

Electronic System Design

Department of Electronics and Communication Engineering

Electronic System design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

Our goal is to design constructive design trajectories for electronic systems that leads to high quality, cost-effective systems with the predictable properties(functionality, timing, reliability, power dissipation, cost).

Design and Development of Electronic system, PCB design, software and hardware design of Antibiogram device have been developed by utilizing the facility in the Electronic System Design laboratory.

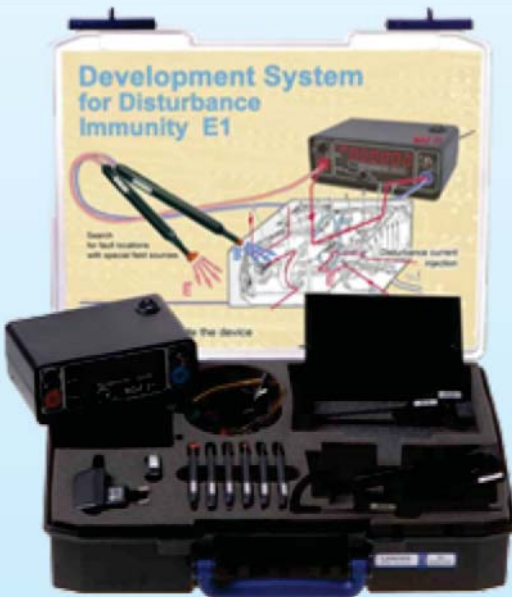
UPE scheme has provided an excellent opportunity to develop this infrastructure. The optoelectronic Design of Antibiogram device has been developed utilizing the facility developed in this laboratory.

The instrumentation of Antibiogram-cum-pathogen identification device has been designed in modular form for ease of fabrication and for operation as combined or standalone at affordable cost. Thus this laboratory is established with the main objective of developing affordable and cost effective PCB design software and hardware tools. The main focus of the laboratory is Research and Development, Commercialization and Training. This focus will bring in researchers from universities, industries and hospitals to a sole aim of providing cost effective PCB design software and PCB Rapid printing Prototype Machine were established in the laboratory. It will develop a multidisciplinary research environment wherein researches from various fields of Engineering, Physiology, pathology, neuroscience, etc.

The facilities in the lab will be used for Training the students and researchers whose working in various optoelectronic design background and thus this will enhance the human resources in this field.



EMI/EMC Testing



A clean room of class 10k is a facility has been created under UPE. This is utilized as a part of specialized industrial production or scientific research, including the manufacture of PCB electronic design and development of prototype. This is designed to maintain extremely low levels of particulates, such as dust, airborne organisms, or vaporized particles.



Clean Room Facility For PCB

EMC testing is critical for managing risk in medical device manufacturing. Devices must be able to work together in close environments without interference or noise compromising performance. The FDA requires that all medical devices undergo EMC testing per the appropriate FDA Reviewer Guidance document or the European IEC 60601-1-2 standards. In the EU, all medical devices must have CE marking, which requires both immunity and emissions testing per IEC 60601-1-2.

Under UPE – BMI a comprehensive test facility for EMI/EMC compliance testing to cater the needs of academic institutions, R&D organizations, Manufacturer / Industry has been created.. The laboratory is equipped with the state-of-the-art instrumentation, which complies with the requirements of International standards. The testing is performed automatically and controlled through software. The test facility available is also extended for developmental activity. EMI/EMC tests are conducted as per National / International standards.



Wave soldering Machine

Wave Soldering Machine is compact, Microprocessor controlled, automatic. It processes the assembled boards' upto 12" wide and require very little solder for their size. It contains conveyor, foam fluxer with integral air compressor, preheaters, stainless steel solder pot with drain valve.



Pick and Place Machine

It is equipped with Universal circuit board holder, the unequalled guiding system of the assembly head, Dispenser, X/Y locking device, Z locking device results in comfortable and fatigue-free daily work. All of the control elements are arranged logically and ergonomically, which assists the user in the best possible way.



CNC Drilling Machine

It is a computer controlled unit equipped with X/Y locking system and air driven spindles. The drilling machine is a computer-controlled and the operator on selecting the right drill program, tells the machine which drill to use and the X Y co-ordinates of the holes. Then the drills use air-driven spindles which can rotate up to 150,000 revolutions per minute. High speed drilling ensures clean hole walls to provide a secure base for good plating on the hole walls for PCB.



Voltera V-one(Double layer PCB Printer)

It is a 3 axis machine, which is equipped with a heated platform used to cure conductive ink and to reflow solder paste, the high precision probe inside creates a height map of the substrate, the dispenser is magnetically mounted and an automated drilling attachment. It creates two layer PCBs on our desk.

