

## ***Topics To Be Covered***

---

### **Session1 : Sensors**

- Different kinds of sensors
- IR sensor
- Light sensor
- TSOP sensor
- Temperature sensor
- Moisture sensor

Hands On :

- Debugging IR sensor using multimeter
- Building and testing TSOP based obstacle sensor

### **Session2: Actuators and drivers**

- Different kinds of actuators
- DC motor
- DC Geared motor
- Stepper motor(Unipolar & Bipolar)
- Servo motor
- DC Geared and bipolar stepper motor driver i.e. Hbridge(L293D)
- Unipolar stepper motor driverULN2803

Hands On :

- Driving DC geared motor using hbridge
- Driving Stepper motor using ULN2803
- Driving servo motor using microcontroller(to be taught in next session)

### **Session3: Microcontroller basics**

- AVR microcontrollers
- Atmega8 pin configuration
- Simple input output

- Current and voltage ratings of Atmega16
- What is clock & its significance
- First programming session
- Which compiler to choose (WinAVR,CVAVR)
- Writing first simple code to blink LED's
- Demonstration of using microcontroller pins for simple input output
- Choosing resistance for driving LED with microcontroller pins
- Compiling the program
- What is Burner
- Burner hardware and burner software
- Transferring hex file to microcontroller

Hands On :

- Running various LED patterns on microcontroller board with programming

#### **Session 4: Very first simplest robot (Line follower and wall follower)**

- Interfacing IR sensor with microcontroller
- Interfacing hbridge with microcontroller
- Putting logic in microcontroller to make the system behave as line follower
- Putting logic in microcontroller to make the system behave as wall follower

Hands On :

- Making a line follower and increasing its speed and efficiency
- Making a wall follower and increasing its speed and efficiency

#### **Session 5: Another simple robot (edge avoider) to enhance understanding of coding**

- Introducing delays
- What role clock plays in generating delays
- Writing code to make an edge avoider robot

Hands On :

- Building a robot that runs continuously on table but never falls off

### **Session 6: Advanced microcontroller features**

- Timers
- Counters
- USART
- Interrupt handling
- Masking interrupts
- Built in ADC's

Hands On :

- Making small programs to illustrate use of timers,ADC,UART and counters

### **Session 7: Display Devices**

- 16X2 LCD interacing with microcontroller
- Displaying your name on LCD
- How to use seven segment displays

Hands On :

- Displaying your name on LCD

### **Session 8: Computer controlled Robot**

- Practical use of UART
- Controlling robot with keyboard by pressing keys

Hands On :

- Communication between robot and computer
- Controlling robot using computer

### **Session 9: Zone based GSM Home Security System**

- What is SIM 300 GSM module.
- Interfacing SIM300 GSM module with microcontroller
- AT Commands

- Making calls and SMS using microcontroller

Hands On :

- Building a very sophisticated zone based GSM home security system

#### **Session 10: RFID based Identification**

- What is RFID
- Interfacing RFID reader to microcontroller
- Using RFID reader to provide access to only authorized users

Hands On :

- Building a very sophisticated attendance and authorization system used in IT companies today

#### **Session 11: Location Tracker**

- What is GPS
- Interfacing GPS module to microcontroller
- What are NMEA commands
- Using NMEA commands to get location information

Hands On :

- Displaying our current location on earth on LCD

#### **Session 12: Mobile controlled Robot**

- DTMF decoding
- DTMF decoder IC (HT9170,8870)
- Choosing proper headphones to get the DTMF tones
- Programming your bot to follow the DTMF commands

Hands On :

- Building a robot to control it remotely via mobile phone

### **Session 13: VoIP(Internet) controlled Robot/Remote crawler**

- Voice Over Internet Protocol
- Use of VoIP to reduce call costs
- Controlling your robot through VoIP

Hands On :

- Controlling robot through Internet
- Using a webcam keeping an eye on where it moves remotely

### **Session 14: Range finder Robot**

- What are ultrasonic sensors
- How to use them to find distance
- Displaying object distance on LCD
- Avoiding collisions using ultrasonic sensors

Hands On :

- Displaying object distance on LCD
- Crash avoider using ultrasonic sensor

### **Session 15: Hexapod**

- What are servo motors
- How to drive them
- Using servo motors to build six legged walking robot

Hands On :

- Making a hexapod

### **Session 16 : PCB Designing**

- Hand etched PCB's

- Software Designed PCB's
- PCB designing process
- Etching
- Masking
- Screening
- Tinning

Hands On :

- Making light sensor PCB and etching it

### **Session 17 : Final competition**

- The problem statement to be revealed at the end of session 13
- 3 hours to complete the robot
- Winners will get cash prize and merit certificates.

### ***Projects done During Training***

---

- Hexapod
- RFID based attendance system used in IT Companies
- Location Tracker(GPS)
- Zone based GSM Security System
- Remote crawler/Internet controlled video surveillance robot
- Computer controlled Robot
- PCB Designing
- LCD Games
- Wall follower Robot
- Mobile controlled Robot
- Line follower Robot
- Edge avoider Robot
- Obstacle avoider Robot