

**Object
Oriented
Programming**

**Human
Computer
Interface**

**High
Performance
Computing**

**Data
Structures**

**Computer
System
Design**

Algorithms

**Computer
Networking**

CAD for VLSI

**Operating
Systems**

**Embedded
Systems**

**Computer
Engineering
Lab Courses**

Computational Engineering Practice

The course provides hands on exposure to program design & development using C as an implementation tool. Programming constructs namely selection, iterative, recursion, arrays, structures and file processing in C are explored with relevant problem solving sessions to test drive each of the constructs. Algorithms that implement comparison sort and search strategies namely linear and binary are also explored.

The course equips students with skillset required for Command Line Interface based Application Development incorporating **Usability Guidelines**. Real life applications such as student grading, dictionary creation & searching, Complex number arithmetic, etc. are covered.

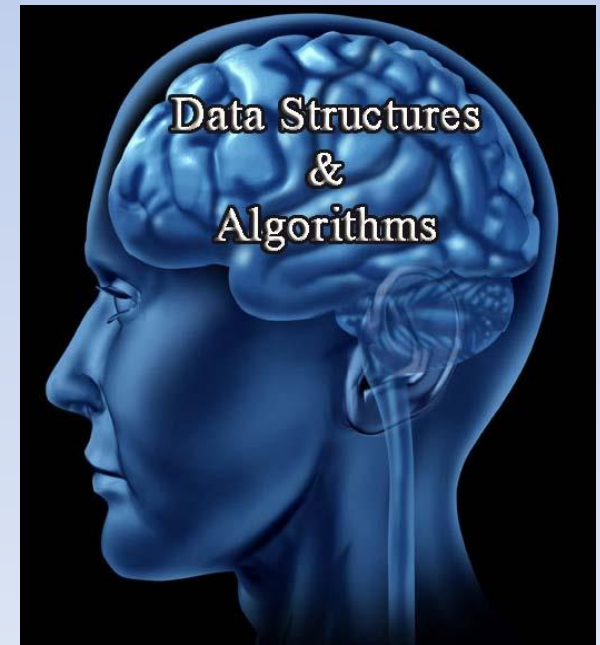
Sixty All-in-1 Systems supporting Ubuntu are used in the lab sessions.



Data Structures & Algorithms Laboratory

Objective of this laboratory course is to impart the skills to students to solve problems using computer in general as data structures & algorithms is the brain of computer science & engineering. Students are trained to design various Abstract Data Types (ADT) and to use them in algorithm design effectively. Various algorithm design strategies such as Divide and Conquer, Greedy, Backtracking, Branch and bound, Dynamic programming, incremental design and decrement design are included. Issues related to tractability are taught through Programming.

This lab also provides necessary fundamental skills to project and research students in computer science & engineering. Many projects and also algorithms designed by researchers in computer science use various data structures such as stack, queue, tree and graphs. As the problem solving using computer is the goal of any researcher in computer science, solving problems using various strategies are required for efficient problem solving, and hence this laboratory course is useful for project and research students in computer science.

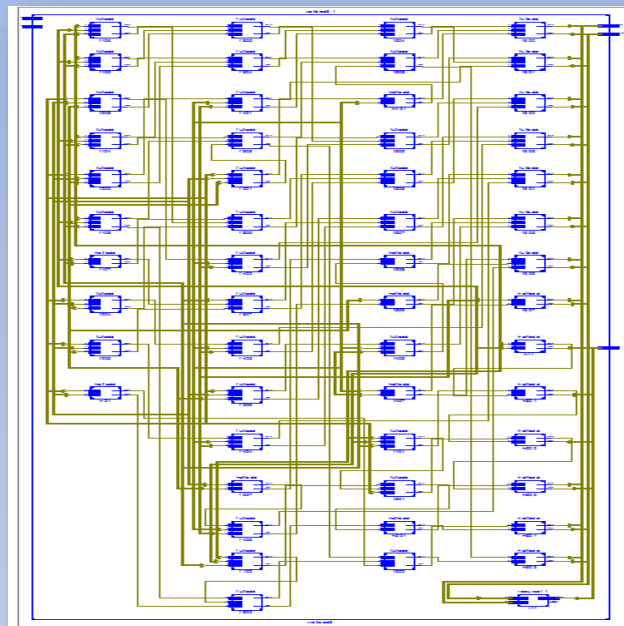


Computer Organization Laboratory

The **Computer Organization Laboratory** the Institute provides the state of the art facilities for the design and implementation of the digital computer systems.

Current facilities that include Cadence digital system prototyping tools and Xilinx ISE environments are used for modeling the digital system and the same is used for estimation of area, power and delay.

The focus of the lab is to impart the organization of the processor's internal blocks such as register file, arithmetic Logic unit, Instruction format, Internal bus organizations are modeled in the EDA Tools, functional behavior of the each module is tested using simulation, and performance will be estimated by synthesizing the circuit.



Object Name	Value
a[15:0]	111111100000001
sum6[14:0]	001111011100001
carry6[10:0]	11011110001
a[7:0]	11111111
b[7:0]	11111111
p0[7:0]	11111111
p1[7:0]	11111111
p2[7:0]	11111111
p3[7:0]	11111111
p4[7:0]	11111111
p5[7:0]	11111111
p6[7:0]	11111111
p7[7:0]	11111111
sum1[9:0]	1011111101
sum2[9:0]	1011111101
sum3[12:0]	101101101001
sum4[9:0]	1011111101
sum5[14:0]	100111010110001
carry1[7:0]	11111111
carry2[7:0]	11111111
carry3[7:0]	11111111
carry4[7:0]	11111111
carry5[9:0]	1011111101
co	0

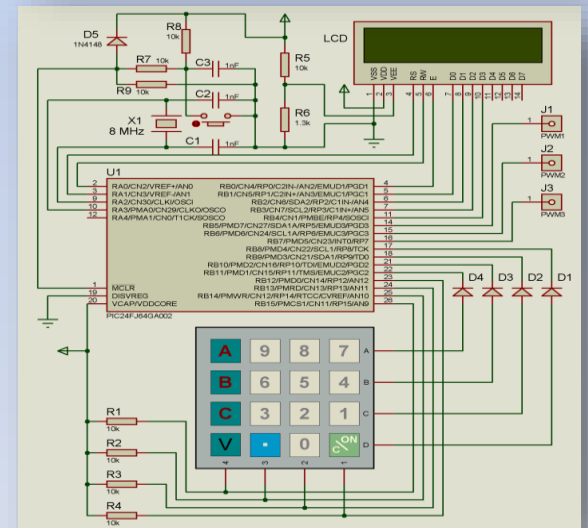
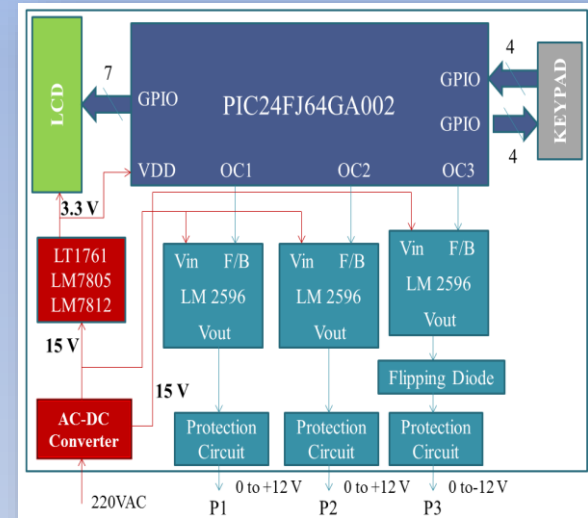
8-bit Wallace Tree Multiplier

Computer Organization & Microprocessor Laboratory

The **Computer Organization and Microprocessor Laboratory** of the Institute provides the modern facilities for the design and implementation of the computer system.

Current facilities include 16-bit Microprocessor Kits, Assembler, Interfacing Kits related to real world applications.

The focus of the lab is to impart the computer system design and Interfacing with real world applications using microprocessors in different modes, by writing assembly language programs and controlling the applications like stepper motor, Room temperature maintenance, Elevator simulation, Generation of different waveform. The students are exposed to micro-computer systems design concepts.



Programmable Power Supply Unit

Scripting Languages Laboratory

Objective of this laboratory is to impart knowledge, to develop shorter codes, with specific domain in mind. Scripting languages such as Perl and Python are taught in this course. Pattern matching using regular expression is effectively done in Perl. Graphical user interface is effectively designed using Python. The major tools for this laboratory are Python Interpreter, Perl Interpreter, Linux Operating Systems



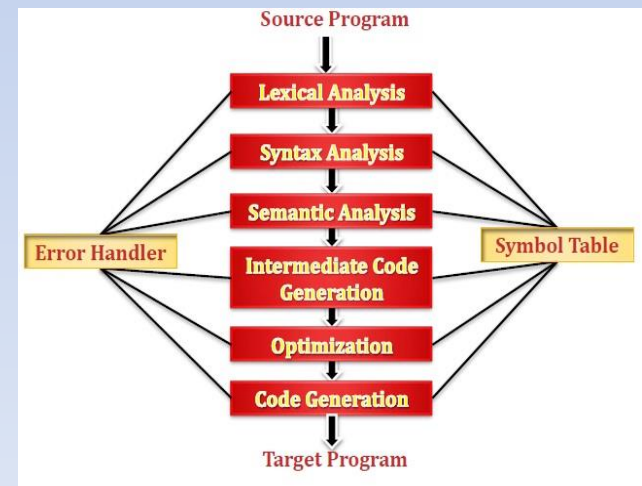
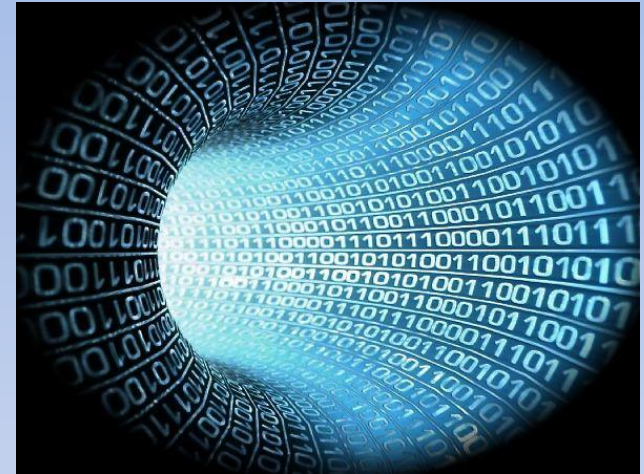
This lab is very useful for project students working on application program design and also graphical user interface design (GUI) as Perl provides rich library for pattern matching and Python provides rich library for GUI design.



