

Certificate Course
Embedded System using AVR

Course Contents

Introduction to Embedded Systems

- Understanding an embedded system.
- Basic components of Embedded System
- Hardware Classification of Embedded System
- Programming Language Classification of Embedded System
- Advantage & Disadvantage of Low level & High level programming language of Embedded System
- Comparison between AVR and 8051
- Comparison of ATMEGA Family

Quick Review of previous Basic Concepts

- Overview of basic electronics and digital electronics.
- Microcontroller vs. Microprocessor
- Common features of Microcontroller.
- Different types of microcontrollers.

Get deep into Basic Electronics with:

- Resistor
- Capacitor
- Diode
- Transistor
- Relay
- Switches
- Voltage Regulators

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Introduction to AVR Microcontroller

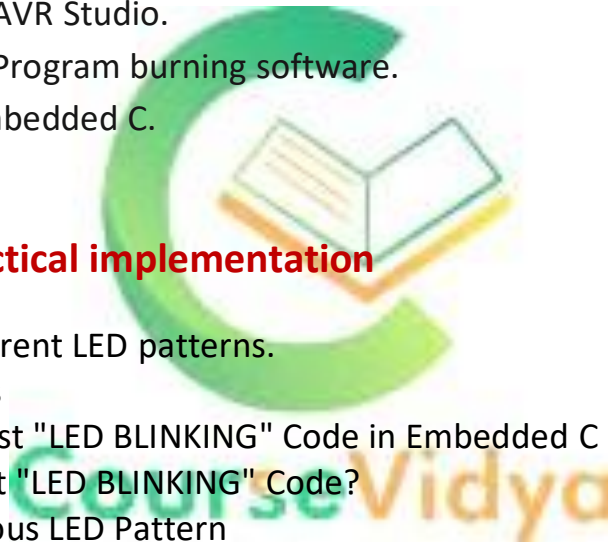
- Pin configuration and architecture.
- Device features.
- Concept of registers and ports.

Time to understand Programming AVR

- Introduction to AVR Studio.
- Introduction to Program burning software.
- Starting with Embedded C.

First Step to Practical implementation

- Generating different LED patterns.
- Rotation of LEDs
- How to write First "LED BLINKING" Code in Embedded C
- Why always First "LED BLINKING" Code?
- Practice on various LED Pattern
- Relay Race of LEDs.
- Binary Counter.



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Introduction to Computational Devices

- What is Computational Device?
- Transistor
- Logic Gates
- Microprocessor
- Microcontroller
- Difference B/W Various Computational Devices
- Application of various Computational Devices
- Selection of Computational Device
- How to use Various Computation Device/
- Work on AVR Family with Mega Series (ATmega8)

Interfacing to Actuator

- What is Actuator?

How to work on Educational & Engineering Level Actuator

- DC Motor
- DC Geared Motor
- Stepper Motor
- Servo Motor

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Introduction to Driving System/Locomotion

- What is Driving System?
- Various Types of Driving System
- Why need Driving System

How to Drive Motor

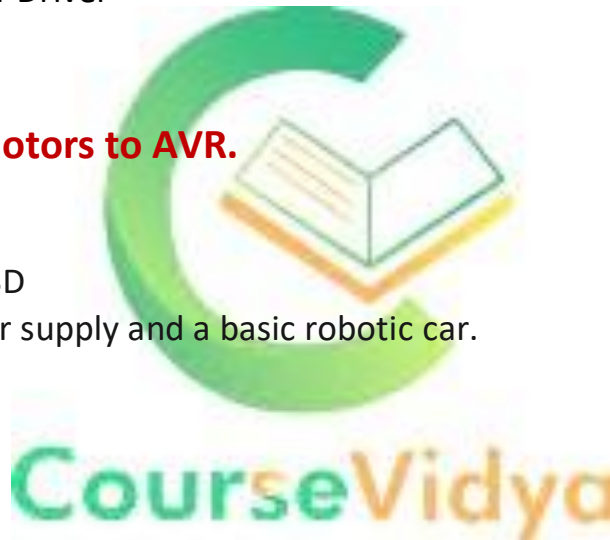
- H-Bridge Motor Drive
- Advanced Motor Driver

Interfacing DC motors to AVR.

