

## Opto Electronics and Communication Systems

### Vision based Navigation Sensors for Flying Robots

The project includes identifying the principle behind each components, implementing algorithms and techniques for realising each sensor. It also develops a bio-inspired vision based sensor suitable for navigation and flight stabilization of flying robots.

### Optical flow sensor and Robot control

The project gives a detailed study of a bio inspired optical flow sensor. The optical flow was computed in different softwares such as MATLAB and Worn Schunck algorithm. This bio inspired technique offers robust and cost effective solutions.

### Centralized fault detection and localisation system

The objective of this project is to formulate desirable monitoring technology which is cost effective as the PON market. OTDP is a versatile instrument of testing optical fibers during installation, maintenance and restoration.

## Signal Processing

### QRS complex processing for telemetry

The compression of ECG signal is necessary in many transmitting and storage applications. Effective storage is required for large quantities of ECG information in ICCU or in monitoring tasks. The possible method of QRS compression is by using Transformed Lorentz function.

### Automatic traffic Surveillance System stimulation

The vision based approach of the project has advantages of easy maintenance and high flexibility in traffic monitoring. Vehicles can be detected by image differencing and tracked using Kalman filtering. Once vehicle size is extracted an optimal classifier is then designed to robustly categorize vehicles into different classes.

### 3D Object Recognition of Canonical Objects from 2D Views

3D object recognition has two parts- training and recognition. The recognition algorithms are robust and implemented in CUDA GPU since recognitions and training algorithms support parallel processing.

## Electronics and Biomedical Engineering

### Medical Emergency Responder Bike

The project led to the development of a two wheeler ambulance equipped with necessary trauma care devices and other basic entities. The equipments include defibrillator, ECG, Heart rate monitor, pulse oximeter, respiratory assisting equipment, video telemetry and other necessary circuits.

### Arm Exoskeleton Control using EMG

The core objective of the project is development of an exoskeleton controller for a prototype robotic arm which is stand alone, portable, programmable and easy to maintain and use. The project can become a basis for future exoskeleton controller designs where it can make a significant impact on research and industry.

### Deaf Aid Telephone System

Deaf aid telephone system with speech recognition is a complex electronic device that can help to provide a sense of sound to a person who is deaf. The word produced by a normal person in transmitter end can be viewed by a physically deaf person in the receiver.

## Electrical and Electronics Engineering

### DC to DC Changeover Switch

In substation the control panel is delivered with DC supply from battery charger. The project incorporates a DC changeover switch where switching is done between two sources. The project aims to reduce switching time, losses and provide ease in functioning without interruption.

### Non conventional Interrupted Power Supply

The charger is charged using a solar panel only if the output required crosses a threshold value else it charges from ac supply. The project consists of three modules- charging module, charge controlled module and protection module whose function are what the terms indicate.

### Small Scale Maglev Train

High speed maglev train promise dramatic improvement for human travel. The project works on the principle of magnetic levitation which utilises a linear, synchronous motor for propulsion and permanent disk magnets for stabilisation and levitation.



## Electronics and Communication Engineering

### Phased Array Speaker System

An array of antennas in which the relative phases of the respective signals are varied in such a way that the effective radiation pattern is reinforced in a desired direction and suppressed in undesired directions. A Phased Array Speaker System is capable to generate flexible and directional sound.

### Gesture to Voice Conversion for Hearing/Speech Impaired

The Gesture to Voice system prototype was developed using artificial neural network for translation of ASL to English. Different sets of universal hand gestures were captured from video camera and utilized to train the neural network for classification purpose.

### Pick and Place Robot

Continuous and real-time field image is taken using a camera fixed over the area and processed continuously using MATLAB program. When the object is detected, an image coordinate system is created and the angle of rotation such that it minimizes the distance to be traveled by the robot is calculated.

## Computer Science and Engineering

### Graphical Password Authentication using Cued Click Points

Cued Click Points (CCP) is a cued-recall graphical password technique. Users click on one point per image for a sequence of images. The next image displayed is based on the previous click-point so users receive immediate implicit feedback as to whether they are on the correct path when logging in.

### An Android Application for Fall Detection

An android application for fall detection using an android based smartphone with an integrated triaxial accelerometer. The application precisely notifies a serious fall and do not go off during daily activities like jogging.

### Eye Tracker

A real time gaze determination software that controls a computer cursor by following the user's gaze. Eye movements are tracked using motion analysis to impart relative movement to cursor. Blink detection is used to implement left click, right click and double click.

