EMBEDDED SYSTEMS

SPIRO IT ACADEMY

(Unit of Spiro Solutions Pvt. Ltd, Chennai)

Nasscom Listed Company

ABOUT SPIRO ITA

Spiro ITA is Subsidiary of Spiro solutions Pvt. Ltd . Spiro ITA is a premier provider of IT Training, Research and Development ,Project Training skills across The India, Singapore and the Malaysia We offer true competency-based programs, we guarantee quality, and we guarantee to lower your costs, all at the same time. Our courses cover over 40 different subject areas, including programming, Domain Training, Project Training and system administration skills. We offer stand-alone classes in addition to all-inclusive certification training tracks. Founded in 2005 by experienced professionals, Spiro ITA has served thousands of Institutes and Lakhs of individuals over the seven years.

Objectives

• To function as an efficient industrial skill provider for students.

• To increase the eligibility of students to enter various industries.

• To reduce the knowledge deficiency in student career.

• To recognize the students exact desires and making them to grow in it.

• To create a Maximum awareness about Research & Development and its importance.

Vision

Spiro ITA will be recognized as, the predominating Research & Development Project Training and IT Training organization for students, Trainees to acquire excellent knowledge, professional development and personal growth. To be a leading organization and recognized as global leader in industrial skill training. By providing real time training and trusted communication. Our vision doesn't begin and end with the execution of R & D, Projects, IT Training. The main intension is to provide world-class training to the students in Research & Development sector by sharing our knowledge and expertise to create value is our ultimate goal.

EMBEDDED SYSTEMS

COURSE DURATION: .... FEES: ....

BATCH START DATE: .... TIME SLOT : ....

DIPLOMA IN EMBEDDED SYSTEM & DESIGN

Students Will Learn:

● Basics of electronics ● C Programming ● 8051-Microcontroller ● 8051-with interfaces ● PIC controller ● PIC with Interfaces

● ARM Processor ● ARM with Interfaces

Course Description:

Realizing the growth of embedded systems in day-to-day life and the need for trained manpower in this promising area, SPIRO ITA has launched a Diploma in Embedded Systems Design (DESD) for Engineers in computers, electronics and IT. Embedded Systems is a unique field, where engineers need to have sound knowledge in hardware and software design. Keeping this aspect in view, SPIRO ITA has designed the diploma giving equal emphasis to hardware and software, enabling engineers to face challenges in the design and development of state of the art embedded systems.

Course Prerequisites:

Basic Knowledge of c Programming, Basic knowledge of electronics and microprocessor.

CONTENT
ORIGIN OF ELECTRONICS   ● History ● Need of electronics ● Advantages ● Building block of electronics   **DIFFERENCE B/W ELECTRONICS AND ELECTRICALS:**   ● Electrical basics ● Difference in functionality ● Comparative study ● Band theory   **SEMICONDUCTORS:**   ● Basics of semiconductors (Semiconductors-material of choice) ● Types of semiconductors and practical examples   ● Band theory (revised)   **DIODE:**   ● Basics of diode ● Types of diode ● Principle of operation ● V-I characteristics   **APPLICATIONS OF DIODE(L):**   ● Function of a diode-an electronic switch ● Rectifier ● Clipper/Clamper
TRANSISTOR: ● Basics of a transistor ● Types of transistor ● Configurations of transistor ● Principle of operation ● V-I characteristics   **APPLICATIONS OF TRANSISTOR(L) :**   ● Functions of a transistor- a switch and an amplifier ● Inverter ● Buffer ● Basic amplifier ● Audio amplifier- Darlington pair   **TRANSISTOR CIRCUIT ANALYSIS(L)**   ● Electrical law in Electronics ● CE Amplifier analysis ● AC and Dc analysis ● Op-Amp analysis ● AC and Dc analysis   **FILTERS+OTHER BASIC COMPONENTS (L):**   ● Basics of filters ● Types of filters ● Capacitors ● Inductors ● Resistors ● Crystal Oscillators ● Voltage regulators   ● Transformers ● Variable resistors
DC REGULATED POWER SUPPLY(L):   ● Development of a fixed dc power supply ● Development of a variable dc power supply   **DIGITAL ELECTRONICS(L):**   ●Introduction ● Number Systems ● Conversions ● SOP and POS ●K-Maps ● Simplification based on Boolean algebra ● Logic Gates

