EMBEDDED C
- Embedded C Vs C
- Data Types and Memory Classification
- Revising Number System
- Variables and Syntax
- Operators (Arithmetic/Unary/Relational/Logical/Ternary/Bitwise)
- Macros
- Enumerations
- TypeDef
- Storage Classes (auto/static/register/extern)
- Constant and Volatile
- Understanding Structures and Unions
- Software Installation and Environment Overview
- Simple Electronic Circuit Interfacing
- Circuit Simulation

INTRODUCTION TO A MICROCONTROLLER
- Pin Diagram
- Block Diagram
- Memory Diagram
- Understanding the Microcontroller Datasheet
- Introduction to the Programmable Registers

INTRODUCTION TO LED INTERFACING
- Interfacing a simple LED, RGB LED
- Interfacing Multiple LEDs
- Understanding Delays
- Generating LED patterns

INTRODUCTION TO LOOPS
- Using for loop to generate LED Pattern
- Using While loop to generate LED Pattern

INTRODUCTION TO SEVEN SEGMENT DISPLAY INTERFACING
- Interfacing a Seven Segment Display
- Creating Single Digit Up & Down Counter
- Interfacing Multiple Seven Segment Display
- Creating Multiple Digit Up Counter
- Creating Multiple Digit Down Counter

INTRODUCTION TO ARRAYS
- Creating Arrays for Seven Segment Display
- Using Loops for Generate Counters
- Seven Segment Matrix Interfacing
- 4 and 6 digit Display Interfacing

INTRODUCTION TO SWITCH INTERFACING
- Understanding If and Else Statements
- Single Switch to Control LED
- Concept of Pull-Up/Pull-Down
- Understanding Nesting and Ladder If-Else Statements
- Multiple Switch to Control RGB LED
- Understanding Pin Targeting and Delayed Switching
- Single Switch to control Seven Segment Display
- Multiple Switch to Create Up and Down Counter
- Understanding Switch Debouncing

INTRODUCTION TO MOTOR INTERFACING
- Types of Motors
- Interfacing a DC Geared Motor
- Understanding the DC Geared Motor Driver
- Using Switch to Control DC Geared Motors
- Interfacing a Stepper Motor
- Using Switch to control Stepper Motor

INTRODUCTION TO FUNCTIONS
- Understanding Types of functions
- Creating Functions for LED Pattern Interfacing
- Creating Functions for Motor Interfacing
- Understanding Switch-Case Statements
- Understanding Return from a function
- Creating Function for Seven Segment Display Interfacing
- Understanding Character Arrays and Pointers
- Understanding Reference and Dereference Pointers
- Understanding String and Special Characters

INTRODUCTION TO CHARACTER LCD INTERFACING
- Understanding LCD Pinouts and Commands
- Creating Functions for LCD 8-bit Command Mode

- Creating Functions for LCD 8-bit Display Mode
- Creating Functions for LCD 8-bit Initialization
- Creating Functions for LCD 4-bit Command Mode
- Creating Functions for LCD 4-bit Display Mode
- Creating Functions for LCD 4-bit Initialization
- Printing Character Array using Loops
- Printing String using Loops
- Creating Function to Print String using Library functions
- Understanding Recursion and its drawbacks

INTRODUCTION TO SENSOR INTERFACING

- Analog to Digital Conversion
- Understanding ADC registers
- Types of Sensors (Potentiometer/LDR/DHT11/LM35)
- Interfacing Sensors with LED
- Interfacing Sensors with Seven Segment
- Interfacing Sensors with Motor
- Displaying the Sensor Data on LCD
- Interfacing with Infrared Sensors
- Interfacing with Ultrasonic Sensors
- Interfacing a Mechanical Relay for AC Load

DEVELOPING MINI PROJECT 1: WEATHER STATION

DEVELOPING MINI PROJECT 2: SENSOR BASED AC LOAD CONTROLLER

EMBEDDED AVR
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
- 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 12C Registers
- Creating a Write Function
- Creating a Read Function
- Interfacing RTC DS1307 using 12C

DEVELOPING A MAJOR PROJECT

PCB DESIGN
INTRODUCTION TO CIRCUIT DESIGNING

- Need of Circuit Designing
- Introduction to Electronic Components
- How to Select Components
- Basic Circuit Designing Process

- Types of PCB's used
- The Designing Process

INTRODUCTION TO CIRCUIT SIMULATION TOOL

- Exploring the Simulation Tool
- Adding and Exploring Component Libraries
- Creating 5VDC Multivibrator Circuits
- Adjusting Voltage, Current and Values of Components
- Creating 220VAC Power Circuits
- Connection Troubleshooting

INTRODUCTION TO PCB DESIGNING TOOL

- Exploring the Designing Tool
- Loading components in Library
- Working on component schematic
- Working on component footprint
- Working on component 3D model
- Working on Annotations Marking

DEVELOPING A SCHEMATIC

- Schematic sheet Setup
- Placing components in schematic
- Annotation of the components
- Routing the schematic
- Working on net class
- Adjusting Net Parameters
- Working on port connections
- Multiple sheet schematic
- Design rule check
- Adding text
- Shape and image
- Troubleshooting Warnings and Errors
- Generating Netlist
- Printing Schematics

DEVELOPING A LAYOUT

- Configuring the Circuit Board
- Understanding the Board Layers
- Placing components in layout

- Routing the components
- Working on Copper Pouring
- IPC Standard Rules and Conventions
- Multiple Layer Routing
- Placing Ground and Power Planes
- Design rule check
- Adding text, shape and image
- Troubleshooting Warnings and Errors
- Generating Gerber Files
- Generating N/C Drill Files
- Working on 3D View
- Generating 3D View Files

PCB PRINTING AND ETCHING PROCESS
- Printing the Layout
- Developing copper clad layout
- Etching the clad
- Drilling for holes
- Mounting components and soldering
- Troubleshooting

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