Aims and Objectives

The aim of this course is 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: Mohammed Ali Mazidi*
2. *The 8051 Microcontrollers Architecture, Programming & Applications: Kenneth J. Ayala*

Reference
1. *Design with PIC Microcontroller: John Petman*

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### 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-clockwise 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*
Module I  
**10 Hrs**
Information Theory – Concept of information, Communication Channel, Entropy - Shannon’s theorem-channel capacity- Bandwidth Considerations –Noise trade off – Analog Vs Digital Communication-

Module II  
**10 Hrs**
Data Communication Techniques-serial and parallel Communication-asynchronous and synchronous Communication-Coding scheme- ON-OFF, RZ, NRZ, Bipolar-Manchester signaling and differential coding –

Module III  
**15 Hrs**

Module IV  
**15 Hrs**

Module V  
**10 Hrs**
Communication system interfaces and standards-current loops-RS232 standard-X21- Communication Equipment-Modem-Different types, Multiplexers and Concentrators

Module VI  
**12 Hrs**

**Text Book**

(1) 8 Experiments among experiment numbers 1 to 11
(2) Experiment Numbers from 12 to 16 are compulsory
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. Govindarajulu
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 Reparing 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.
Text Book: *Upgrading and Repairing PCs – Scot Meuller* – Pearson Edn.

**Unit II**

**Module IV**

10 Hours

- BIOS – Hardware and Software, Motherboard BIOS, ROM Hardware, Shadowing, POST, ROM upgrading/flashing, Plug and Play BIOS

Text Book: 1. *IBM PC and Clones – Govindarajalu, TMH*


**Module V**

13 Hours

- Memory Basics, ROM, DRAM, Cache Memory: SRAM, RAM Memory Types - FPM, EDO, Burst EDO, SDRAM, DDR-SDRAM, RDRAM- SIMM, DIMM & RIMM

Text Book: *Upgrading and Repairing PCs – Scot Meuller* – Pearson Edn.

**Module VI**

13 Hours

- OS Concepts - DOS & Windows OS – Features, LINUX OS - Features, Steps in Installing OS

Text Book: *Upgrading and Repairing PCs – Scot Meuller* – Pearson Edn.

*(For getting full advantage of this course a demonstration of the PC peripherals and their installation may be carried out)*

**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

**UNIT I**
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, bandiwidth 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

Basically, stepper motors are like the DC motors that rotate in discrete steps. They have multiple arranged coils and they are usually known as phases. Motor will rotate one step at a time if we energize each phase sequence. High levels of precision can be achieved by controlling the stepper motor with computer. Steppers motors are available in the market in many different sizes. The speed of the stepper motor is controlled by frequency of pulses generated. They have wide range of applications like hard disk drives, robotics, telescope, antenna, toys etc. A six wire stepper motor is shown in If you rotate its shaft by hand in clock wise or anti clock wise direction it generates a pulse on its four (Coil ends) wires with some voltage and current respectively. Then if you want you can mention how a stepper motor can usually be used as a rotary encoder.

This may be a tricky task. use suitable gear with stepper motor and the shaft rotating the board. This require some mathematics.

From there you can calculate the angles Axr, Ayr and Azr: $A_{xr} = \arccos\left(\frac{R_x}{R}\right)$ $A_{yr} = \arccos\left(\frac{R_y}{R}\right)$ $A_{zr} = \arccos\left(\frac{R_z}{R}\right)$. share | improve this answer | follow.

We send commands from the NI LabVIEW through the serial port i.e. NI LabVIEW serially communicates with the Arduino to control the speed of the stepper motor. Arduino sends commands to the L298 motor controller and it decides what to do after manipulating the different commands from Arduino. Executed commands are also printed on LCD (Liquid Crystal Diode). A command box variable having command L will rotate the stepper motor with slower and slower speed if it is rotating at a higher speed. The command box variable having command S will stop the rotation of the stepper motor. Now, go to the Front Panel and Right Click on it. Go to Controls-> Modern-> Boolean and you can see there different Boolean blocks. Choose the encircled block as shown in the figure below.