



Course Contents:

1. Introduction to Embedded System

- What is Embedded System?
- Embedded System Vs. Robotics
- How Embedded System is growing
- Present Trends in Embedded System

2. Get started with Embedded C

- Begin with C Programming
- Basic Syntax, Data Types, Header Files
- Conditional Statements, Keywords, Operators
- Loops, Functions, Return types
- Build projects with C

3. DIY Circuit Designing

- Resistor, Capacitor, Buttons, LEDs
- Learn about circuit designing
- How to use General Purpose PCB.
- Understanding & making own circuits
- Soldering

4. Introduction to Microcontrollers and AVR Family

- Introduction to AVR Microcontroller
- RISCVs CISC
- Brief on RISC Microcontroller
- Introduction to ATmega8/ATmega16 features
- Input/ Output ports of AVR
- Registers Bit of AVR & controlling it.

5. DIY Kit: Solder & Learn to create your own board.



6. AVR Programming

- What is Embedded C
- Embedded C Programming for AVR Microcontroller.
- Introduction to Programmer strategy using Registers
- Code structures and debugging.
- Code Flashing and execution

7. Sensor: Adding Sense to your DIY board

- Type of Sensors
- IR Sensor
- Circuit & working of IR Sensor Logic
- Sound Sensors
- Temperature Sensor

8. Display it with AVR

- Interfacing Displays
- **LED**: Programming LED Patterns
- Displaying patterns, Relays of patterns
- Displaying : **Seven Segment Display**
- Displaying : Alphanumeric **LCD**

9. Running Motors

- What's H-Bridge
- How L293D works?
- Interfacing Actuators: DC Geared Motor
- Running Servo Motor!

10. Interfacing Devices with Microcontroller

- Bluetooth Module
- Accelerometer
- X-Bee
- Relay



11. Introduction to USART

- USART
- UART
- Difference between USART & UART Register of USART
- What is Prescaler Serial communication Vs Parallel Communication
- Practical Application of Serial Communication
- Serial Communication between System & Microcontroller

12. Introduction to Timers/Counters

- What is timer/counter
- Timer Register
- Timer0/Timer1 Programming for timer
- Practical application of Timers

13. Introduction to PWM

- What is PWM
- PWM Register in Timer
- How to Generate PWM Pulse from Microcontroller
- What is Duty Cycle
- Practical Application of PWM

15. Introduction RF Module

- RF Communication
- RF Attendance Module
- How to Interface Attendance module with Microcontroller
- Implementation of RF Attendance Module Based Application

16. Advance with AVR

- Home Automation System
- Hand Gesture Home Appliance Control
- Four-Legged Robot
- Distance Calculator Ultrasonic Sensor
- Cross Protocol Based Projects
- RFID based Attendance module.



17. Project Building and Implementation

- Designing
- Coding
- Development
- Testing

Projects Covered:

- Making own DIY Development kit
- Led Patters/Binary Counter
- Intelligent Line Follower Robot
- Obstacle Avoider
- Edge Avoider
- DTMF: Cell phone Operated Robot
- Clap Controlled Robot
- Distance Finder/Collision Avoider
- Displaying Information on LCD
- Digital Counter using Seven Segment display
- Moving Message display on LCD
- Controlling Brightness of LED
- **Cross Protocol Projects:** Controlling Speed of Motor using Bluetooth
- **Cross Protocol Projects:** Bluetooth Controlled HOME AUTOMATION
- Bluetooth controlled Servo Bot
- Temperature Display on LCD
- **ADC with Analog IR Sensor**

Tool Kit Content:

- General Purpose PCB
- ATmega 8 IC Base
- Atmega 8 Microcontroller
- Capacitors, Button, Resistors, LED
- Power Supply, Male Burg Sticks
- Connecting Wires
- L293D Module
- USB Programmer
- Screw Driver
- 16x2 LCD
- Motors



- Wheels
- CasterWheel
- Chassis
- IR Sensor Pair
- Soundsensor
- DTMFModule
- SoftwareCD

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