Compiler Design Laboratory

Objective of this laboratory is to train students to design various phases of compiler such as Lexical analyzer, syntax analyzer, semantic analyzer, intermediate code generator, code optimizer and code generator. Students are also exposed to design compiler construction tools such as lexical analyzer generator and parser generator. Applications of finite state machine and pushdown automaton in compiler design are also taught in this Lab. The tools used in this laboratory are Linux OS, cc/gcc/g++ compilers.

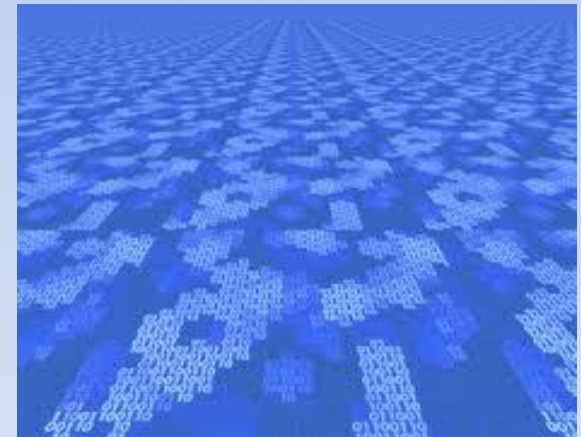
This lab also helps project and research students who are using concepts such as finite state automata, push down automata, regular and context-free languages and grammars. This lab also provides skills to design compiler for new programming language.



Software Engineering Practice

The objective of this lab is two fold. As part of Software Engineering, students are expected to learn how to write Software Requirements Specifications as per IEEE format, software design using UML (Class Diagram, Use case diagram), and how to write technical documentation as per industry standard (function call-tree, class-object diagrams).

As part of Database systems, students are exposed to ER diagrams, SQL queries. A mini-project using PHP and MySql is also undertaken. On the research front, implementation of Database design Algorithms and its analysis are done. SQL query optimization and minimization are also explored. Study on emerging trends like data mining, data warehousing , indexing are also done.



Computer Networks Laboratory

The focus is on learning Socket API programming. Lab exercises include interconnecting two systems in wired/wireless mode, transfer of files using Socket-API, implementation of CRC-32, checksum algorithms, simulation of stop and wait protocol. Implementation of unicasting, multicasting and broad casting.

Some on going projects

- Study of delay vs throughput for IIITDM campus network .
- Study of Wi-Fi and WiMax protocols at Layer-2.
- DDoS attack and its impact on network
- Optimum campus network design from both wired and wireless, Perspectives

Resources

30 Dell T1600 Workstations; Red Hat Enterprise Linux; Gcc/g++.

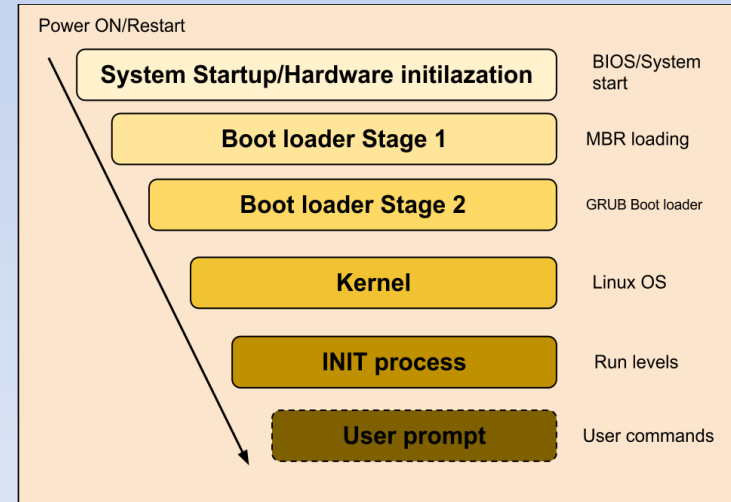
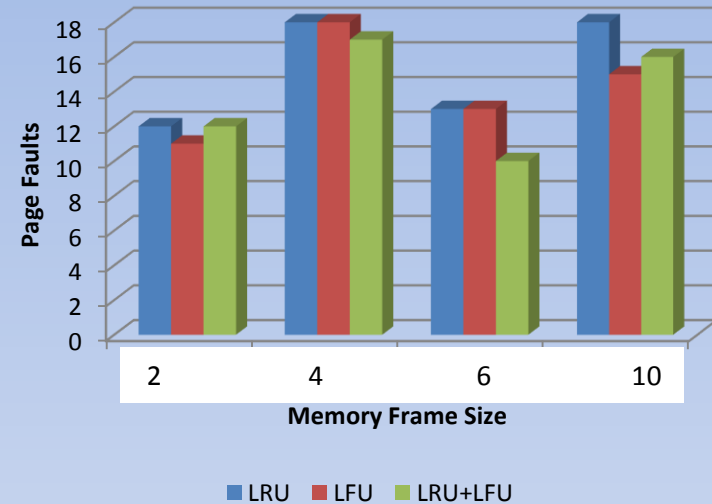


Operating Systems Laboratory

The Practice course emphasizes on design and development of modern OS.

Current facilities that include Workstations, Open source Compiler and Xilinx EDK environments are used for modeling the concepts of the operating systems.

The focus of the lab is to impart the operating system concepts like system calls, process handling, scheduling, deadlock, semaphores, threading, page replacement algorithms.

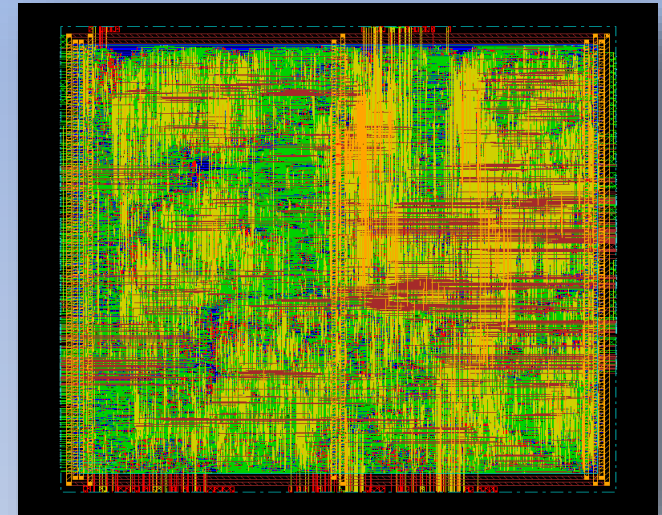


Booting Process Sequence

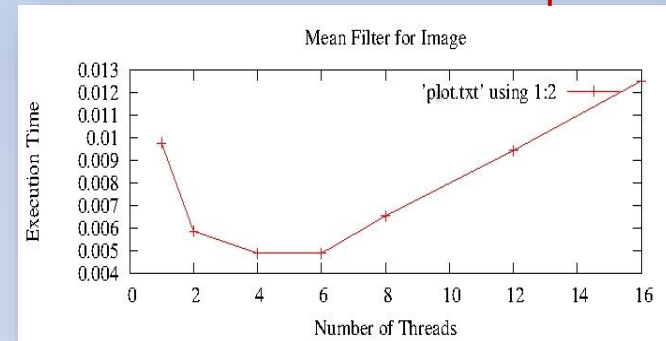
Computer Architecture Laboratory

The **Computer Architecture Laboratory** of the institute provides state of the art facilities for the design and implementation of the High Performance Circuits & Computer Systems. Current facilities that include Cadence digital system prototyping tools and Xilinx ISE environments are used for modeling the digital system and the same is used for estimation of area, power and delay.

The focus of the lab is to impart the high performance arithmetic circuit design, high performance dynamic Instruction Scheduling and out-of-order processor design, Modeling of multi-core processor, Cache design. The designed circuits are synthesized to estimate the speed, area and power. Threaded programming for multi-core processor and CUDA using openMP and CUDA APIs.



Wavelet Transform Chip



Multicore Programming using OpenMP

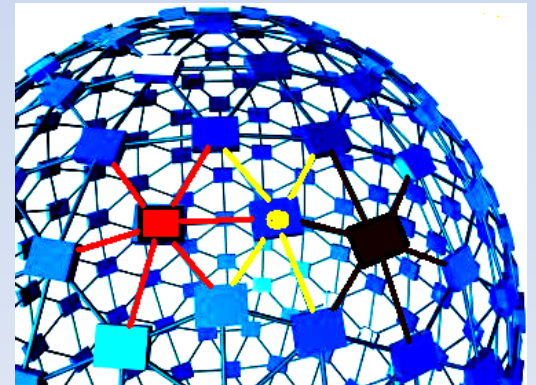
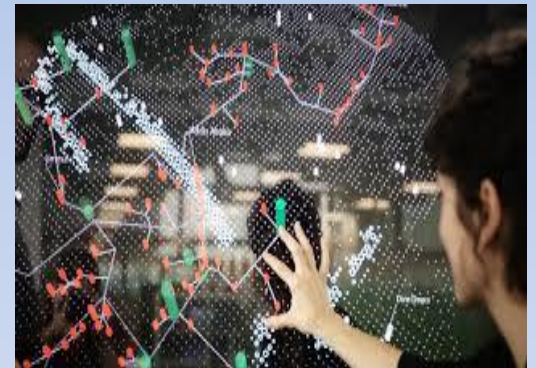
Simulation and Modelling Laboratory

Initial phase of the simulation exercises include Introduction to Scilab, Scilab programming for Curve fitting and Root finding.

Second phase includes simulation of Finite Automata, Push Down Automata and Turing Machines. Final phase includes simulation of a networking protocol, namely, sliding-window protocol.

Ongoing Projects

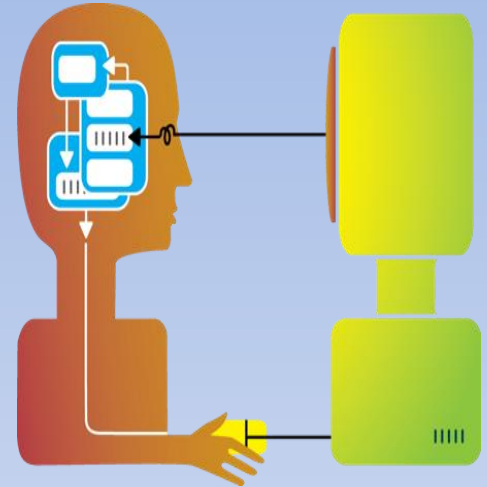
Modelling and simulation of Layer-2 protocols were explored. Impact of approximation ratio on special graph classes was Explored through simulation for classical problems like Vertex cover, Steiner tree, etc., Simulation of parallel Algorithms for biconnectivity augmentation was explored.