AI Based Opto Electronic Medical Imaging Platform

Department of Electronics and Communication Engineering

Imaging techniques form the main part of diagnosis procedures for a number of diseases. Clinicians use the information from the images as the main supportive information for diagnosis along with other results such as the clinical lab results. Thus, medical images play a vital role in disease diagnosis. However, the amount of information such handled and processed for accurate diagnosis and treatment needs experience and time on the part of the clinician. Hence, it becomes highly essential to develop cost effective imaging devices and development of image based disease diagnosis algorithms.

Some of the treatment are to be planned in a patient specific manner due to variations in anatomical and physiological information from subject to subject. In such cases, multimodal image based solutions can be developed by the biomedical engineers. For accurate performance of image guided surgical procedures, tools can be developed based on non ionizing, non invasive imaging procedures which provides safety to the patient as well as to the doctor. For patients with neurological disorders, rehabilitation is an important part of the treatment. The technique can be based on virtual reality procedures.

The government is now working towards "Health for all and hence it becomes essential to develop cost effective indigenous imaging devices and image based analysis solutions mainly for mass screening purpose in the rural side. Thus the establishment of an imaging laboratory will help in developing devices and algorithms for disease diagnosis, treatment planning and surgery and also for rehabilitation purposes. And this will definitely provide better healthcare delivery to the people of India.

UPE scheme has provided an excellent opportunity to develop this infrastructure. The imaging and image analysis parts of the Antibio gram device have been developed utilising the facility developed in this laboratory.

Thus this laboratory is established with the main objective of developing affordable and cost effective imaging devices and medical image analysis tools that enhances the healthcare in India. The main focus of this laboratory will be Research and Development, Commercialisation and Training. This focus will bring in researchers from universities, industries and hospitals to a sole aim of providing cost effective medical diagnosis and treatment so that the future society is having a better healthcare.

The establishment of this laboratory will develop a multidisciplinary research environment wherein researchers from various fields of engineering, physiology, pathology , neuroscience , etc will be having vital part.

Main objectives

A)Research& Development

Design and development of new imaging techniques at low cost
Development new algorithms to analyse the images for the purpose of diagnosis and theca PY

Development of algorithms for 3Dvisualisation of organs to help in image guided surgery

Parameter extraction from images for rehabilitation purposes

B) Training

The facilities in the lab will be used for

Training the students and researchers in various image acquisition and processing techniques and thus this will enhance the human resources in this field

This Opto Electronics Imaging Laboratory has installed the standard version of MATLAB, medical image analysis software such as 3 D Doctor, MIMICS, Biometric data acquisition systems, FPGA development boards, Thermal Imaging System, Fluorescence Imaging System, Computer Vision System, Telemedicine workstation – Healthcare setup with software, NI compact vision software, m – health platform for wearable product development, Optical and illumination design software for signal and image processing and dedicated application development purpose.

THERMAL IMAGING SYSTEM



Utilized to obtain the temperature profile of the hotspots such as short circuits, electric shocks, and other faults in the PCB Board.

Utilized for early detection of diabetic foot complications in patients with diabetic mellitus.

Utilized by doctors/ researchers to detect breast cancer, thyroid gland abnormality, arthritis, fever screening, neuro musculoskeletal disorders in healthcare.

COMPUTER VISION SYSTEM

The cameras and the lens system are used to determine the camera resolution, type of lens, and the illumination system to be used in the Antibioqram system.

Used in analysis of Microscopic Images and detection of superficial skin lesions.

Utilized for real-time inspection of Movement and Gait analysis and also in robotic surgery.



OPTICAL AND ILLUMINATION DESIGN SOFTWARE AND OPTO-MECHANICAL DESIGN SOFTWARE



Utilized to determine the size and type of lens. It is used to simulate and analyze the performance of the optical system in the Antibioqram device.

Utilized to model a wide range of reflective, refractive, diffractive components and to develop specialized design and analysis software tools for modeling, testing and manufacturing optical systems.

M-HEALTH PLATFORM FOR WEARABLE PRODUCT DEVELOPMENT



Utilized to develop the AntibioGram device in mobile platform and to analyze and display the results in Android Application.

Utilized to develop wearable devices in m-health platform integrated with IoT technology.

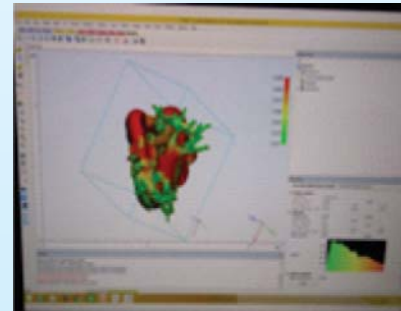
To develop vital parameter measurement system using wearable technology.

MIMICS SOFTWARE

Utilized by Researchers, innovators and industries for Development of image processing algorithms related to antibiogram device.

Development of other image processing algorithms for healthcare applications.

Development of devices for additive manufacturing.



FPGA DEVELOPMENT BOARDS



Utilized by Researchers, innovators and industries for Development of embedded image processing and signal processing algorithms for real-time applications device to reach market quickly