Aims and Objectives
The aim of this course to provide the student with a detailed understanding of Microcontrollers and Embedded systems. The course covers fundamentals, The 8051 Architecture, Assembly Language Programming, Instruction set, Serial Communication and Interfacing techniques of 8051 Microcontroller

Contact Hours: 72
Credits: 4

Course outline

Unit I
Module I 10 Hrs
Introduction to Microcontrollers and Embedded Processors – Microcontrollers survey-four bit, eight bit, sixteen bit, thirty two bit Microcontrollers --Comparing Microprocessors and Microcontrollers-Overview of the 8051 family

Module II 15 Hrs

Module III 20 Hrs
8051 Assembly Language Programming-Structure of Assembly language-Assembling and running an 8051 program- Addressing modes-Accessing memory using various addressing modes- Instruction set- Arithmetic operations and Programs-Logical operations and Programs -Jump and Call instructions and Programs -I/O Pot Programs -Single bit instructions and Programs –Timer and counter - and Programs

Unit II
Module IV 5 Hrs
8051 Serial Communication -Connection to RS-232- Serial Communication Programming- Interrupts Programming

Module V 15 Hrs
Microcontroller Interfacing -Key Board - Displays- Pulse Measurement - D / A and A/D conversion- Stepper Motor-
Module VI

Basic concept of PIC microcontroller – Microcontroller Architecture – PIC16F

Family

Text Book
1. The 8051 Microcontrollers and Embedded Systems: Muhammed Ali Mazidi
2. The 8051 Microcontrollers Architecture, Programming & Applications
   Kenneth J. Ayala

Reference
1. Design with PIC Microcontroller: John Petman

ECB20 Practical - Microcontroller Lab

1. Multiplication of two numbers using MUL command
2. Division of two numbers using DIV command
3. Pick the smallest number among a given set of numbers
4. Pick the largest number among a given set of numbers
5. Arrange ‘n’ numbers in ascending order
6. Arrange ‘n’ numbers in descending order
7. Generate a specified time delay
8. Interface a ADC and a temperature sensor to measure temperature
9. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
10. Flash a LED connected at a specified output port terminal
11. Interface a stepper motor – and rotate it clockwise or anti clock wise through given angle steps
12. Using Keil software write a program to pick the smallest among a given set of numbers
13. Using Keil software write a program to pick the largest among a given set of numbers
14. Using Keil software write a program to arrange a given set of numbers in ascending order
15. Using Keil software write a program to arrange a given set of numbers in descending order
16. Using Keil software write a program to generate a rectangular wave form at a specified port terminal

Note: Student has to perform the following experiments
(1) Experiments among experiment numbers 1 to 11
(2) Experiment Numbers from 12 to 16 are compulsory

ECB21 DIGITAL COMMUNICATION

Module I

Module II

Module III

Module IV

Module V

Module VI

Text Book

2. Principles of Communication : Taub and Schilling

References

EC5B22 PRACTICAL - COMMUNICATION LAB

List of Experiments
1. Colpitts Oscillator
2. Hartley Oscillator
3. Second order High Pass Filter, Plot the frequency response
4. Second order Low Pass Filter, Plot the frequency response
5. Second order Band Pass Filter, Plot the frequency response
6. Universal Active Filter, Plot the frequency response
7. Collector Modulation
8. Base Modulation
9. Phase Locked Loop, Determination of lock range and capture range
10. FM Modulation using PLL IC
11. Voltage Controlled Oscillator Using 566 IC, Design free running frequency
12. Pulse Modulation- PAM, PWM, PPM
13. IF Amplifier
14. Balanced Mixer
15. Opto coupler
16. ASK, PSK, FSK

All the experiments are compulsory, Circuit Design is required.

EC5B23 COMPUTER HARDWARE

Unit I

Module 1 (7 hours)
Introduction: Functional units, Basic operational concepts, PC family
Motherboard: Form factor types: AT, ATX, NLX, WTX, BTX, Mother board components, Motherboard logic
Text: 1. Computer Organisation, Carl Hamacher
      2. Troubleshooting, Maintaining & Repairing PCs, Stephen J. Bigelow
      3. IBM PC and Clones, B. Govindarajalu

Module 2 (13 hours)
Processor-internal organization, Types, packaging, over clocking, Sockets/Slots, Heat sinks Co-processors, Chipset
BIOS-functions, DOS-BIOS interaction, POST, POST sequence, POST error indications, BIOS Set up, Expansion buses-type & features
Text: 1. Computer Organisation, Carl Hamacher
     2. IBM PC and Clones, B. Govindarajalu
     3. Upgrading and Repairing PCs, Scot Mueller
Module 3
(12 Hours)
Memory: RAM-Static & Dynamic, memory refresh logic, ROM-TYPES, concept of Cache memory- L1/L2 cache, virtual memory
Memory modules: SIMM, DIMM & RIMM features, Memory banks, System Logical memory layout
Ports- serial, parallel, USB, IEEE-1394, connectors
Text 1. Computer Organisation, Carl Hamacher
2. Upgrading and Repairing PCs, Scot Mueller

Unit II

Module 4
(20 Hours)
Storage Devices: Hard Disk Drive- construction, Types , IDE, SCSI & SATA, connectors/interfaces, RAID, Data organization , operation, capacity, speed and storage improvements, features, installation, Partitioning, Formatting, MBR, DBR, File Systems- FAT, Root Directory, HDC, Floppy Disk & Drive, FDC, Optical storage: CD ROM technology, operation , DVD- capacity(sides and layers, Blu-ray disc, tape back-up, Complete Booting process
Text 1. All About Hard Disk Drives, Manahar Lotia
2. Upgrading and Repairing PCs, Scot Mueller

Module 5
(10 Hours)
Text 1. All About Printers/Keyboards/Mouse, Manahar Lotia
2. Upgrading and Repairing PCs, Scot Mueller

Module 6
(10 Hours)
Special board: Sound, Modem, NICs, Graphical accelerators, Video (Block diagram approach only) SMPS: types- voltages, UPS, Batteries, Test equipments, Software Diagnostics: PC Tools and Norton Utilities, Viruses, Antiviruses
Text: 1. IBM PC and Clones, B. Govindarajalu
2. All About Hard Disk Drives, Manahar Lotia
3. Upgrading and Repairing PCs, Scot Mueller

EC5D01 OPEN COURSE

AUDIO AND VIDEO ELECTRONICS

Aim of the course:
To enable the student to expertise in the field of Audio and video engineering.