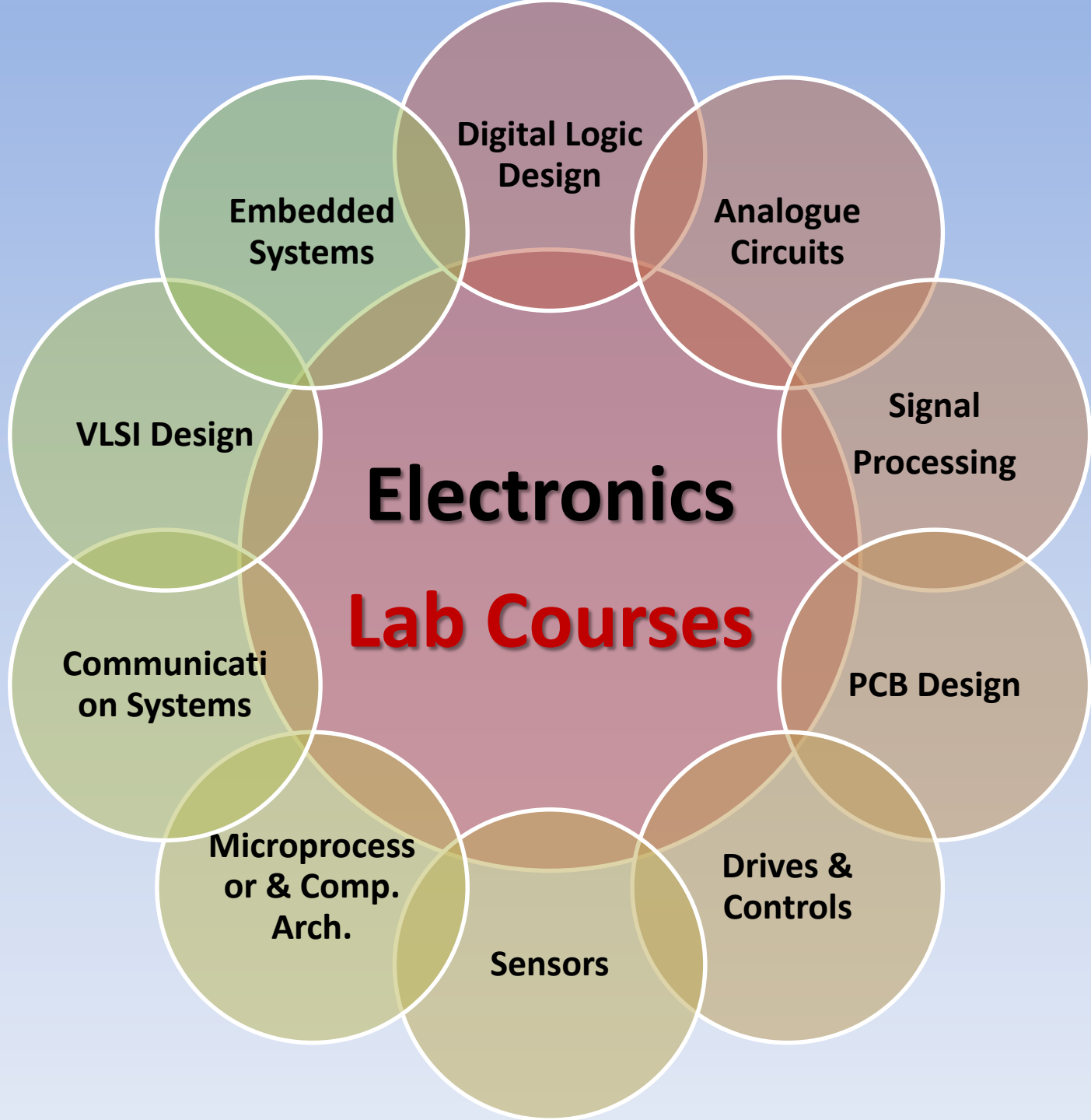


Human Computer Interaction Practice

The course is a higher semester Interaction Design Principles course and focuses on design principles in the context of software development. Cognitive issues involved in interface design, user support systems, evaluation that enhance usability of apps is explored.

HCI concepts such as primality, recency, 7+-2 rule, CAPTHCAs, Loading Bars, etc. related to application software development are test driven. Experiments that highlight the keyboard layout, mental models & its violation, Fitts Law simulation, GOMS model, web usability / Accessible & Universal Design principles are explored using applications such as loading bar / progress bar design. HCI Lab supporting 35 Dell & HP Systems – IDE (Integrated Development Environment) for Software Design & Implementation hosts the lab sessions. B.Tech projects such as frameworks (quantitative & qualitative) for design / evaluation of loading bars, CAPTCHAs, search engines etc. are carried out as an extension to the concepts covered by the course.





Digital Logic Design

Analogue Circuits

Signal Processing

Electronics
Lab Courses

PCB Design

Drives & Controls

Sensors

Microprocessor & Comp. Arch.

Communication Systems

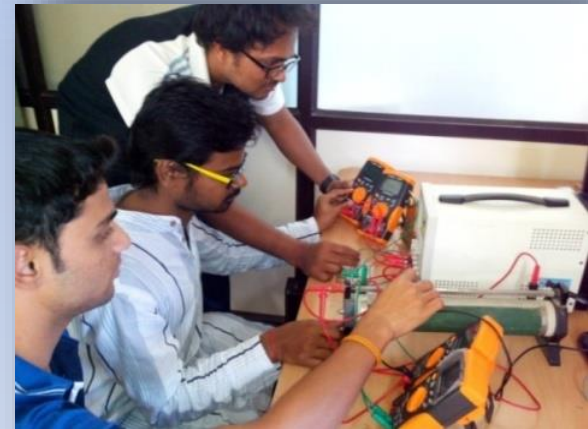
VLSI Design

Embedded Systems

Electronic Circuits

The Electronic Circuits Laboratory of the Institute provides the state of art facilities for designing, implementing and testing various electronic components/circuits and devices. A diverse types of licensed software viz. NI Lab View (Multisim) etc. are also available for simulating innovative electronic circuits before its realization of printed copper boards/ Bread boards.

A high quality Agilent/Lecroy make digital oscilloscopes (200 MHz/ 2Gs), function generators (20 GHz), variable power supply, multimeters, BreadBoards, electronic components are available for training the UG/PG students to learn the basic electronic principles of designing and implementing rectifiers, amplifiers, oscillators, filters, clippers, clampers, voltage regulators, transistor biasing in their respective practice sessions.



Digital Logic Design Laboratory

The **Digital Logic Design Laboratory** of the Institute provides both the knowledge and skills required to design digital circuits and formalism of logic enabling students to analyze logical processes.

Current facilities include Digital trainer Kit, IC tester, NI Multisim.

The goal of the lab is application oriented design and practical real world problem solving by digital techniques. The current research activities include design of consumer electronics.

The facilities are used for the practice sessions of B Tech (EDM) and M Des (EDS).



Networks and Systems Laboratory

The **Networks and System Laboratory** is to introduce students the practical, circuit design, and to provide them good engineering skills. The experiments covered in this laboratory are in synchrony with the theory.

Current facilities include Tektronix F.G, Tektronix DSO, MATLAB, NI Multisim, LABVIEW.

The objective of the lab is to experimentally test and evaluate electrical circuits and systems. It is important that students develop this practice using modern lab equipments similar to that in industry. The current research activities include Electrical discharge machining.

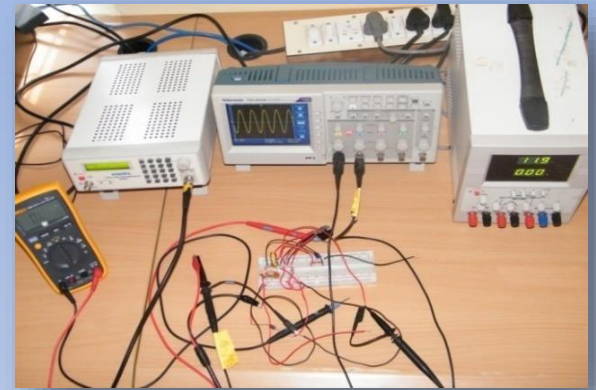


Analog Circuits Laboratory

The **Analog Circuits Laboratory** of the Institute is intended to enhance the skills of the students about analog circuits.

Current facilities include NI Multisim, LABVIEW, Orcad, LT Spice.

The aim of the lab is to introduce the basic electric circuit components to the students and strengthen the circuit analysis methods practically with the help of the experiment methods which is similar to that in industry. The current research activities include Mixed analog/digital VLSI, Simulation and modeling mixed-mode simulation, analog nonlinear and computational circuits and signal processing.



Analog IC and Applications Laboratory

The **Analog IC and Applications Laboratory** of the Institute is intended for IC design and IC test experiment, including analog IC design, VLSI testing, VLSI design and synthesis in relation to the real-world application.

Current facilities include NI Multisim, LABVIEW, Orcad, LT Spice.

The aim of the Analog Integrated Circuits Application Laboratory is to give the students a better understanding about the circuit integration on a single chip. It also provides training to the students according to the need of the industry. The current research activities include high-speed digital and high-frequency analog circuits, microwave circuits, memories and consumer electronics.

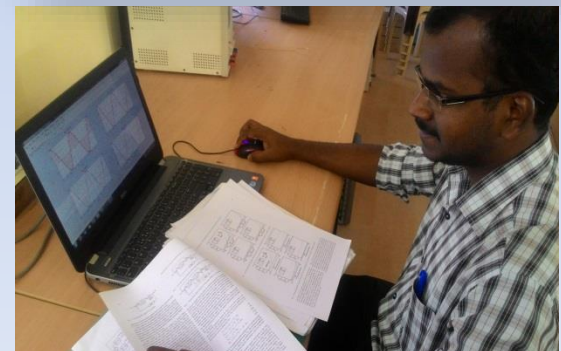


DSP Laboratory

The **Analog IC and DSP Laboratory** of the Institute is envisioned to teach students about analog circuits, signal processing algorithms on the computer as well as on DSP boards. The lab comprises of test and measurement equipment for doing advanced research and development work in digital signal processing field.

Current facilities include TMS320C6713 DSP kit, CCS Studio (DSP Edition), MATLAB, NI Multisim.

The objective of the lab is to provide information on the principles of digital signal processing, digital communications, DSP chip. The current research activities include analog and digital filter design for highly accurate measurement, audio and image processing.

