

# **Advanced Wireless Technologies with Micro-Controller Interface**

## **Part – 1: Programming Languages**

### **Module 1 Introduction to Embedded Systems**

What are and Why Embedded Systems?, Types of Embedded System, Classifications of Embedded Systems, Characteristics of an Embedded System, Applications of an Embedded Systems, Overview of Embedded Industry, Comparing Layers of GPC & Embedded System

### **Module 2 C Programming**

What are Micro Processors?, What are Micro Controllers?, Difference between Micro controller and Microprocessor, System Design using Microcontroller and Microprocessor, Difference between Von Newman and Harvard Architectures, Difference between CISC & RISC Architectures, Overview of 8 bit, 16bit, 32bit & 64bit microcontrollers

### **Module 3 Advanced C Programming**

Function, Storage Classes, Scope and Lifetime of a variable, Volatile, Recursive Functions, Stack Frame Analysis, Drawbacks of Functions, GDB, Basic Debugging Commands, Debugging a sample C Program, Arrays, Arrays and Functions, Pointer, Pointer Arithmetic, Pointers and Arrays, Pointers and Functions, String Handling Function like strcpy, strcat, strcmp, strlen, Pointers and Strings, Function Pointers, Variable Augmented Function,

### **Module 4 Data Structure Programming**

Dynamic Memory Allocation, Memory Leaks and Dangling Pointers, Structure, Structures and Array, Structures and Functions, Structure Padding and Alignment, Union, Bit fields, Using Typedefs, Enumerations, Macros

### **Module 5 Embedded C Programming**

Introduction to Data Structures, Types of Arrays, Coding Standard, Linked Lists, Singly Linked List, Doubly Linked Lists, Stacks and Queues.

## **Part – 2: Micro-Controllers**

### **Module 6 Basics of Micro controllers**

System Programming Vs Application Programming, Why C for embedded programming, Review of C language with embedded perspective, Bitwise operators programming, Bit field programming, Number System conversion program, Pointer Arithmetic programming, Register manipulation, Mixing Assembly and C.

### **Module 7 8051 Microcontroller MCS-51 Programming**

8051 Architecture, AT89C51 specifications, Register architecture, Special function registers, KEIL IDE, ProgISP, Flash Magic, LED programs, switch, 7 segment, LCD and scrolling LCD, Keypad, DC and Stepper motor, UART Programming, Timer and Counters, Interrupt programming, Relay, PWM, MOSFET, Opt couplers, Parallel ADC ADC0804, ADC0809, Serial ADC, I2C RTC DS1307.

### **Module 8 Sensor Programming with 8051 Microcontroller**

Temperature Sensor LM35, LDR Light detection Sensor, Ultrasonic distance sensor, PIR Motion detection sensor, humidity sensor, Level Sensor, MEMS Sensor, Gas Sensor,

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## **Module 9 ARM 7 Microcontroller LPC2148 Programming**

ARM Architecture, LPC2148 specifications, Register architecture, Special function registers, KEIL IDE, Flash Magic, GPIO Programming, LED programs, switch, 7 segment, LCD and scrolling LCD, Keypad, DC and Steeper motor, UART Programming, Timer and Counters, Interrupt programming, Relay, PWM, MOSFET, Opt couplers, Parallel ADC ADC0804, ADC0809, Serial ADC, Temperature Sensor LM35, LDR Sensor, Ultrasonic sensor, I2C RTC DS1307, SPI, USB.

## **Module 10 ARM Cortex Microcontroller LPC1768 Programming**

Cortex Architecture, LPC1768 specifications, Register architecture, Special function registers, KEIL IDE, Flash Magic, GPIO Programming, LED programs, switch, 7 segment, LCD and scrolling LCD, Keypad, DC and Steeper motor, UART Programming, Timer and Counters, Interrupt programming, Relay, PWM, MOSFET, Opt couplers, Parallel ADC ADC0804, ADC0809, Serial ADC, Temperature Sensor LM35, LDR Sensor, Ultrasonic sensor, I2C RTC DS1307, SPI, USB, CAN.

## **Part – 3: Wireless Modules**

### **Module 11 GPS Wireless Module Programming**

Architecture | NEMA Standards | GPS Sentences | GPGGA Sentence | UTC Time | Latitude, Longitudes and Altitude extraction | Digitalized Map

### **Module 12 GSM Wireless Module Programming**

Architecture | Frequency Bands | International Standards | AT Commands | SIM card Role | SMS / MMS commands | GSM Module Interfaces | GUI Programming

### **Module 13 RF Wireless Module Programming**

Architecture | Frequency Bands | Range calculation | Data Encryption | Data Decryption | Send and Received Program

### **Module 14 Infrared (IR) Wireless Module Programming**

Frequency bands | wavelength | Active Infrared | Passive Infrared | Modes | Obstacle and Reflection | RC5 Protocol

### **Module 15 Bluetooth Wireless Module Programming**

Architecture | Commands | IEEE standards | Radio interference | L2CAP profile | Pairing | Security | Data transfer programming

### **Module 16 RFID Wireless Module Programming**

Radio Frequency | Tag / Transponders | Readers | Data Processing subsystem | Types of Tag | Near Field Communication | Active and Passive Tag | Interfacing and programming with microcontroller

### **Module 17 WiFi / WLAN Wireless Module Programming**

Radio Architecture | IEEE standards | Frequency bands | Bandwidth | TCP / IP Layers Accessing in programming | Receive and Transmit Programming

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## **Module 18 Zigbee Wireless Module Programming**

Communication Interfaces | Protocol Layers | Radio Architecture | IEEE standards | Frequency bands and range | Bandwidth | Programming with microcontrollers.

## **Module 19 Touch Screen Panel Module Programming**

Touch Screen Panel Architecture | Resistive and capacitive nature | 4 wire resistive touch panel construction and working | Programming the Touch Screen Panel | Application of Touch Screen Panel in Projects.

## **Module 20 CAN Protocol Programming**

CAN History, CAN protocol standard, Understanding CAN protocol Architecture, Layers in CAN protocols, CAN Kingdom, CAN open, CAN Programming with Cortex Board.

## **Module 21 Project Development with 8051 /ARM7**

## **Module 22 Project Development with ARM Cortex**

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