



## Curriculum Of Embedded AVR

**Duration:- 6 Weeks**

### REVISITING THE EMBEDDED C PROGRAMMING

- Variables and Operators
- Conditions – Nested and Ladder
- Loops
- Functions and Pointers
- Macros and Enumerations

### BASIC ELECTRONICS SIMULATION

- Software Installation and Environment Overview
- Simple Electronic Circuit Designing and Hardware Interfacing
- Circuit Simulation

### INTRODUCTION TO ATMEGA16 MICROCONTROLLER

- Features of ATmega16 Microcontroller
- Understanding Pin Diagram
- ATmega16 Block Diagram and Peripherals
- ATmega16 Basic Programmable DATA Registers
- Controlling the PORT and PIN in ATmega16

### TESTING THE BASIC IO UTILITY

- LED Interfacing – Simple and Pattern
- Seven Segment Display Interfacing – Simple and Multiplexed
- Switch Interfacing – Single, Multiple and Keypad
- DC Geared Motor Interfacing
- Stepper Motor Interfacing
- LCD Interfacing – 4bit and 8bit Mode
- Relay Interfacing to control AC Load

### ANALOG TO DIGITAL CONVERTOR

- Understanding the ADC Registers
- Single Conversion and Repeated Conversions
- Interfacing Single sensor using ADC (Normal Mode)
- Interfacing Multiple sensor using ADC (Normal Mode)
- Interfacing Single sensor using ADC (Differential Mode)
- Interfacing Multiple sensor using ADC (Differential Mode)

### INTERRUPT HANDLER

- Understanding Interrupt Utility
- Understanding the Interrupt Registers



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- Difference between Polling and Interrupt
- Identifying Interrupt Vectors and Priority Table
- Interrupt Service Routine
- Creating and Initializing Interrupts
- Interfacing Sensor with Interrupt Service Routine
- Interfacing with External Interrupts

### **TIMER AND COUNTERS**

- Understanding Timers and Counter Peripheral
- Understanding the Timer Registers
- Generating 1us Pulse on IO
- Generating 1ms Pulse on IO
- Creating User Defined Delay Function
- Understanding Timer CTC Mode
- Creating 100KHz Frequency Generator
- Understanding Timer PWM Mode
- Interfacing LED Dimmer using PWM
- Interfacing Servo Motor using PWM
- Understanding Timer ICP Mode
- Creating a Frequency Detector using ICP Mode

### **UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER**

- Understanding the features of UART Protocol
- Understanding the UART Registers
- Creating a Serial Data Transmitter Function
- Creating a Serial Data Receiver Function
- Interfacing a Serial Communication Device using UART

### **SERIAL PERIPHERAL INTERFACE**

- Understanding the features of SPI Protocol
- Understanding the SPI Registers
- Creating a Master Data Out Function
- Creating a Master Data in Function
- Interfacing a Multiple Slave Environment using SPI

### **INTER INTEGRATED CIRCUIT**

- Understanding the features of I2C Protocol
- Understanding the I2C Registers
- Creating a Write Function



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- Creating a Read Function
- Interfacing RTC DS1307 using I2C

### DEVELOPING A MAJOR PROJECT