EE 312: EMBEDDED SYSTEMS (3–0–2: 4)

8051 Microcontroller: Features and Architecture

Overview of the 8051 family, pin description, hardware connection, architectural overview, special function registers, memory organization, /O ports, interrupts, timer/counter, serial communication.

8051 Programming and interfacing: with Assembly and C

Instruction set, addressing modes, I/O ports programming, interrupts programming, timer/counter programming, serial communication programming, interfacing external devices.

PIC16C6X-7X / PIC18F Family Microcontroller

Introduction, features and overview on family, architecture, CPU registers, Oscillator connections, Stack, configuration registers, memory organization, I/O ports, hardware connection, interrupts, timers, watchdog timer, on-chip data converter module, Serial I/O,

PIC Programming and Interfacing

Instruction set, programming for port communications, timer/counter, interrupt, data conversion, different waveform generations, interfacing external devices.

Introduction to dsPIC33F Family Digital Signal Controllers

Introduction and overview, CPU, special MCU Features, data addressing overview, DSP engine overview, dsPIC33F programmer's model, CPU control registers, arithmetic logic unit (ALU), DSP engine, memory organization, interrupt and trap vectors, data address space, motor control PWM module.

Embedded System

Embedded systems introduction and description, design considerations & requirements, Embedded processors for embedded systems, power sources, high performance architecture and execution, embedded design life cycle, Concept of real time systems, data communication in embedded systems, embedded software tools, real time operating systems (RTOS).

Suggested list of Experiments:

8051 Based system designing using µvision and Proteus VSM:

- I/O port interfacing,
- Timer based system,
- Display and Keyboard interfacing,
- Serial Communication

PIC 16F7X /PIC18F based system designing using MPLAB IDE and Proteus VSM*:*

- I/O port interfacing,
- Timer based system,
- Display/Keyboard interfacing,
- ADC programming
- PWM programming

dsPIC33F based system designing using MPLAB IDE and Proteus VSM:

- Basic system interfacing
- Module addressing
- DO Loop
- PWM generation

Designing microcontroller based system on breadboard/ Vero-board

Text Books

1. M. A. Mazidi , J. G. Mazidi and R. D. Mckinlay others, “The 8051 Microcontroller and Embedded Systems”, Prentice Hall of India.
2. Ramesh Gaonkar, “Fundamental of microcontrollers and Applications in Embedded Systems”, Pen Ram.

References

1. Ajay V Deshmukh, “Microcontrollers [Theory and Applications]”, Tata Mcgraw hill
2. Richard H. Barnett, Larry O'Cull, Sarah Alison Cox, “Embedded C Programming and Microchip PIC”, Thomson Learning Inc.
3. Raj Kamal , “Embedded systems: Architecture, Programming and Design”, TMH.
4. Muhammad Ali Mazidi, Rolin D. McKinley, Danny Causey, “Pic Microcontroller And Embedded Systems: Using Assembly and C for Pic18”, Pearson.
5. dsPIC manual: www.microchip.com