Embedded System lab

The Embedded System Laboratory has following equipments, which can be used by the students for their project/ research work.

Hardware configurable boards:

1. **Eblock Pic micro Deluxe Starter pack.**
   The board provides a selection of E-blocks that can be used for a wide range of applications in microcontroller programming: both for learning and for projects.

2. **dsPIC/PIC24 Starter pack**.
   The dsPIC/PIC24 Starter pack E-blocks boards and accessories can be used to form a wide number of electronic systems, for learning or for project work, and additional E-blocks boards and sensors can be added to these systems as you need them.

3. **Deluxe AVR Starter pack.**

   The E-blocks Deluxe starter pack contains two Atmel AVR multiprogrammers, two Switch boards, two LED boards, a Terminal board, an LCD board, a quad 7-segment display block, a Prototype board, a Power output board, a Patch board, an SPI and D/A board, a keypad board, a sensors mother board with analogue temperature sensor, digital temperature sensor, Gyroscope, PIR sensor and magnetometer, a metal backplane with nuts and bolts, a power supply and rugged trays with foam inserts for storage.

4. **Deluxe ARM Starter pack**.

   The E-blocks Deluxe starter pack contains two Atmel ARM multiprogrammers, two Switch boards, two LED boards, a Terminal board, an LCD board, a quad 7-segment display block, a Prototype board, a Power output board, a Patch board, an SPI and D/A board, a keypad board, a sensors mother board with analogue temperature sensor, digital temperature sensor, Gyroscope, PIR sensor and magnetometer, a metal backplane with nuts and bolts, a power supply and rugged trays with foam inserts for storage.

5. **RFID Training Solution.**

This solution can be used to provide a complete 20 hour course in developing RFID systems. This will give students who are familiar with microcontrollers an understanding of the programming techniques involved in developing RFID systems, as well as an understanding of how these systems is developed from scratch. This solution includes an E-blocks RFID board which supports the development of Near Field Communications techniques frequently used in modern phone designs and four RFID tags embedded into credit cards.

6. **USB Training Solution.**

This solution allows students to carry out a number of practical exercises in USB technology. Students learn about USB by developing 8 different system developments: Mouse, Joystick, Temperature logger, USB terminal, USB to RS232 converter, Basic slave, Storage scope, and Oscilloscope with variable trigger. Some of these experiments are accompanied by programs written in Visual Basic. Working through the exercises students build a good understanding of the various types of USB system including Human Interface Devices, Communications Devices and Slave devices.

7. **ZigBee Training Solution**.

The Zigbee training solution can be used to provide a complete 20 hour course in developing wireless area networks based on the ZigBee standard. This will give students who are familiar with microcontrollers an understanding of the programming techniques involved in developing ZigBee wireless communication systems, as well as an understanding of how these systems are developed from scratch.

8. **Mobile Phone Training Solution**.
This solution can be used to provide a complete 20 hour course in developing communication systems. This will give students who are familiar with microcontrollers an understanding of the programming techniques involved in developing communication systems, as well as an understanding of how electronic systems are developed from scratch. The solution can also be used as a motivating platform for learning general microcontroller programming, and is supplied with additional prototype and patch boards for project work. The solution includes a fully working mobile phone based on E-blocks.

9. **Embedded Internet Training Solution**.

This training solution, built from E-blocks technology, allows students to carry out investigations into embedded internet technology standard using high level macros written in Flowcode, assembly code, or C. The solution consists of a number of E-blocks boards and an advanced Ethernet module which form a complete web server. This solution is used in conjunction with a PC and Internet Explorer to facilitate a range of experiments that allow students to understand and investigate embedded internet technology including ASP, HTTP, TCP, IP, UDP, ICMP, ARP protocols and communications layers and their OSI linkage, as well as DLC and MAC protocols. The solution also allows students to carry out simple web based control over the internet.

10. **Bluetooth Training Solution.**

This training solution, built from E-blocks technology, allows students to carry out investigations into the Bluetooth standard using high level macros written in Flowcode. The solution consists of a number of E-blocks boards and an advanced Bluetooth module which form a complete Bluetooth transmitter receiver solution. This master slave unit is used in conjunction with a PC and Bluetooth USB adaptor (inc analyser) for a range of experiments that allow students to understand and investigate Bluetooth profiles including the SPP profile, headset profile and data profiles.

11. **CAN Bus Trainer.**
This training solution is designed to facilitate the development and investigation of systems that use the CAN bus protocol for communications. The solution is comprised of four fully programmable CAN nodes which mimic Electronic Control Units (ECUs) in an automotive application. These are mounted on rugged backplanes and are fitted with ancillary circuit boards which mimic the functions of indicator lamps, switches and sensors.

Software:

- **FlowCode 6 (Licensed):**

The above hardware boards can be configured for different applications using the Flowcode 6 software. The department has 10 number of licenses.