## Image Processing

### Simultaneous enhancement of images using Retinex algorithm

The project addresses four issues related to image enhancement. Simultaneous enhancement of contrast and sharpness of images, reduce the halo effect, solve the out range problems and avoid enhancement of noise.

### Classification of SONAR images

The project uses feature extraction, reduction techniques and principal component analysis is performed to extract the image feature. The classification is done using supervised classification techniques.

### Retinal Blood Vessel Segmentation

The project aims at automated retinal blood vessel segmentation for diabetic retinopathy screening from among the alternatives available and also finds the width of retinal blood vessels.

## VLSI and Embedded Systems

### Transient ST segment derivation episode detection

The implementation of ST-segment deviation detection on ARM processor based embedded platform. The method developed using European ST-T database consists of 3 stages; Pre-processing, Feature extraction and Classification.

### Foetal Electrocardiogram for the detection of Foetal Asphyxia

The project mainly focuses on the extraction of foetal ECG (FECG) from the composite abdominal ECG (AECG) signal. The ECG obtained is used for foetal heart rate variability analysis and health.

### FPGA in centralised dynamic AHB bus Arbiter

The project aims at building a centralised clock gate, dynamic AHB Arbiter with support for fixed priority, Round robin priority, Programmable priority and an AXI to AHB bridge for AXI masters.

## Energy Management

### Concentrator photovoltaic panel with water cooling

Concentrator photovoltaics (CPV) is an alternative to the flat arrays. It optimize a concentrator system. All the features and parameters of the different components are implemented.

### Solar powered steam cooking device

Steam cooking device is designed to reduce energy consumption and time. The device helps in retaining nutrients, flavour, colour and texture of the food items cooked.

### Solar Dryer

The solar dryer is designed in order to dry agricultural products. Finite Difference Method is used to solve the partial differential equations representing the heat and moisture transfer during the drying process.



## Image Processing

### Core subjects :

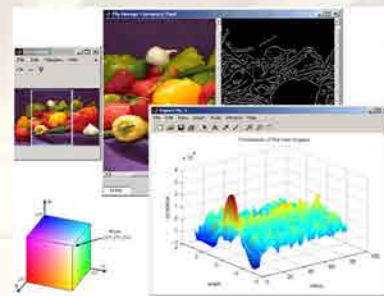
1. Digital Image Processing
2. Advanced Data structures and Algorithm
3. Pattern Recognition
4. Computer Vision
5. Computer Graphics

### Labs and resources :

Image Processing Lab, Computer Graphics, Two CUDA processors- Tesla C2070 and GeForce GTX480.

### Electives :

1. Artificial Neural Networks and Fuzzy Systems
2. Data Mining
3. Natural Language Processing
4. Data Compression
5. Medical Language Techniques



## Energy Management

### Core subjects :

1. Energy Conversion Systems
2. Solar Energy Engineering
3. Electrical Energy Systems & Management
4. Energy Audit & Management
5. Renewable Energy Technology

### Labs and resources :

Solar Energy Engineering Laboratory, Computational Laboratory.

### Electives :

1. Economics of Energy Engineering
2. Energy Systems Modeling & Analysis
3. Vehicle Power Management
4. Emerging Refrigeration Technologies
5. Research Methodology



## Signal Processing

### Core subjects :

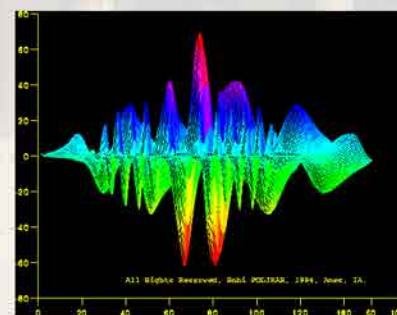
1. Fundamentals of Spectral Estimation
2. Advanced Digital Systems Design
3. Digital Communication
4. VLSI Architectures for DSP
5. Adaptive Signal Processing

### Labs and resources :

DSP Hardware Lab, Advanced DSP Lab, GNU Octave, Maple, TMS320C6455 Based Starter Kit, Medical Imaging Software Tool.

### Electives :

1. Multirate Signal Processing
2. Digital Signal Processors
3. Signal Compression Techniques
4. Optimal Control Theory
5. Artificial Neural Networks



## Electronics and Biomedical Engineering

### Core subjects :

1. Digital Electronics
2. Control Systems & Engineering
3. Integrated Circuits & Systems
4. Bio Instrumentation
5. Object Oriented Programing
6. Microprocessor
7. Bio Signal Processing

### Labs and resources :

Digital Electronics Lab, Basic Electronics Lab, Microprocessor Lab, Bio Signal Processing Lab, Bioengineering Lab, Medical Electronics Lab.

