Applications of auxetic structure in automobile structural components for crashworthiness, Integrated Thermal Management technology for BEV vehicle, Battery management system, Power Electronics for E-mobility, Enriching transportation facilities using V2X communication for Emergency vehicle passage, Secure vehicular network with machine learning approaches, Design, development and optimization of metal hydride based canisters for vehicle applications.

**Data Science and Machine Learning:** Data and Text Mining, Data Pipeline, Machine Learning and Deep Learning, Optimization and Big Data Analytics  
Natural Language Processing, Deep Learning using GPU Architecture, Robotics & Artificial Intelligence, Big Data Analytics in Information and Cyber Security.

**Micro Nano Manufacturing:** Micro Nano manufacturing, Biomedical devices, Additive manufacturing and reverse engineering, Microfluidics, Laser material processing, Biomechanics.

**Robotics and Artificial Intelligence:** Optimization of Multimodal Robot Programming, Third party calibration of Industrial Robot, Dynamic robot control for autonomous robot navigation (Drones & AGVs), Low cost automations using plastic, Robotisation of Medical instrumentation using AI support, Redefining the sustainability in Agriculture using Robotisation.

**Smart Materials and Sensor Designs:** Smart materials and sensor design, Smart material-based sensor, electronic olfaction, smart sensor system for liquid analysis.

**Design and Applications of IoTs:** Precision Agriculture/Precision, Control, Healthcare, Energy Distribution and control, Smart factory, Electronic Communication Systems for Defence.

**Energy and Environment Science:** Development of anode materials for Solid oxide fuel cell, Valorisation of slag/Ash, Agricultural waste utilization and biochar development, Development of water filter to improve boiler efficiency, Sensor materials for precision agriculture.