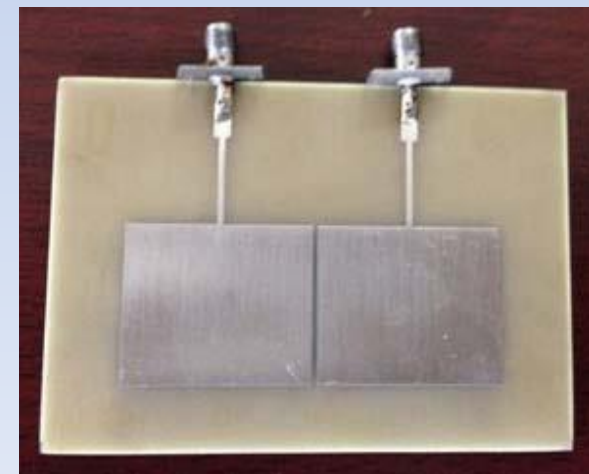
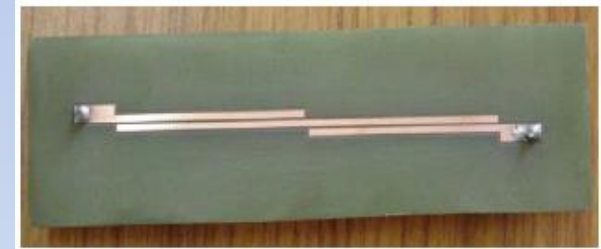
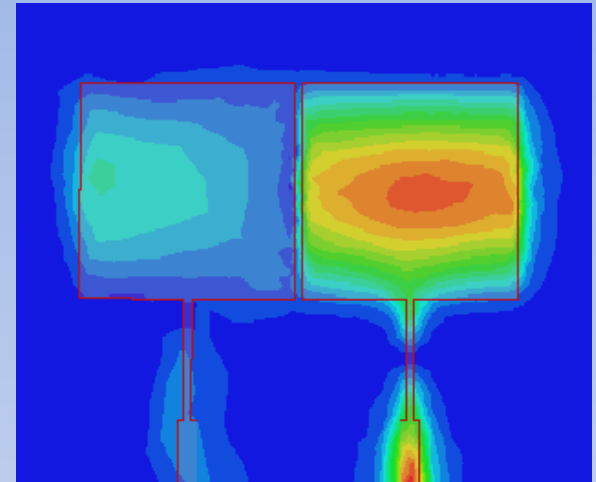


RF Circuit Design Laboratory

The **RF circuit design laboratory** at the Institute is motivated to work towards the design and analysis of microwave circuits and components for RF/Microwave and millimeter wave applications including antennas.

Current facilities include Microwave test benches, Network analyser, MIC trainer and workstations equipped with AWR Microwave Office, Ansys Designer and Ansys HFSS.

The focus of the lab is on learning basic principles in Microwave and RF Communications as well as system level simulations. The current research activities include design and development of performance enhanced power dividers, antennas and microwave sensors.

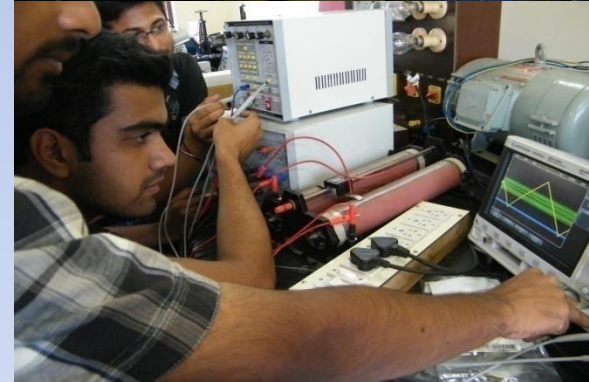


Electromechanical Energy Conversion Laboratory

The **Electromechanical Energy Conversion Laboratory** of the Institute provides the facilities to study the operation, analysis and performance of various electrical machines.

Current facilities include Single phase Transformers, Rotating machines like DC Machines, Single & Three phase induction machines, Synchronous machines, in addition to special machines like PMSM & BLDC.

The focus of the lab is on performance analysis of electrical machines. The current research activities include analysis of PMSM and BLDC machines for efficient energy conversion.



EMIC and Communication Practice Laboratory

The **EMIC and Communication Practice Laboratory** of the Institute provides the state of the art facilities for conducting experiments on Electromagnetic Interference, Microwave Communication, and Digital Communications.

Current facilities include an EMI/EMC hardware kit (consisting of an EMI source module and an EM coupling module), and workstations equipped with MATLAB and Simulink packages.

The focus of the lab is on learning basic principles in Microwave and Wireless Communications as well as system level simulations. The current research activities include system level simulation of MIMO wireless, and cooperative diversity systems .

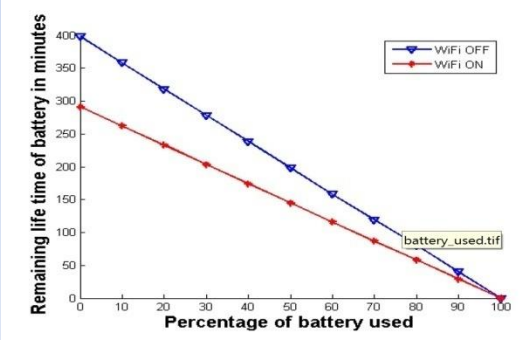
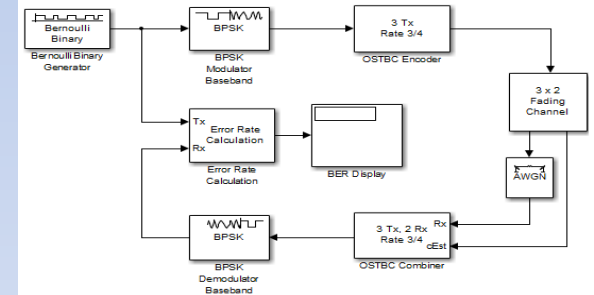
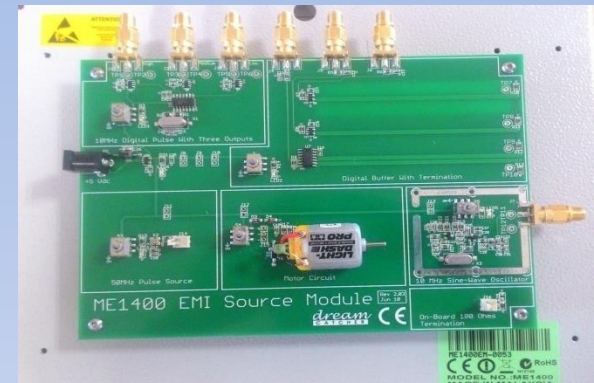


Fig. 1. Experiment to demonstrate energy saving:

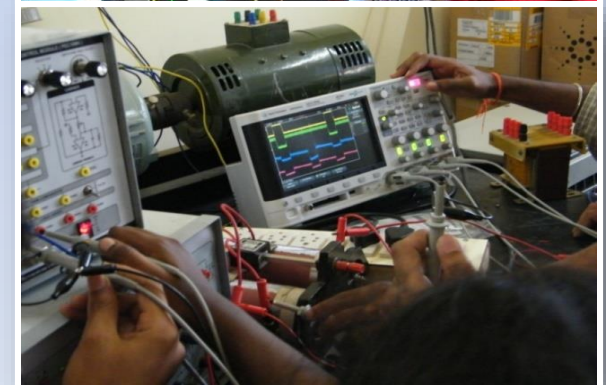
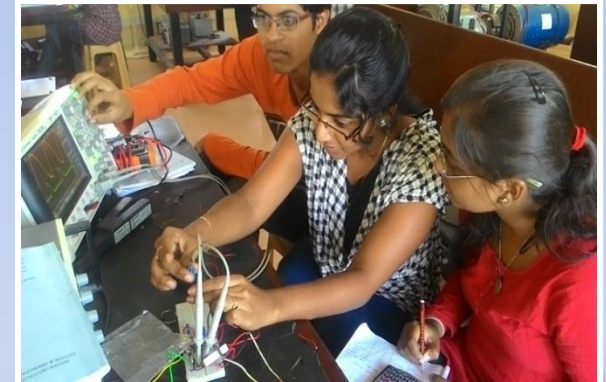
Power Electronics Laboratory

The **Power Electronics Laboratory** of the Institute provides the facilities for realizing various power electronic converter circuits.

Current facilities include DSP & Microcontroller Boards, 200 MHz - 4 channel DSOs, 50 MHz Current probes, DC Power supplies, in addition to various converters.

The focus of the lab is on design, analysis and implementation of power electronic circuits. The current research activities focus on DC-DC converters, PWM switching techniques of Inverters and Harmonic reduction by active filters.

The facilities are also used for the practice sessions of B Tech (EDM)



Data Networks Practice

The Data Networks Practice course helps the students to study the advances in communication such optical amplifier, WDM, and stop and wait protocol. In optical fiber communication, we study how light transmits information from one place to another through optical fiber using the principle of total internal reflection and minimising the losses.

The laboratory is equipped with Function Generator, Digital Storage Oscilloscope, Fiber optic kit, Wicom-T kit, LAN Trainer kit, Netsys-T kit, and Optical fiber trainer kit.



Electronic Circuit Design Practice

The practice course introduces the student to practical circuit design and analyze the circuit by constructing it using devices and components. The experiments covered in this laboratory are synchronized with its theoretical part so that students are able to understand the practical aspects of it.

Current facilities include Digital Signal Oscilloscope, Function Generator, and Power Supplies in addition to the Multimeters.

The experiments such as design and development of amplifier, rectifiers, comparators, clippers, clampers, analog and digital converters, etc.

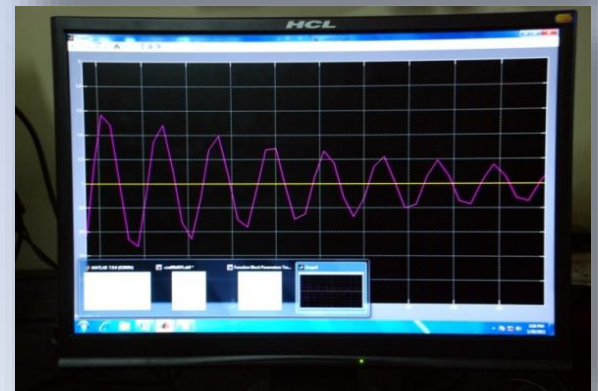
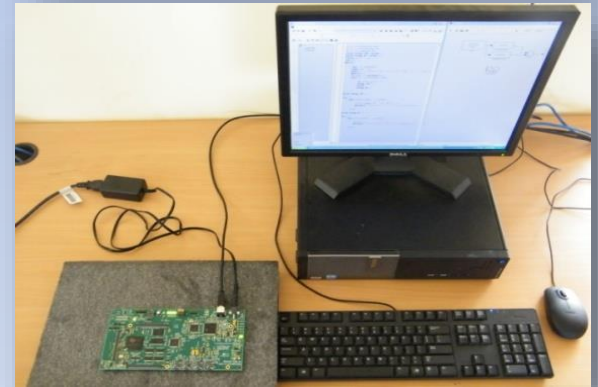
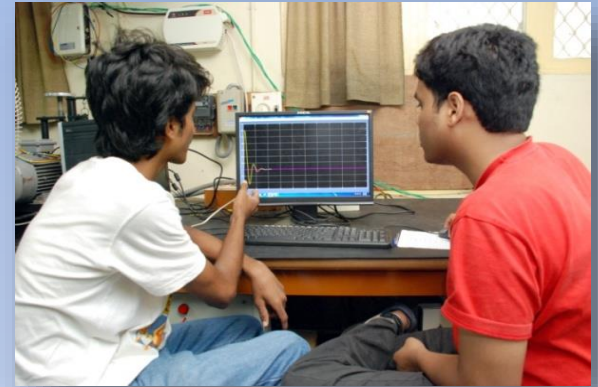


Analog & Digital Communication Signal Processing

The course provides comprehensive, hands-on instruction in the terminology, principles, and applications of analogs digital communication circuits. Over the last two decades, digital communications have become prominent because of its ability to support high datarate and low BER.