Contact hours: 72
Credits : 4

Course Outline

Unit I

Module I 8 Hours

Module II 14 Hours
Construction and working principle of various types of microphones, directivity, sensitivity, frequency responses of microphones, construction and working principle of various types of loud speakers, frequency response, directivity, distortion power handling capacity of speakers, columns and enclosures for speakers, crossover networks in columns

Module III 14 Hours
Sound recording methods, sound on disc, constructional characteristics of stylus microgroove, head, tracking error and compensation- Magnetic recording, DC and AC bias, frequency response, speed equalisation and signal to noise ratio, recording circuits, Dolby system concept, optical storage systems-Coding and decoding applied to CD – CD-R

Unit II

Module IV 12 Hours

Module V 12 Hours
Module VI

12 Hours

Concept of HI-FI Stereo amplifiers-bass control, treble control and balance control, loudness control in stereo amplifier, distortion in stereo amplifiers, typical circuits installation of the stereo system. PA system and projection equipment, pre amplifiers, high wattage audio amplifier, Horns and their poor handling capacity working principles and operation of film projector.

EC5D01 OPEN COURSE

COMPUTER ASSEMBLING

Aim of the course:

To get an in-depth knowledge of computer hardware and hence to create a confidence in using and assembling PC

Contact Hours: 72
Credit :4

Course Outline

Unit I

Module I

8 Hours
Computers-History, PC Components- Hardware and Software, PC Architecture
Text Book: 1.IBM PC and Clones- Govindarajalu, TMH
2.Upgrading and Repairing PCs – Scot Meuller- Pearson Edn.

Module II

12 Hours
Microprocessor Types-Generation, Processor Specifications, Processor Sockets and Slots- Math Co-Processor- Popular Intel Processors-P4, P5, & P6 Processors- Processor Installation stopes.

Module III

16 Hours
Motherboard- Form Factor- Components, Chipsets-Evolution, North Bridge/South Bridge Architecture, Hub Architecture, Intel i810E Chipset features and architecture, Super I/O chips, System Bus-Types, functions and features, FSB, Memory Bus, I/O Bus, Mother board settings and installation Steps.
EC5D01  OPEN COURSE

ELECTRONIC COMMUNICATION

UNIT I

Aim of the course:

To enable the student to become an expert in various communication techniques, modulation, concept of digital modulation and data communication

Contact Hours : 4
Credits : 4
Module I

What is communication, Uses of communication, the structure and types of communication systems, communication systems and data communication


Module II

The communication channel, electromagnetic wave, frequency and wavelength, the electromagnetic spectrum, bandwidth, bandwidth and channel capacity, bandwidth and distance


Module III

Modulation and demodulation, types of modulation, amplitude modulation, frequency modulation, phase modulation


Unit II

Module IV

Multiplexing, space division multiplexing frequency division multiplexing, time division multiplexing

Text book: Chapter 4-4.3, 4.4, 4.5,4.6- Data Communications, William L Scweber, Mc Graw Hill, 1998

Module V

Description of digital systems, advantages of digital systems, role of the medium, wire and cable air and vacuum, fiber optics


Module VI

Role of modems, modem functions, operation of a modem, originate and answer connecting the modem to the line, other specialised modems- fiber optic modems, direct connection modems, digital modems

Pin 2 and 3 of the NANO are connected to the STEP and DIR pin of the Easy Driver. We also connect a Ground pin of the NANO to the Easy Driver GND pin. Pin A4 of the NANO is used to read the Analog value of the Potentiometer Center pin. We will be using the AccelStepper library to control the speed and acceleration of the stepper motor, we want the motor to move in relation to the rotation of the Potentiometer. Since a Potentiometer can change value even when we are not touching it, we are moving the motor only if the Potentiometer value has changed +6 or -6 from the previous read value, that way we avoid jitter of the Stepper motor. As always please have a look at the tutorial video for more information. Arduino Stepper Control with Potentiometer. A stepper motor moves one step when the direction of current flow in the field coil(s) changes, reversing the magnetic field of the stator poles. The difference between unipolar and bipolar motors lies in the may that this reversal is achieved (figure 1) : Figure 2 : ICs for Unipolar and Bipolar Driving. According to which phase is leading, the motor axis rotates clock-wise or counter-clockwise, whereby the rotation speed is proportional to the clock frequency. In the half-step system the situation becomes more complicated. The minimal two control signals become four control signals. Stepper motors are increasingly taking its position in the world of the electronics. Starting from a normal Surveillance camera to a complicated CNC machines/Robot these Stepper Motors are used everywhere as actuators since they provide accurate controlling. In this tutorial we will learn about the most commonly/cheaply available stepper motor 28-BYJ48 and how to interface it with Arduino using ULN2003 stepper module. Stepper Motors Meaning, they will move only one step at a time. These motors have a sequence of coils present in them and these coils have to be energized in a particular fashion to make the motor rotate. When each coil is being energized the motor takes a step and a sequence of energization will make the motor take continuous steps, thus making it to rotate.