### Electives :

1. VLSI Design
2. Embedded Systems & Applications
3. Artificial Neural Networks
4. Computer Communications
5. Computer Graphics
6. Mechatronics
7. Bio MEMS Nanotechnology



## Electrical and Electronics Engineering

### Core subjects :

1. Industrial Power Electronics
2. Microprocessor Based Systems
3. Power Systems
4. Digital Signal Processing
5. Control Systems
6. Electronic Instrumentation
7. Electrical Machine Design

### Labs and resources :

Basic Electrical Engineering Lab, Electrical Measurement Lab, Power Electronics Lab, Digital Electronics Lab, Electrical Machine Lab, Microprocesor Lab.

### Electives :

1. HVDC Transmission
2. Neural Networks and Fuzzy Logic
3. Digital Image Processing
4. VLSI Design
5. Computer Communications
6. Digital Image Processing
7. Flexible AC Transmission





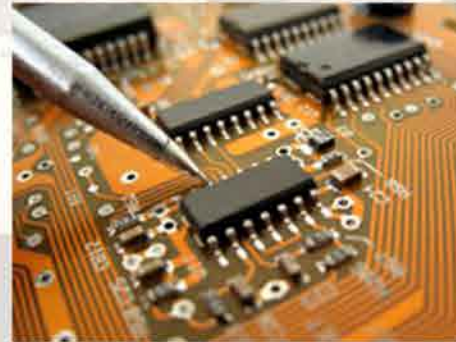
## Electronics and Communication Engineering

### Core subjects :

1. Microprocessors
2. Electronic Product Design
3. Microwave Techniques & Devices
4. Optoelectronics and Communication
5. Digital & Analog Communication
6. Digital Signal Processing
7. VLSI & Embedded Systems

### Electives :

1. Intelligent Systems
2. Hardware Modelling
3. Mixed Signal System Design
4. Fundamentals of RF Design
5. Digital Image Processing
6. ASIC Design



### Labs and resources :

Advanced Microprocessor Lab, E-CAD Lab, VLSI Lab, Digital Communication Lab, Electronic Circuits Lab, Edwin Software, Virtual Modelling Systems.

## Opto Electronics and Communication Systems

### Core subjects :

1. Digital and Optical Signal Processing
2. Optoelectronics
3. Laser Technology
4. Fibre Optics
5. Biophotonics
6. Optical Communication Theory

### Electives :

1. Modem Optics
2. Communication Networks
3. Laser Based Instrumentation
4. Integrated Optics
5. Industrial Photonics
6. Advanced Optical Communication



### Labs and resources :

Signal Processing Lab, Optoelectronics Lab, Fibre Optics Lab, Optical Communication Lab, Faraday's Apparatus, Fibre Optics Kit, Industrial Photonics, Advanced Optical Communication.

## Computer Science and Engineering

### Core subjects :

1. Compiler
2. Computer Architecture
3. Object Oriented Programming
4. Database Management Systems
5. Data Structures & Algorithms
6. Computer Networks
7. Operating Systems

### Electives :

1. Bioinformatics
2. Embedded Systems
3. Artificial Neural Networks
4. Web Commerce & Technology
5. Digital Image Processing
6. Software Architecture
7. Mobile Computing



### Labs and resources :

System Programming and Hardware Lab, Data Structures Lab, Network and OS Lab, Language Processor Lab, Two CUDA processors-Tesla C2XXX & Geforce GTX480.

## VLSI and Embedded Systems

### Core subjects :

1. Advanced DSD
2. Designing with Microcontrollers
3. VLSI Technology and Design
4. Embedded System Design
5. Analog Integrated Circuit Design
6. Advanced DSP and Architecture

### Electives :

1. VLSI Design and Automation
2. Embedded and Real Time Systems
3. System on Chip Design
4. Low Power Digital Design
5. High Speed Digital Design
6. CPLD & FPGA Architecture



### Labs and resources :

Reconfigurable Computing Lab, RTOS Lab, High Speed Design Lab, Advanced microcontroller Lab and DSP Lab, Physical Design Lab, Xilinx Virtex-4 SX XC4VSX35, FF668 Device Kit, Xilinx Virtex-II Pro, Xilinx Spartan-III Families.