Current facilities include Tektronix Digital Signal Oscilloscopes, Function Generators, Power Supplies in addition to the active devices and passive components.

The laboratory focuses on system level simulation performance of communication systems. The various modulation techniques have been studied.



VLSI Design Practice

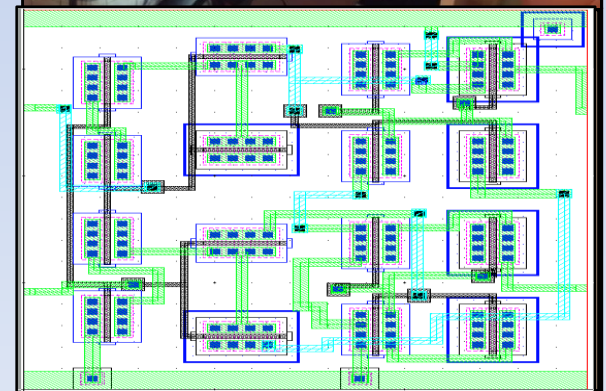
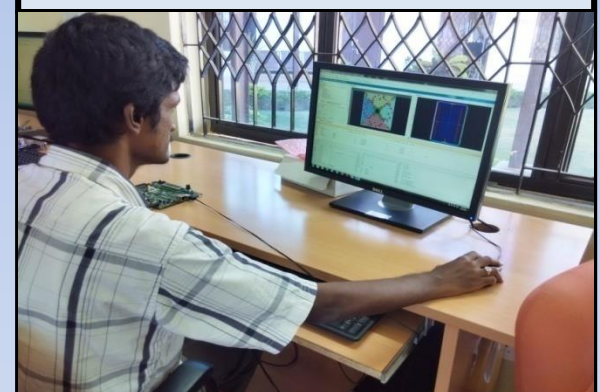
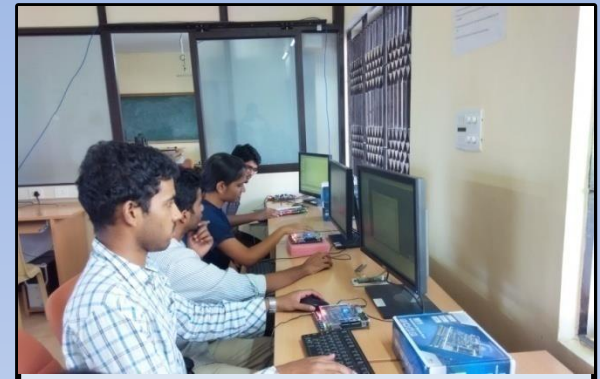
Laboratory type :UG & PG & Research

The VLSI Design Lab equipped with advanced EDA tools and sophisticated development platform to foster strong digital and analog design environment.

FPGA prototyping using Xilinx Spartan 3E (22), Altera DE1 (6) and DE2 (4) supported by Altera subscription edition (10 licenses) provides comprehensive methodology for hardware design

Cadence university Bundle full suite (30 license) enables full custom analog and digital IC Designs.

Notable Ongoing Research topics includes PLL Design, High speed Multipliers design, High performance DSP Architectures, FPGA based Power converters and Reversible logic circuits.

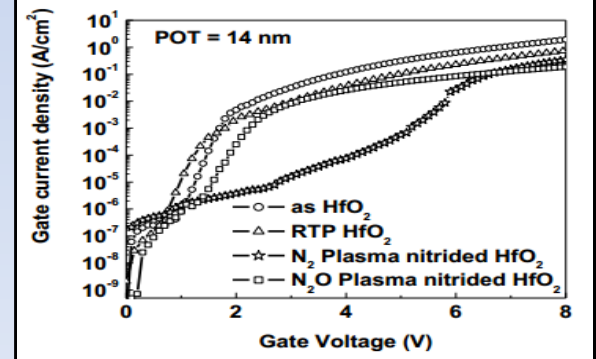


Solid State Devices Laboratory

Solid State Devices lab ensures undergraduate in getting good exposure to semiconductor devices its characterization and modeling. Aided by SPICE and MULTISIM simulation for characteristics analysis, laboratory workbench are available for physical testing and validation.

Equipped with AGILENT and TECKTRONICS high bandwidth oscilloscopes. Research on device modeling is supported by SYNOPSIS EDA package and INTELLISUITE integrated design environment (MEMS).

Notable Ongoing Research includes Simulation and Modeling of leakage current characteristics of SiC MIS capacitors and experimental study of these capacitors fabricated in IISc Bangalore lab.



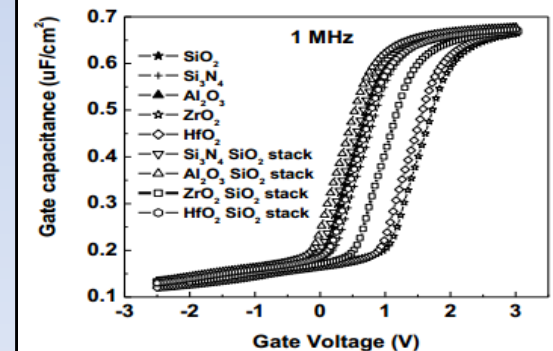
Analog Circuits Laboratory

Analog Circuits lab ensures undergraduate in getting good exposure to design and implementation of analog circuits based on MOSFETs, BJT's and Op Amps.

Aided by SPICE simulation using LT Spice they perform simulation studies of all circuits before their actual implementation on breadboard. Physical testing, optimization of design and parameters and validation of results are also done.

Students are also introduced to CADENCE analog simulation platform in which they complete the design of a simple two stage operational amplifier.

Notable Ongoing Research includes design of Analog Multipliers, Voltage controlled oscillators and Phase locked Loops.



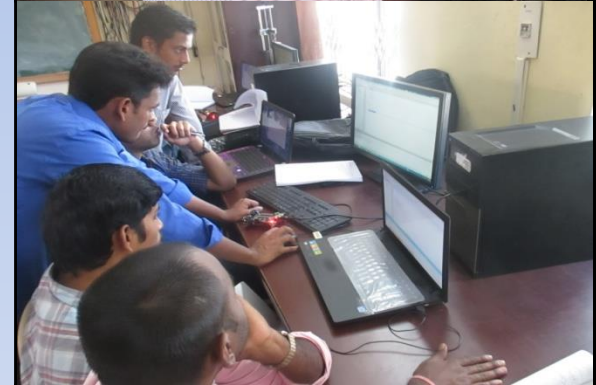
Embedded Systems Practice

Laboratory type : PG/UG

Students get introduced to KEIL 4 micro Vision Software & LPC2148 Micro controller .

They develop different models using the microcontroller including realization of port functionality, ADCs, DACs, USB communication , Serial communication, Video interfacing, Audio interfacing, PS/2 Communication and implementation of semaphore using RTOS .

Using MSP 430 Microcontroller and IAR Embedded Work Bench 5.20 , they develop Interrupt driven Process control system, Interfacing of 16X2 LCD, ADC, Serial communication, Multiprocessor communication and RTC implementation



PCB and Embedded Design Practice

Laboratory type : PG

PCB and Embedded Systems lab is composed of experiments from PCB Design as well as development of Embedded Systems.

Using ORCAD PCB 9.1, the students get expertise in Schematic Symbol and Schematic Net List creation, Placement and Routing of Components and Constrains to be taken care of, Length Matching and Silk Screen Assembly, SMD and Through Hole Component footprint Creation and Pre GREBBER to GREBBER file Generation.

They verify the results by fabricating the PCB using MITS milling machine. Notable Ongoing Project work includes design and implementation of all B Tech and M Des project works in which they build the prototype of the electronic product as end product of the project.



PCB/Prototype Design & Development Practice

The **PCB Prototype Design and Development Laboratory** of the Institute provides specialist training that are at the intersection of software and hardware.

The course equips students in the area of design implementation for multi-layer PCBs, various aspects of routing, scripting, component placement, spacing constraints and manufacturing file creation using different EDA tools. This practice course fulfills the skill requirements of industries in the areas of electronic design automation, and industrial automation.

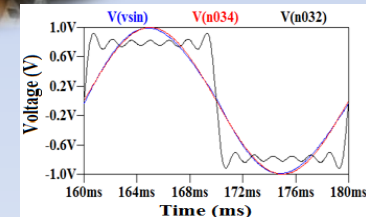
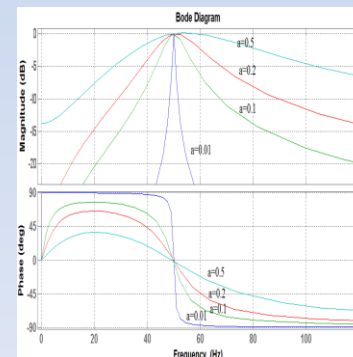
Software facilities

MITS Design Pro

Hardware facilities

MITS PCB Prototyping Machine

Soldering Workstations for SMDs



Electronic Instrumentation Laboratory

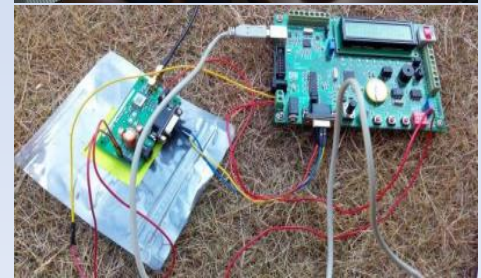
The **Electronic Instrumentation Practice Laboratory** of the Institute provides the state of the art facilities for realizing ideas of next generation engineers to develop systems.

Current facilities include

- NI QNET MECHATRONIC board
- NI ELVIS board
- NI Medical instruments board
- Inductive & capacitive pickup
- Temperature controller

The focus of the lab is to provide principle knowledge, practical training and best measurement practice for a range of temperature, pressure, electrical, velocity, acceleration etc of dynamic systems.

The current research activities include developing intelligent instruments like wireless EEG, non invasive monitoring of hemoglobin, Automatic system for vehicle safety etc.



Control Engineering Practice Laboratory

The **Control Engineering Laboratory** of the Institute is a basic interdisciplinary laboratory exploring students of 4th semester to model various dynamic systems, and design controllers for closed loop systems.