- H-Bridge Circuit
- Working of L293D
- Making of power supply and a basic robotic car.

Relays

- Type of relays.
- Working of a magnetic relay.
- Controlling Electrical appliances with electromagnetic relays.



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Introduction to 7-Segment Display

- What is 7-Segment Display
- Types of 7- Segment Display
- Application of 7-Segment Display
- Programming of 7-Segment Display

Interfacing of Anatomy of Robot

- Assembling of Robot

Introduction to Timer/Counter

- What is Timer/Counter
- Application of Timers/Counter
- Registers of Timers/Counter's Different Modes
- Programming on Atempa8 Timers/Counter

Introduction to Analog to Digital Convertor (ADC)

- ADC, How it works???
- Different Mode and Registers of ADC
- Programming ADC

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Serial Communication

- ADC, How it works???
- Different Mode and Registers of ADC Programming ADC
- Difference between Parallel and Serial Communication
- USART / UART Protocol
- RS232 Standard
- TTL Converter
- UART Programming

Serial Communication cont.....

- Difference between Parallel and Serial Communication
- USART / UART Protocol
- RS232 Standard
- TTL Converter
- UART Programming



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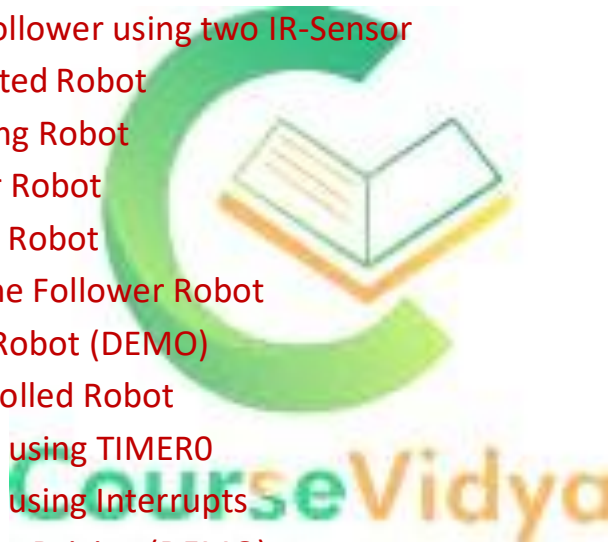
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Projects to be covered

1. LED Blinking
2. Running LEDs
3. Sand Glass Filling of LEDs
4. Decoration LEDs/ LED Patterns Etc.
5. Sensor Interfacing
6. DC Motor Driving
7. Black Line Follower using two IR-Sensor
8. White Line Follower using two IR-Sensor
9. Sound Operated Robot
10. Light Searching Robot
11. Wall follower Robot
12. Edge Avoider Robot
13. Intelligent Line Follower Robot
14. Grid Solving Robot (DEMO)
15. Mobile Controlled Robot
16. Blinking LEDs using TIMERO
17. Blinking LEDs using Interrupts
18. Stepper Motor Driving (DEMO)
19. Servo Motor Driving (DEMO)
20. Displaying your Name on LCD
21. Blinking Text on LCD
22. Automatic Counting of Numbers using LCD
23. Seven Segment Display



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- 24. Seven Segment Multiplexing
- 25. Digital Voltage Measurement
- 26. PC to μ C Communication
- 27. μ C to PC Communication
- 28. PC - μ C Full Duplex Communication
- 29. Digital Visitor Counter
- 30. Digital Clock
- 31. Temperature Controlled Fan (DEMO)



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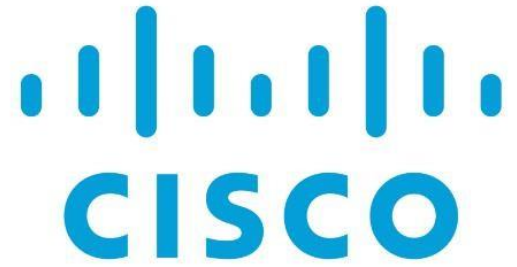
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- Data Analytics using Advance Excel
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- Core Java
- Advance Java
- Android App. Development
- Core Python with Django
- .Net with framework
- Core PHP with Framework/CMS
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- Web Development
- Software Testing
- Ethical Hacking and Cyber Security

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- Diploma in Internet Marketing
- Diploma in Embedded Systems & Robotics

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