SYLLABUS FOR SIX MONTHS TRAINING OF MICROCONTROLLER

Why Embedded Systems?

Embedded systems are involved in almost every state of modern life. All modern luxury equipments like Spacecraft, Video Games, Digital Cameras, Mobile Phones, GPS Devices, Cars, Bikes, Televisions, Answering Machines, Microwave Ovens, are some of the examples of Embedded Systems.

a)Today's cars may contain many embedded microprocessors, controlling such tasks as antilock braking, climate control, engine control, audio system control, airbag deployment etc.

b) Even PCs, which are designed around powerful CPUs such as the Intel Pentium 4(Four), contain embedded systems, hard disk drives, CD-RW and DVD-ROM drives, and external Peripherals such as, and other SCSI, USB, or printers, scanners devices all contain embedded processors.

c) The vast number of applications for embedded computing has given rise to high demand for engineers with experience in designing and implementing embedded systems.

Introduction:

- Microcontroller and microprocessor Architecture
- Assembly language Programming (with some exercises)
- Microcontroller peripherals
- Analog Design
- Digital Design
- Compilers, Assemblers
- Cross compilers

1) Understanding Embedded Systems (1 week)

a. Overview of Processors & Microcontrollers
b. Memory (RAM, ROM, EPROM, EEPROM, FLASH)
c. I/O Interface

2) ATMEL 8051, AVR, PIC, ARM Microcontroller (4 week each)

a. Architecture
b. RISC Architecture of AVR, PIC, ARM family.
c. Addressing modes
d. Instruction Set
e. Assembly Programming
f. Programming Exercises.

8051, AVR, PIC, ARM Microcontroller Interfacings with:

- LEDs
- Switches
- DC Motor
- Stepper Motor
- Relay
- ADC

- DAC
- Temperature Sensor
- Serial Communication
- LCD
- Seven segment display

6) PCB Designing: (4 week each)

- History of PCB/ Types of PCB/Base Material
- Overview of PCB Technologies UK –Video-V1
- Overview of Manual Routing Technologies, CAD System as a substitute of Manual Routing, How to judge CAD System
- Design Rules IPC-Standard 2221
- Design Factors
- UK Video-V2 BGA, IPC-Video-VT18 Component Identification Manual IPC1-Considerations of Design Laminates/Thermal Management
- Reliability Tooling Holes/Stiffeners (IPC- Lessons)
- IPC-Video-VT33 & VT 47
- (Introduction to Surface Mount Assembly & Wave Soldering)
- IPC-Video- VT20 & 21 (Reflow Soldering)
- Entry of Schematic Diagram / Net list File Creation
- Practical of Schematic Diagram/ Net list File Creation
- Layout Rules & Parameters/Library & Its Components
- Practical of Layout & Component Formation
- Practical Component Placement, Layout Checklist (general/electrical/physical)
- Cross Probing, Conductor routing/ Mid Term Interaction
- Practical Checking routing
- Post Processing, Art work generation

7) Major project using any of the above technologies. (Remaining days)