Current facilities include

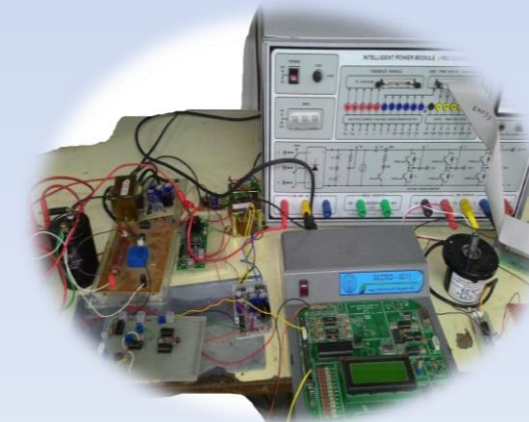
Hardware:

- NI ELVIS II
- Quanser Inverted Pendulum
- Quanser DC motor Control
- Air flow controller

Software :

- Lab VIEW
- MATLAB R2010a

The current research activities include implementation of digital controllers using FPGA or DSP processors for electrical power applications.



Instrumentation Engineering Laboratory

The **Instrumentation Engineering Practice Laboratory** of the Institute provides exposure to state-of-the-art instrumentation, sensors, transmitters, analog and digital controllers. Current facilities include

- NI QNET MECHATRONIC board
- NI ELVIS board
- NI Medical instruments board
- Inductive & capacitive pickup
- Temperature controller

The focus of the lab is on calibrating and interfacing sensors for various dynamic systems to provide system level manufacturing solutions.

The current research activities include developing intelligent instruments for medical, manufacturing and automobile applications.



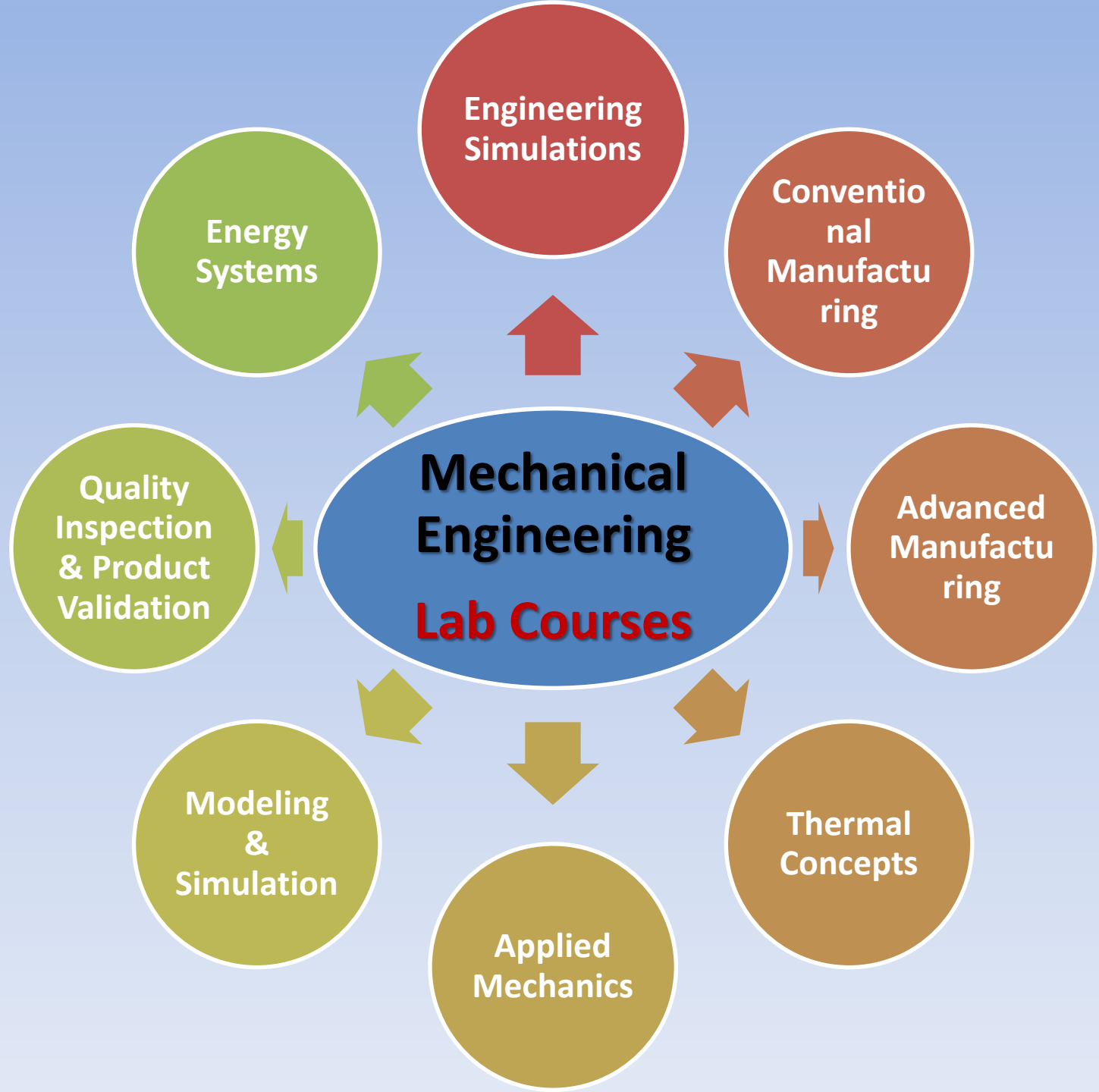
Microprocessors and Embedded Controllers

The **Microprocessors and Embedded Controllers Laboratory** of the Institute contains variety of microprocessors, microcontrollers, and FPGA kits along with various digital interfaces, stepper motors etc. for implementing smart electronic solutions in real-time.

The laboratory is also sufficiently equipped with licensed versions of advanced software viz. RIDE, MASM, Verilog Xilinx WinTalk, WinISP etc. for programing , interfacing and controlling the 8085, 8086, 8051 and Sparten 3E Xilinx boards.

The facilities are also employed for training the UG/PG and Ph. D. students in their respective laboratory/practice sessions and for executing their projects/research activities towards translating the usage of software in controlling the hardware for automation .





Thermal Engineering Lab

The **Applied Thermal Engineering Laboratory** is planned to provide the students the opportunity to perform experiments and understand the application of theory covered in various courses on fluid and thermal engineering.

The lab is equipped with sophisticated experimental setups. The experiments include performance study of extended surfaces, heat exchanger, refrigeration system, air cooled single cylinder spark ignition engine, solar water heater. Determination of viscosity, losses in flow through pipes and valves, are also carried out.

The associated research activities include development of wind tunnel and study of flow visualization, nucleate boiling, flow boiling, miniaturized heat exchangers, freeze drying, etc.



Precision Manufacturing & Metrology Practice

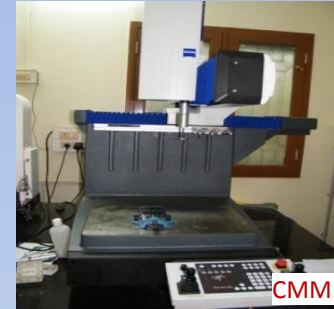
This laboratory provides hands-on experience with industrial-grade CNC machines. Students gain knowledge in writing CNC programmes, generation of codes, execution of these tasks for turning and milling operations and inspection of machined parts. Also included is a 3D printing machine capable of converting a 3D CAD model in to a prototype .

Current facilities include 3D Digital printer, CNC machines, besides conventional machines and sophisticated metrology equipments such as CMM and Video Microscope.

The current research activities in this lab includes manufacturing process and system simulation, process planning, production planning, manufacturability analysis and manufacturing automation.



CNC Drilling M/c



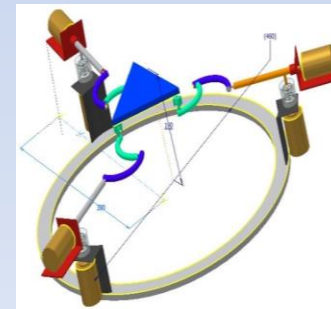
CMM



Universal Milling M/c



Optical Microscope



Mechanism for 3D Machining Centre



Gripper for Compliant Machining

Mechanical Engineering Practice

The **Mechanical Engineering Practice** provides the elementary idea about the basic machining processes such as metal joining, turning, milling, drilling, sheet metal working etc. The practical relevance of Pneumatic, Electro-pneumatic circuits and surface morphology practice is also included.

Current instrument facilities include universal milling machine, lathe, surface roughness tester, metallurgy microscope, Shear cutter, Double disk polishing, Belt lining machine, 3D printer, Rockwell Hardness Test and cutting, hand tools etc. These amenities are utilized for the regular practice sessions (II B.Tech Mechanical) and also for project purposes of B Tech, M Des and PhD.



Robotics and Automation Practice

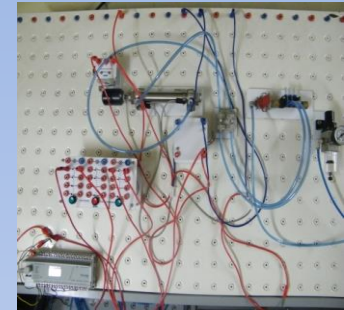
This Laboratory provides hands-on experience in design, development, mathematical modeling, simulation and experimental validation of various robot mechanisms and automation devices such as PLC operated pneumatic circuits. It also includes study of forward / inverse kinematics and dynamic analysis of mechanisms using specialized software such as ADAMS.

Current facilities include: ABB Industrial Robot, Robot kit with servo actuators, PLC based electro -Pneumatics, Multipurpose Carronbot with Vision Guided Multifunctional Capabilities and Mobile Robots

The focus of the lab is to provide hands on experience in the design and development of various robotic and automation systems .



