NextSapiens

Regular 3 months weekend Program

Detailed Course Content

Introduction to concept of microcontroller and Embedded Systems

- What is an embedded system, Need of Embedded system design.
- Basic Electronics , Importance of electronics in today's world,
- Integrated circuits and their identification, types of ICs
- ICs as heart of electronic world.
- Embedded systems as a basis of electronic world.
- Introduction to Microcontroller
- Microcontroller Vs microprocessor
- Introduction to microcontroller families.
- **8051 architecture**.
    1. I/o port
    2. Port structure and operation
    3. I/O Configuration
    4. Port loading & interfacing
    5. code memory
    6. Internal RAM
    7. External RAM

- **8051 Registers**
    1. Basic registers
    2. Special function registers (SFR)
    3. The accumulator
    4. B Register
    5. Data pointer register
    6. Program counter

- **8051 Interrupts**
- Introduction to Programming languages
- Introduction to motor driving, concept of H-bridge.
- Motor Driver ICs , L293D, Bidirectional motor driving
- Motor control for autonomy purposes
- Concept of PWM (pulse width modulation) and motor speed control using PWM.
- Advantages and disadvantages of **Basic**
- Basic language and familiarization with IDE- Bascom.

- Programming fundamentals like iteration, decision making, logic development.

Detailed Programming with Bascom IDE in Basic language

- Logic development and programming, use of iterative statements in Bascom-IDE
- Different data types in Basic
- Memory models for 8051
- Conditional statements , data transfers , Jump and loop statements
- Subroutines and functions in Basic language
- **Timers**
    1. Concept of timers in Bascom
    2. Use of timers as counters
    3. How Timers Count
    4. Measuring Time using Timers
- Programming counters/timers in Bascom
- Interfacing with different hardware and real world entities
- **LED interfacing**
    1. Making Different Patterns with Led
    2. Rotation of Led
- **Display modules**
    1. Concept of Display modules
    2. Interfacing of display modules
    3. LCD interfacing
    4. Data display on LCD
    5. Seven segment display
    6. Common anode Common Cathode
    7. Number display using seven segment display
- Analog and digital data
- Concept of Sampling for analog to digital conversion
- External ADC module and its interfacing and use.
- Transducer , concept of sensors as a type of transducer
- Digital and analog sensor : their use and interfacing

Introduction to Programming in Embedded C

- Introduction to C
- Embedded C : difference between standard C and embedded C
- Introduction to Programming in embedded C
- Data Types
- Structures and arrays
- Memory models
- Accessing hardware features using Embedded C.

- Keil IDE: compiler , editors and simulators
- Features of Keil IDE and embedded development tools
- Interfacing of Hardware and external entities using C
    1. Interfacing of Matrix keyboard with 8051
    2. Integrating Led modules and controlling them with keys
- Concept of a basic line follower
- Line following and its application
- Comparator based line follower
- Light Dependent Resistors(LDR) as a sensor
- Use of LDR for line following using ADC module

8051 Instruction set and Programming in Assembly

- Introduction to Registers of 8051
    1. Basic registers
    2. Special function registers (SFR)
    3. The accumulator
    4. B Register
    5. Data pointer register
    6. Program counter
- 8051 peripherals
- Interrupts in 8051
- Familiarization with Instruction set of 8051
- 8051 programming in assembly
- Interfacing of external devices and real world entities in Assembly
    1. DC motor control using motor drivers
    2. Bidirectional motor driving
    3. Stepper motor control
    4. Driving a stepper motor in assembly.

Introduction to Robotics and 8051's use in making various robots.

This section would be running concurrently with other sections so that students are familiarized with concept of Robotics and they may appreciate the use of 8051 in field of Robotics.

It includes:

- Introduction to robotics
- History of robotics
- Future of robotics in India as well as abroad.
- Concept of autonomy
- Use of 8051 for robotic projects.
- 8051 as brain of autonomy.

- Real world projects and different advanced robotics concepts
- Concept of object follower
- Obstacle avoidance robot
- DTMF decoder concept and GSM based robotics: control your robot form your mobile from anywhere where your network takes you.
- Line follower

Practical projects

Following 14 practical would be dealt in detail to cover all theoretical concepts mentioned above.

1. LED Blinking and its Control
2. Interfacing of LCD.
3. D.C. Motor Control using motor driver
4. Interfacing of ADC
5. Analog and Digital Sensor Interfacing
6. Interfacing of Matrix Key Board
7. Temperature Indicator
8. Traffic Light Control system
9. Stepper Motor Control
10. GSM Control Robot
11. Autonomous Object avoidance Robot
12. Autonomous Object Follower Robot
13. Basic Line Follower Robot (using LM324)
14. Autonomous Line follower Robot (Using LDR sensor)

This course will open the gateways of 900 Billion Dollar Industry of Robotics, automation and embedded system

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Venue of Training: Noida and Bhopal
Duration of Course: 3 months (weekend program, 2 weeks in a month)
Starting dates: 28th August onwards
Registration Closing on 20th August 2009
Course Fees: Rs 3990/participant