

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured as components of embedded systems. Students will be able to understand the difference between microprocessors and microcontrollers. Students will also learn about the assembly language programming.

Course Content

Digital Circuits and Design: S. Salivahanan and S. Arivazhagan

UNIT I: Review of Fundamentals

6 lecture hours

Number System: Binary and Hexadecimal; Combinational Circuits: Adder, Subtractor, Encoder-Decoder; Sequential Circuits: Flip-Flops, Register and Counters; Von Neumann Architecture, Computer Types, Functional Units, Memory System RAM, ROM, Cache, VM, etc.), Design of Basic Computer.

→ Fundamentals of Microprocessors and Microcontrollers: B. Ram

UNIT II: Microprocessor Vs Microcontroller

8 lecture hours

Block diagram, Registers, Internal Bus Organization, Control signals, Input Output Subsystem, Serial communication and DMA features. Memory Subsystem, Interfacing of ADC, sensors, keyboard and DAC using microcontrollers; 8085 Architecture and Pin Diagram

→ B. Ram

UNIT III: Designing ALU and CU

12 lecture hours

Machine Instructions, Opcode, Registers, CPU organization, Instruction formats, Timing and control, Instruction cycle, Addressing modes, Program Control, Instruction Cycle: Fetch Decode and Execute, Control Transfer, Control memory, Micro programmed vs. Hardwired control unit

→ The 8051 Microcontroller and Embedded Systems: Mazidi, Mazidi and McKinlay

UNIT IV: MCS 51 Family

10 lecture hours

Study of micro controller (MCS-51family- 8051) - Architecture, instruction set, addressing modes and programming, Registers, Flags, Counter and Timers, Comparison of various families of 8-bit micro controllers. Interfacing of ADC, sensors, keyboard and DAC using microcontrollers.

→ Mazidi, Mazidi and McKinlay

UNIT V: Embedded System and Program Development Tools

12 lecture hours

Introduction to Embedded Systems, Embedded System: Categories, Requirements and Design Challenges, embedded computing, Applications Areas, Recent trends in embedded systems, Development process & Design, Formalisms for System Design: Integration and testing, Packaging Configuration, Development tools, Linker, Loader, Compiler, Libraries. Design Tools: Kiel, Arduino. Design Case Examples

Text Books