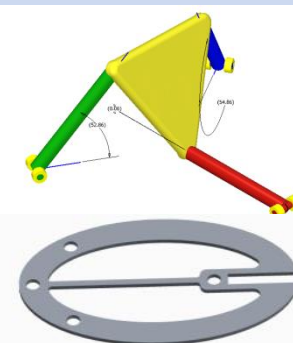
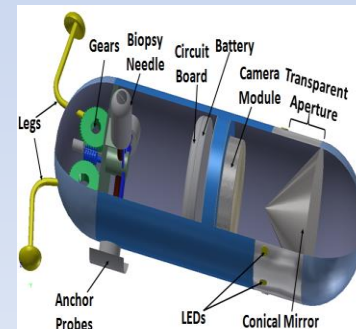
ABB Robot



Electro Pneumatics Kit



Carronbot



Mechanisms and Robotic Devices Developed

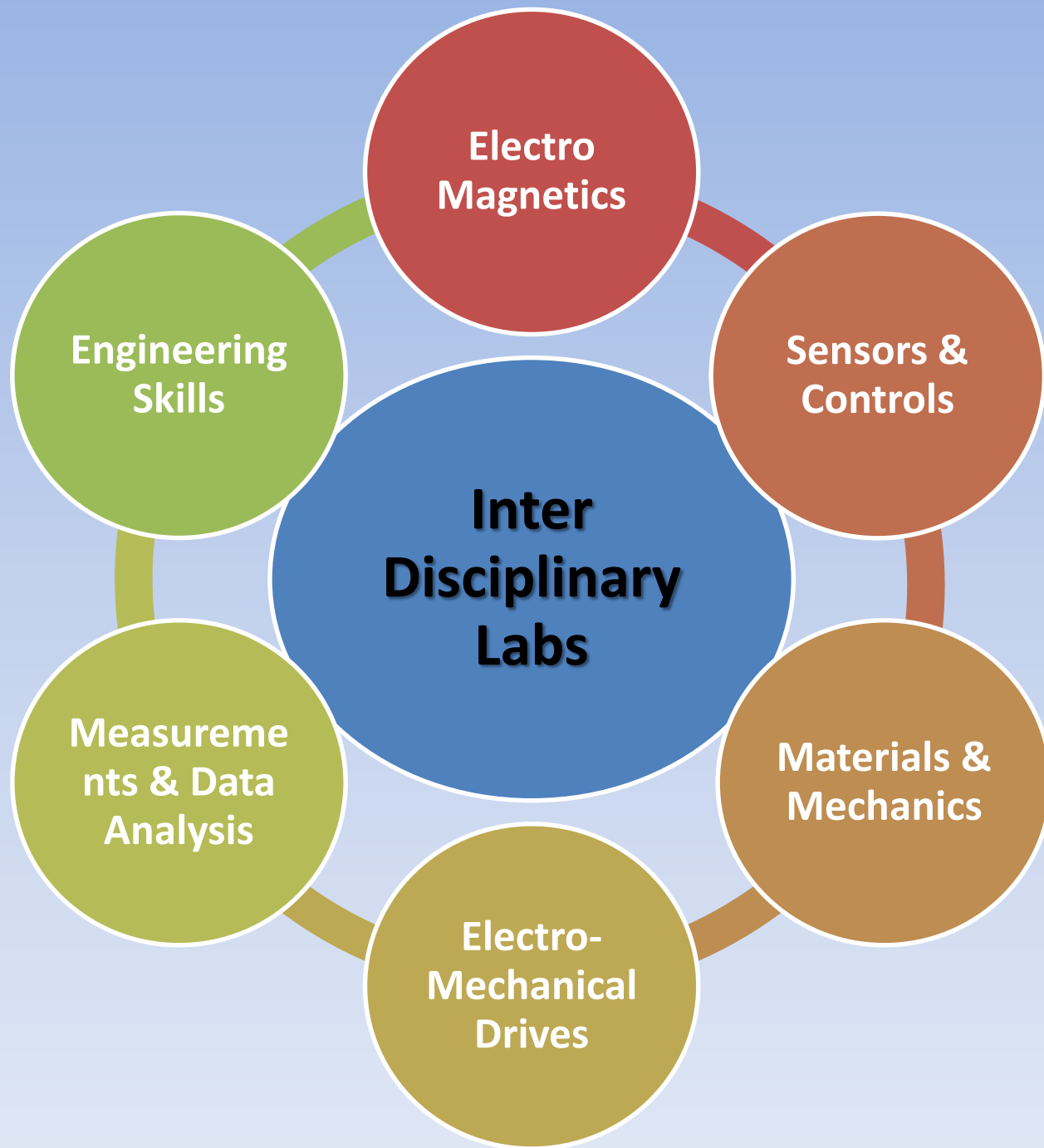
Robotics and Automation Laboratory

The **Robotics and Automation Laboratory** of the Institute, provides the state-of-the-art facilities for realizing kinematic and dynamic behavior of the manipulators and simulation of the several mechanisms in the virtual environment using specialized software.

Current facilities include ABB serial manipulator, Robix kits, Pneumatic panel and software such as, Adams ®, Matlab ®, and Robix ®.

The focus of the lab is to teach the inter-disciplinary concepts and working principles involved for developing the manipulators. The current activities also include kinematic and dynamic simulation in Adams ®, and using Matlab ® to explore the possible rigid body transformation prior to the design phase.





Measurement Techniques Laboratory

The **Principles of Measurement Laboratory** provides facilities for design and realization of various measurement techniques for next generation of engineers.

Current facilities include NI LabView Software, NI ELVIS Boards, Bridges in addition to DSOs.

The focus of the lab is on design and testing of measuring techniques. The current research activities include performance analysis of various measuring techniques.

The facilities are also used for the practice sessions of B Tech (EDM)



Mechanics & Materials Laboratory

The **Engineering Mechanics & Materials Laboratory** is equipped with the state-of-the-art facilities for understanding the basic principles of Engineering mechanics, and realizing the strength of materials and geometries.

The lab is equipped with sophisticated testing instruments and indigenously designed and built modern experimental setups. The experiments include the testing of specimens subjected to tensile load, determination of modulus of elasticity of metallic and non-metallic materials, measurement of strain and torque, determination of the center of gravity, natural frequency, radius of gyration & moment of inertia.

Being a fundamental course lab, the practical sessions of this lab is common to all first year B.Tech. students regardless of their discipline.



Electromagnetic & Quantum Mechanics Practice

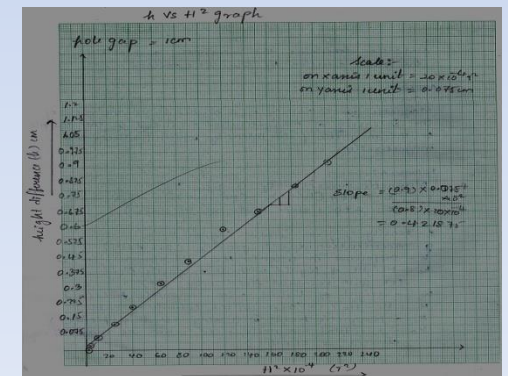
The Electromagnetics and Quantum mechanics Laboratory provides the state of the art facilities for realizing the concept in these subjects and educating the next generation of engineers.

This laboratory provides Experiments to understand some electrical and magnetic properties of materials such as dielectric polarization, resistivity, magnetic susceptibility etc. Some experiments are done here on quantum mechanics which give the idea about the energy quantization and the particle nature of light.

The facilities are used for the practice sessions of B Tech students from all branches and provides hand-on experience of the concepts.



Quincke's method -
Magnetic susceptibility



Engineering skills Practice

The **Engineering Skills Practice** of the institute provides the objective of the practice course is to understand some of the basic process associated with Mechanical, Electrical, Electronics and Communications Engineering.

The practice course covers Fitting, Drilling, Tapping, plastic welding, chemical etching, soldering etc., and also covers the study of serial & parallel connections, IR Trans-receiver principle, Emergency lighting principle and Printed circuit board.

Current equipment facilities are plastic welding machine, Bench drilling machine, Table saw, Jig saw, Circular saw, Scroll saw, wood turning lathe, cutoff saw, and essential Hand tools



Measurements and Data Analysis

The purpose of the Measurements and Data Analysis Laboratory lab is to introduce the students to different measurement techniques/instruments of data acquisition and statistical methods of data analysis. The course contents includes Evaluation of different measurement techniques in estimation of various physical/mechanical/electrical/ thermal/ parameters.

Reporting Methodology: Collection, consolidation and reporting of the data
Probability and Statistics: Presentation, analysis and interpretation of the data

Uncertainty/Error Analysis: Performance evaluation and determination

Signal Characterization, data acquisition and Analysis: Study of vivid waveforms and digitization process. The experiments incorporate the concepts of mechanics, thermal engineering, image processing, sampling, digitization, probability etc.)



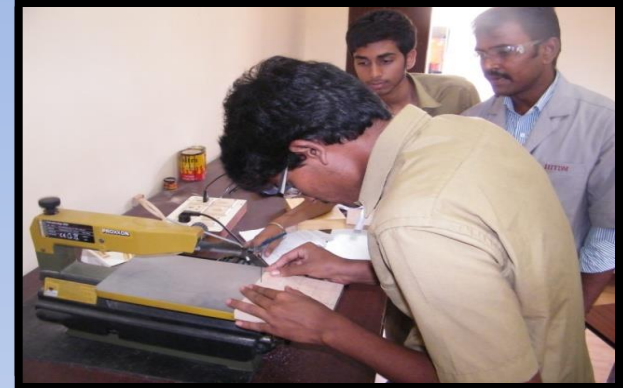
Basic Engineering Practice

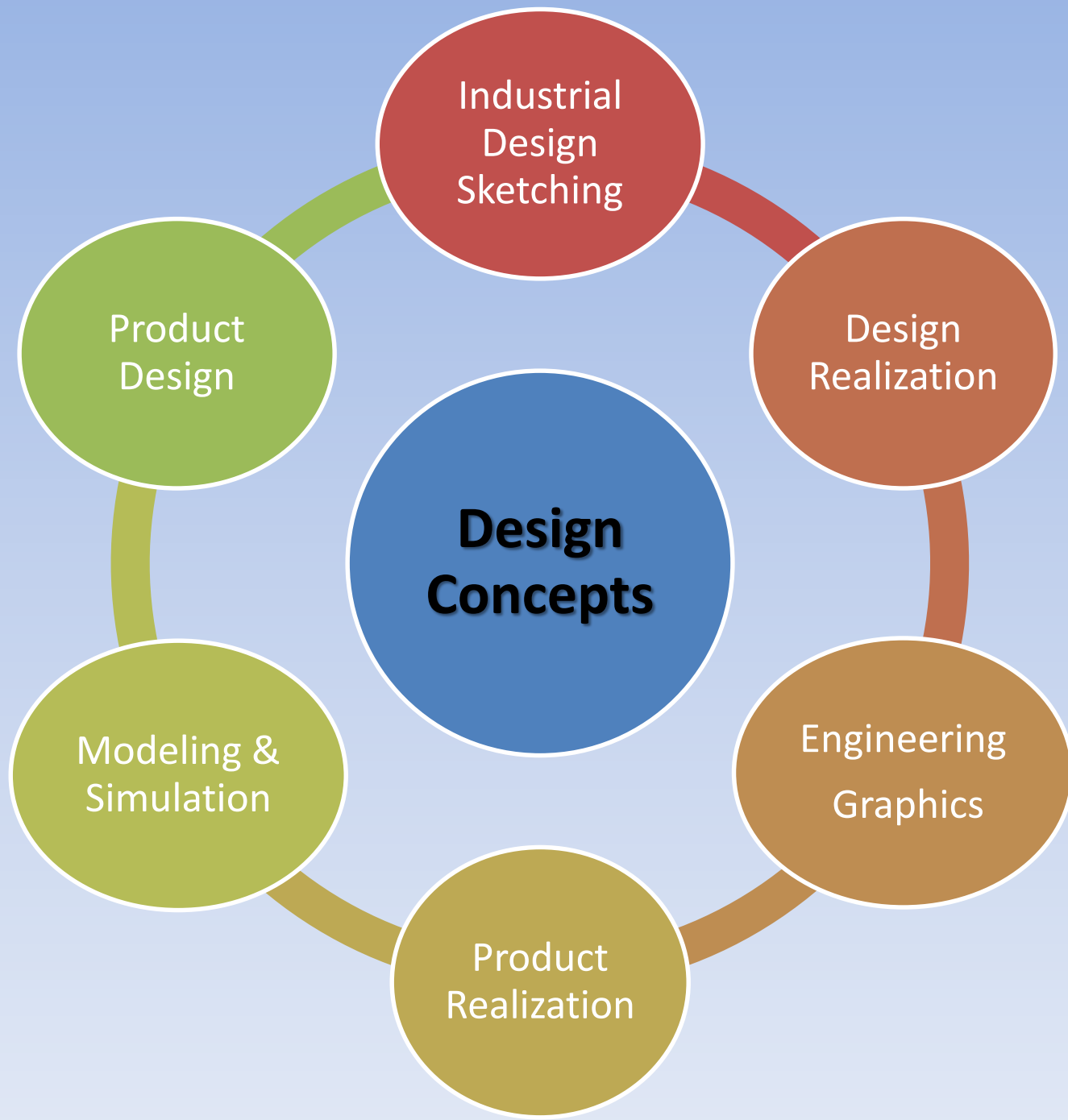
The objective of the Basic Engineering Practice is to equip the students in the area of three different engineering streams like Electrical, Electronics and Mechanical Engineering.