Advanced Communication Lab:

The Advanced Communication Laboratory has following equipments, which can be used by the students for their project/ research work

Hardware:

1. **Real time Signal Analyzer (1Hz- 3GHz).**

The analyzer allows us to view to capture signals in a wide variety of time co-related displays. This is useful for device troubleshooting and signal characterization application. All measurements are based on the same real time data, having unique method for processing, storing and displaying the data.

2. **Satellite Communication Trainer (Uplink transmitter, Downlink Receiver, Satellite Transponder).**

The Satellite Communication Trainer 7272 provides an in-depth study of a basic satellite communication system. It consists of an Uplink Transmitter, Satellite Link and Downlink Receiver. The satellite can be placed at an elevated position if required. The satellite transponder receives signals from an Uplink Transmitter and retransmits at different frequencies to a Downlink Receiver. The Uplink and Downlink frequencies are selectable and carry three signals – Video, Audio, Voice and Data.

3. **GPS technology Trainer.**
Global Positioning System (GPS) technology is rapidly changing how people find their way around the earth. GPS technology Trainer will provide a basic understanding of the GPS Fundamentals, Satellites & Design Aspects of GPS Receiver by actually connecting to the Satellite by GPS Antenna.

4. **Bluetooth Technology Trainer.**

Bluetooth Trainer carries Bluetooth module with integrated Bluetooth core and radio/antenna circuit. It supports Bluetooth v2.0+EDR, SPP, I/O profile, SCO connections and digital I/O. The Trainer is designed to study the Bluetooth Wireless Technology and communication between Bluetooth Modems and Phone. It includes on board peripherals which can be used for designing various small scale application.

5. **Doppler Radar Trainer.**

   Doppler Radar Training System, Radar Training System - Digital Radar Training System has been designed with simulated experiments on hardware interfaced with software on PC. Experimenting with the trainer include different types of fixed and moving objects, object counters, analysis of signals on CRO or Windows based software, test points.

6. **Optical Fiber Communication Trainer.**

   Optical Fiber Communication Trainer demonstrate the simplex method of transmitting information from one place to another by sending pulses of light through an Optical fiber. The setup demonstrates the properties of Simplex Analog and Digital Transceiver, characteristics of Fiber Optics cable, Modulation / Demodulation techniques.

7. **MMIC Trainer.**

   Radio Frequency Trainer IT-8200 has been designed to act as basic tool for performing experiments in the field of RF & Microwave Engineering. This system is specially developed to provide an innovative approach to microwave circuits and systems. The trainer comprises the fundamental passive and active monolithic microwave integrated circuit (MMIC) building blocks, used in modern microwave radio, radar and satellite communications systems.

8. **WDM Trainer.**
   Wavelength Division Multiplexing is a technology which simultaneously transmits Multiple Optical Channels (wavelength) through a Single Fiber. Today WDM technique is as much a part of optical networking as the fiber itself.

9. **225MHz FM/AM Signal Generator.**

10. **Universal Software Radio Platform (USRP 2932) With MIMO capability (6 No)**

    The USRP (Universal Software Radio Peripheral) is a flexible and affordable transceiver that turns a standard PC into a powerful wireless prototyping system. Paired with LabVIEW Communications System Design Software, USRP transceivers help you prototype a wide range of single-channel and MIMO wireless communications systems.

Software:

1. **LabView Simulator from NI Systems (2 Licenses).**
2. **Advanced Design System (ADS) simulator from Agilent (5 Licenses).**

Optical Fiber Laboratory

Hardware:

1. **Optical Fiber Benchmark**:

   is the base-line for every fibre optic laboratory. It demonstrates state-of-the-art concepts in fibre optic communications. It provides for easy experimentation and effectively bridges the gap between a leading-edge technology and currently available technical training tools. As the concepts demonstrated are no different from those encountered in real-life systems, it can provide significant insights, of direct relevance, to the student and practicing engineers alike. In addition, it can serve as a ready-made communications platform for photo typing and in applications calling for fibre optic capabilities.

2. **Fiber splicing /Jointing Toolkit.**

   The S42X Series Fusion Splicer Tool Kit contains all of the necessary tools required for optical fusion splicing in a rugged carrying case. The durable carrying case features separate compartments for organizing tools and consumables

Software:

- **Optiwave Simulator** : includes many important enhancements including several additions to the tool kit for building higher order modulation and Nyquist-based transmission system designs, new components and models for analyzing the impairments/limitations associated with high speed transmitter and receiver design, improved tools for multimode system characterization, and multi-threading for parameter sweeps.

Advanced Network Security Lab

Hardware:

1. **Digital Forensics toolkit (Writer & Blocker).**

   The Digital Forensics toolkit is a portable kit which contains a complete family of UltraBlock hardware write blockers along with adapters and connectors for use in acquiring a forensically sound image of virtually any hard drive or storage device you may encounter. Simply select the appropriate Write Protected UltraBlock and attach it to the source drive and use your desktop or laptop to acquire a forensically protected disk image to an internal drive or externally connected drive enclosure.