ADVANCE EMBEDDED
SYSTEM PIC (PIC18XXXX)

CURRICULUM

» **Advanced Embedded System PIC (PIC18XXXX)**

» **Introduction to Embedded Systems**
- History & need of Embedded System
- Basic components of Embedded System
- Hardware Classification of Embedded System
- Programming Language Classification of Embedded System

» **Classification of Microprocessor & Microcontroller**
- Difference between Microprocessor & Microcontroller
- Classification based on Architecture
- Classification based on Instruction Set
- Type of Microcontroller
- Memory Classification

» **Brief Introduction to Computer Architecture**
- Classification of Von-Neumann and Harvard Architecture
- Difference between RISC and CISC
- Memory Classification
  - Primary Memory
  - Secondary Memory

» **Computer Languages**
- Low Level Languages
- Middle Level Language
- High Level Language
- Advantage & Disadvantage of Low level & High level programming language of Embedded System
- Interaction of language with Compilers

» **Embedded Development Tools**
- Assembler
- Interpreter
- Compiler
- Simulator
- Emulator
- Debugger

» **Designing with Microcontrollers**
- Introduction to 8051 and Family
- Introduction to Microchip and Family
- Block Description of PIC 18F458
- PIN diagram Description of PIC 18F458
- Introduction of File Register (RAM)
- Introduction To RAM Architecture
- Access Bank
- Special Features of PIC18F458

» **Introduction of EMBEDDED C**
- Why C
- Benefits of C over Assembly
- Constants, Variables & Data Types
  - Keywords & Identifiers
  - Data type & its memory representation
  - User Define data types (Structure)
  - Array
  - Pointers
- Operators
  - Arithmetical Operator
  - Logical Operator
  - Bitwise Operators
- Control Statement and Loops
  - If
  - Switch
  - For
  - While
  - Do While
- Introduction to preprocessor directives
- Assembly within C (Inline Assembly)

» Introduction to PIC18 Compiler/ Simulator

- MPLAB Compiler
- MPLAB C 18 Compiler
- Micro Pro C Compiler
- PIC18 Simulator IDE
- Proteus

» Real world interfacing – LED

- Brief introduction to P-N Junction Semiconductor Devices and LED
- Circuit Description of Interfacing LED
- LED Programming Patterns

» Real world interfacing – 7 segment display

- Theory of 7-Segment Displays
- Writing Decoding Chart for 0-f character
- Writing one digit UP/DOWN Counter Program
- Programming 2 Digit/3 Digit /4 Digit Counter
- Introduction To TLC (Traffic Light Controller) Programming

» Real world interfacing – LCD

- Block Diagram of LCD
- Types of LCD
- Pin Structure of 16x2 LCD
- Hardware Interfacing Circuit
- LCD Command set
- Writing program to drive LCD

» Timer/Counter programming

- Description of SFR associated with Timer/Counter
- Configuring as a Timer
- Configuring as Counter
- Delay Count Calculations

» Interfacing of switches & keyboard matrix

- Introduction to Switches & Keyboard Matrix
- Interfacing Circuit of Switches & Keyboard Matrix
- Programming of Keyboard Matrix & Switches
- Controlling of LED's by using Switches
- Key board Matrix & LCD Interfacing Program

» Real world interfacing – MOTORS

- Different kind of Motors
- Interfacing of DC Motors and Stepper Motor
- Motor Drivers Interfacing
  - L293D
  - ULN2003

» Serial Communication programming

- Introduction to the Communication System
- Types of communication System
  - Analog / Digital
  - Serial / Parallel
  - Synchronous/ Asynchronous
- Introduction to Serial Communication
  - Simplex
  - Half Duplex
  - Full Duplex
- Description of SFR associated with Serial Communication
- Data Framing and UART Introduction
  - RS232 Protocol
- Introduction & Interfacing of UART
  - MAX 232 IC
- Programming of UART

» Interrupt driven programming

- SFR associated with Interrupts
- Interrupt Handling Methods
- Programming Hardware Interrupts
- Programming Timer Interrupts
- Programming Serial Interrupts

» Using and configuring adc

- Introduction to ADC
- ADC Initialization

» Introduction of sensors

- Introduction of Transducers
- Types of Sensors
- Sensor Interfacing
  - IR Sensor
  - Temperature Sensor

» Introduction to signal Decoder IC

- DTMF

» Protocol Interfacing

- SPI Protocol
  - Introduction to SPI Protocol
  - SPI Protocol Framing
  - Programming of SPI
- I2C Protocol
  - Introduction to I2C Protocol
  - I2C Protocol Framing
  - Programming of I2C

» Introduction to CCP and ECCP programming

- Standard CCP Module
- Enhanced CCP Module
- Compare mode programming
- Capture mode programming

» Using Internal/External Memories

- Introduction to External Memory Interfacing using Intel Bus Timing
- SFR configuration to read/write Internal Memory (EEPROM)
- Using library to read/write Internal EEPROM

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