Students will learn the concepts about various components and its identification, soldering practice, bread board connections and also familiarization of equipments in the Electronics area.

The main focus in the Electrical area is to be aware of the essential safety concepts in House hold wiring and Energy measurements in electrical equipments.

In Mechanical stream, students are trained in the area like handling different machine tools.





Industrial
Design
Sketching

Design
Realization

Engineering
Graphics

Product
Realization

Modeling &
Simulation

Product
Design

**Design
Concepts**

Industrial Design Sketching

Objective of this course is to train the students in concept product sketching. Industrial design sketching laboratory course train the students in basics of perspective drawing, shading, texturing, coloring, color psychology and 3D sketching.

Learning the concept product sketching and modeling, aid the students to sketch & develop their own concept products in higher semesters.

Wacom Graphic tablet and CATIA V6 Software for concept product sketching.

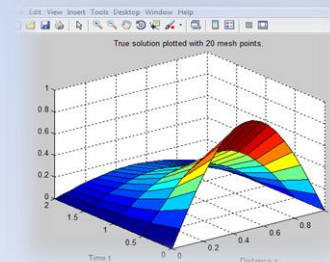
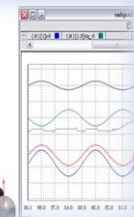
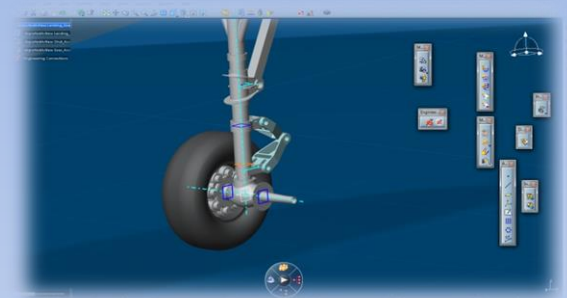


Engineering Simulation

Objective of this course is to train the students to carry out kinematic and dynamic simulation of machines, mathematical modeling & simulation of systems using professional software. Students use advanced modules of professional software to define the different kinematic connections between the parts of the assembly and then perform kinematic and dynamic analysis.

Students also learn to formulate the mathematical model of an engineering system by applying fundamental laws and uses numerical methods to simulate the behavior of the system.

Students are exposed to mathematical simulation of structural, dynamic, thermal, fluid, electrical and electronics systems. Learning the advanced simulation modules of professional software helps the student to develop innovative machine and mechanisms on their own. Learning the mathematical simulation helps the student to address practical engineering problems.

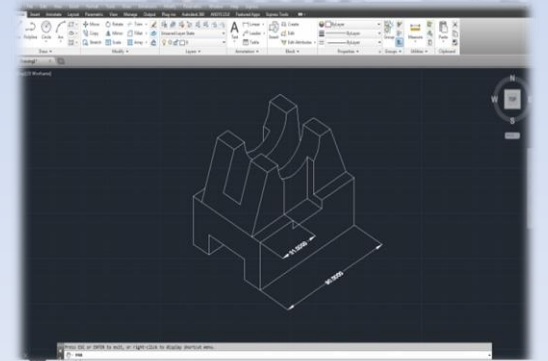
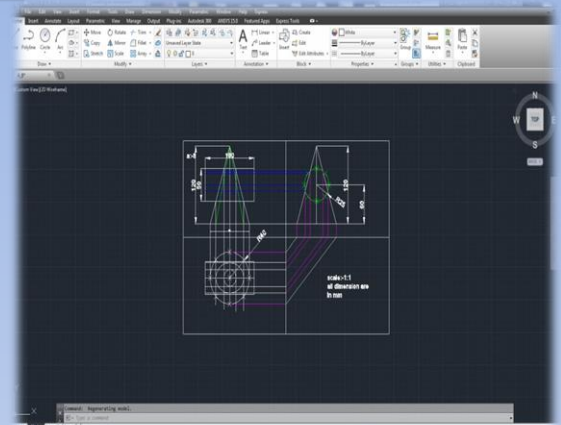


Engineering Graphics

The Objective of this course is to develop skills required to carry out basic drawing, 2D drafting, professional drawing. Engineering Drawing course train the students in basic technical drawing and 2D drafting.

IIITD&M Kancheepuram adopts software based training for Engineering Drawing and has been successfully implementing since 2008. In Engineering Drawing Course, students use Autodesk AutoCAD software to solve several problems from different topics such as, construction of plane curves, orthographic and isometric projection of objects, intersection of solids and development of surfaces.

Learning the drafting software aid the student to understand the engineering drawing fundamentals and provides strong foundation to learn the 3D modeling in higher semester



Design Realization Lab

The Objective of this practice course is to realize the designs and models. The lab course will help the students to realize the concepts through a systematic problem-solving methodology.

Concept selection, Idea generation using SCAMPER, concept screening , Adaptive Design, Need Analysis, Morphological analysis , TRIZ Contradiction and principles, Modular and Integrated Architecture, Aesthetic design, Product Dissection are dealt in this lab and the design is realized using clay, plastic, sheet metal, wood and thermocol models.

Current equipment facilities are Foam cutting machine, CNC router, Laser engraving machine, mojo printer, table saw, Hot gun, hand tools for clay, sheet metal, plastic, wood and foam modeling

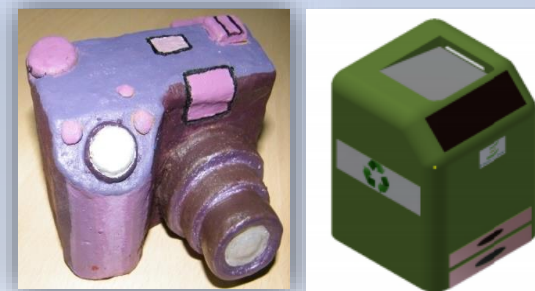


Product Conceptualization and Visualization

The objective of this theory cum lab postgraduate course is to teach the importance of design and conceptualization techniques in product development and visualize the design using suitable material. Students analyze the need, generate multiple concept and finally screen, rank and select the best concept for given task.

The students uses mind maps, brainstorming sessions, brain triggering sessions, morphological chart, inventive principles, product dissection etc and are practically dealt with reference to products of practical use. Students brings aesthetic, universality and ergonomics in to their design. Students are also provided with interdisciplinary group project where they arrive at novel concepts for a real time need of a customer.

The design, which is initially communicated in the form of pencil sketched are developed as models using clay, plastic, sheet metal, wood and thermocol models.



Product design practice and prototyping

The objective of the lab course is to allow the post graduate students to explore the design of products through physical and workable models. Using the design techniques that is taught in the previous semesters, the students are free to use additive prototyping or traditional model making of material of suitable choice. The student will be given an opportunity to shape your own ideas, concepts and theories through this lab course project. Finally the students will have to fabricate the real time working model of their idea.

This systematic approach of product design makes the students to bring aspects of commercial importance, safety features, eco-friendliness, ergonomics, aesthetics etc into the real time product.



Pickle salt meter



Temperature controlling valve



Under water robot



Fake note finder



Emergency tent



Bleeter

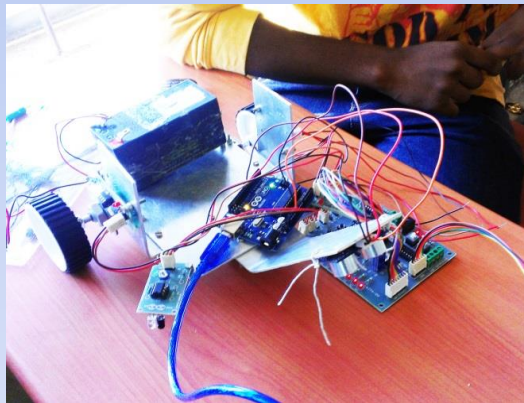
Product Design Practice and Prototyping



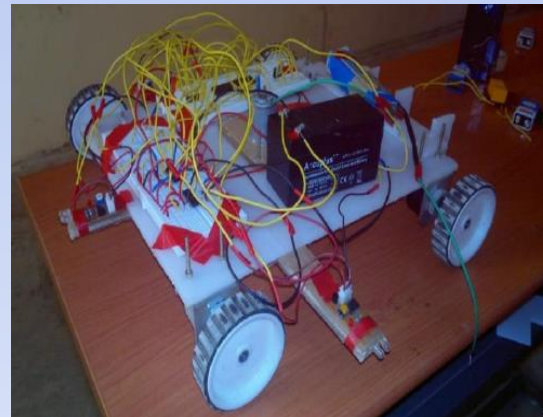
Reconfigurable Origamic Bag



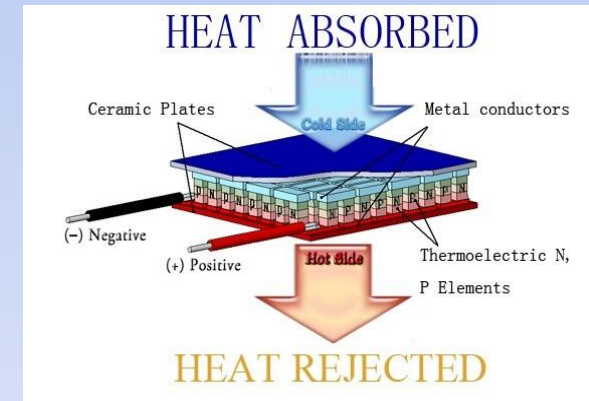
Energy Utilization from Waste Cooking Gas



Road Intelligent and Safety Equipment



Farm Automation Bot



Air Humidity to Water Converter