AIT 510   **EMBEDDED SYSTEMS**   **(2+1)**

Objectives:
This introductory course on embedded computing focuses on these issues germane to embedded systems.This course focuses on concepts of Digital electronics and applications of embedded systems in agricultural.

Theory:
UNIT I
MICROCONTROLLER INTERFACINGS:
LEDs, Switches, DC motor and Dynamo, Relay and Time Clock, Switches, Relay, A/D and D/a Converter, Basics of signal processing, Sensors, LCD, LED, Touch Screen, Bluetooth. Instruction Set, Logic Gates, Number Systems, CISC, RISC, Microprocessor and Microcontroller. Memory: PROM, EPROM, EEPROM. Industrial Control Systems: DCS, PLC, SCADA. Conductors, Semi-Conductors, Insulators, Ohm's Law, Resistors, Transistor, Diode, Capacitor, Sensors, ADC, DAC, VLSI.

UNIT II
ISA, Introduction to ARM, ATMEL, ParallaX, PIC Microcontroller, 8051 Architecture, SoC, I/O Ports, External Memory, I^2C.

UNIT III
The need, Hard and Soft Real Time OS and Embedded OS, Functions, Applications, Examples of Free and Proprietary Distributions e.g. µClinux, Android, QNX, RTLinux, VxWorks etc.

UNIT IV
Getting inputs from Switches, Matrix Keypad, Serial Port, Analog and Digital Sensors etc.Outputting to Displays, Serial Port, Buzzer etc. Interfacing Ethernet and Secondary Storage Devices.

UNIT V
Applications of Embedded Systems in Controlled Environment, Green House and Soil Sensing.

Practical:
1. LED based game.
2. LED based traffic lights.
3. Digital Calendar, Digital Thermometer and Controller.
4. Interfacing temperature and light sensors.
5. Interfacing Display.
6. Interfacing Switches and Matrix Keyboards.
7. Interfacing LAN/Serial Port.

Reference books:
1. Introduction to Microprocessors and Microcontrollers, John Crisp, Elsevier.
2. The 8051 Microcontroller and Embedded Systems, M. Mazidi, PHI.
3. Embedded Systems Design, Steve Heath.
4. Real-Time Systems, Jane Liu.
5. Embedded Systems: Architecture and Programming, Raj Kamal, TMH. 2008.