

Embedded Computer Design

Contemporary design of microcomputer systems focuses on the application of system thinking to fabricate a cohesive ensemble of chip devices. Several well-known techniques are adapted for the system thinking approach.

A

microcomputer system is the fundamental element of an embedded system. It can be a standalone system or it can be part of a distributed system. The CPU is designed to manage a collection of memory and I/O devices that interfaces with peripheral components to provide monitoring and control services for the embedded application.

Course Description

This course provides participants with skills in the design of microcomputers and assembly language programming. It involves the interfacing memory and I/O devices to a microprocessor. The major blocks making up a microprocessor and system are presented. Participants will study I/O interfacing, microprocessor bus operation and timing, timers, and interrupts. The course is designed to be practical and is oriented towards daily laboratory sessions. In addition, a more comprehensive project allows participants to use their innovative ideas to design a real-world embedded controller.

Curriculum

Day 1

Microprocessor Architecture

Interface Framework

Programming with Assembly Language

Serial / Parallel Interfaces

Laboratory Assignment 1: Interfacing Parallel I/O Device

Day 2

Memory Chips (SRAM, DRAM, SDRAM)

Addressing Modes

Timing Diagrams

Serial I/O Device

- **Laboratory Assignment 2** -Interfacing Memory Chips

Day 3

Data Acquisition

Analogue/Digital Conversion

Interrupts Polled,

Interrupt-driven and DMA Interfaces

- **Laboratory Assignment 3**

Day 4

Microcontroller Architecture

Flash Memory

Controlling Equipment

Timer, Counter, Real-Time Clock

- **Laboratory Assignment 4**

Day 5

Development System and Tools

Bus Structure Architecture of Intel, Motorola Microprocessors

System On A Chip System and Application Software

- **Laboratory Assignment 5**

Training Duration

5 days.

Level

Core.

Who Should Attend?

This course is directed at system designers who wish to get updated on the latest trends and techniques in embedded computer design. Software and firmware engineers about to embark on embedded systems design may also attend.

Prerequisites

Digital systems. Microprocessor basics.

SKILLS GAINED

After completing this training, you will be able to:

- **Design and build an 8/16-bit microcomputer system**
 - **Use system thinking concepts** to design a microcomputer system
 - **Identify and analyse** a specification for a microcomputer
 - **Use assembly language** to control and communicate with memory and I/O devices
 - **Use development tools** to conceive and implement the microcomputer.