BASICS OF "C"   ● Levels of programming languages ● Development of C ● Data types ● Software for C-Turbo C ● Variables & constants ● Keywords and identifiers ● Basic instructions- Writing the first code in C ● Type casting and conversion
OPERATORS(L):   ● Operator classification ● Arithmetic ● Logical ● Relational ● Assignment ● Increment/decrement ● Bitwise
CONTROL FLOW (L):   ● Decision control instructions ● Loops ● Break-continue ● Infinite loops ● Nested loops
FUNCTIONS(L):   ● Function declaration ● Function definition ● Pass by value and reference ● Basics of storage classes ● Recursion
ARRAYS(L):   ● Declaration ● Memory layout and accessing ● Initialization ● String ● One dimensional array ● Two dimensional array ● Three dimensional array ● Array with function ● Two dimensional String ● Three dimensional string ● String with function ● Library function for string
STORAGE CLASSES(L):   ● Definition ● Type of classes ● Auto ● Register ● Static ● External
THE C PREPROCESSOR(L):   ● File include ● Macro definition ● Difference between macro & function ● Scope of macro ● Type of macro
DATA STRUCTURE(L):   ● Stack ● Queues ● Linked list

CONTENT
STRUCTURE AND UNION(L):
● Definition of structure ● Initialization of structure ● Array with structure ● Structure with pointer ● Union ● Difference b/w union and structure ● Union within structure ● Bit field ● Typedef ● Enum
MEMORY ALLOCATION(L):
● Definition ● Type allocation ● Deference b/w static and dynamic allocation ● Type of allocation
FILE(L):
● Definition ● Type of file ● Mode of opening file ● Library functions

MODULE III - EMBEDDED SYSTEMS

BASICS OF SYSTEMS:
● Introduction ● Components of a system ● Types of I/O ● Process ● Types of system ● Control system basics
BASICS OF EMBEDDED SYSTEMS:
● Introduction ● Types of embedded systems ● Architecture & Difference ● Types of hardware architecture ● Advantages over other systems ● Applications

MODULE IV - MICROCONTROLLER-8051

MICROCONTROLLER-8051(L):
● Introduction-Basic features of 8051 ● Overview of 8051 family ● Micro Controllers & Embedded Processors ● Memory organization
8051 PROGRAMMING(L)
● 8051 Hardware Architecture, ● Assembling & Running an 8051 Program ● Registers Associated with 8051 ● Addressing Modes
PROGRAMMING THE 8051 MICROCONTROLLER
● Customizing 'C' ● Programming the microcontroller ● Basic programming. ● Software for embedded C-Keil. ● Burning the program into the microcontroller
8051 PROGRAMMING IN C
● Data Types & Time Delay In 8051 C, ● I/O Programming In 8051 C ● Logic Operators In 8051 C ● Data Conversion Programs In 8051 C, ● Accessing Code Rom Space In 8051 C
I/O PROGRAMMING
● 8051 I/O Programming, ● I/O Bit Manipulation Programming
TIMERS PROGRAMMING IN C
● Programming 8051 Timers, ● Counter Programming, ● Programming Timer 0 And 1 In 8051 C
SERIAL PORTS PROGRAMMING IN C(L)
● Basics of Serial Communication, ● 8051connection to Rs 232, ● 8051 Serial Port Programming In Assembly, ● Programming In Second Serial Port, ● Serial Port Programming In C
INTERRUPTS PROGRAMMING IN C(L)
● 8051 Interrupts, Programming Timer Interrupts, ● Interrupt Priority, ● Programming External Hardware Interrupts, ● Interrupt Programming ● Programming Serial Communication Interrupts
INTERFACING MOTOR CONTROL, RELAY, PWM, DC/STEPPER MOTORS WITH 8051(L):
● Relays & Op to Isolators,   ● Dc Motor Interfacing & PWM ● Stepper Motor Interfacing ● Induction Motor Interfacing
INTERFACING LCD,KEYBOARD WITH 8051(L):
● LCD Interfacing, ● LED ● Seven Segment ● Keypad Interfacing ● Buzzer ● Encoder ● Decoder ● Uart
INTERFACING ADC AND SENSORs WITH 8051(L):
● Parallel And Serial Adc,   ● Sensor Interfacing & Signal Conditioning ● IR sensor ● LDR sensor   ● Gas detector ● Temperature sensor ● Humidity sensor ● PIR sensor
INTERFACING WIRELESS TECHNOLOGIES WITH 8051(L):
● Rf Module(433mhz,2.4ghz) ● Rf Reader ● Gsm Modem ● Zigbee
INTERFACING BIOMETRIC TECHNOLOGIES WITH 8051(L):
●Fingerprint ●Rfid Reader

CONTENT
HARDWARE SOLDERING CLASS(L) This class covers how to create and repair printed circuit assemblies by soldering and de soldering various types of electronic components on printed circuit boards (PCBs).
--- PROJECT BASED ON 8051---
REVISION CLASS OF 8051
EXAM ON 8051 , INTERFACING AND BASCI C
MODULE V - PIC MICROCONTROLLER
PIC MICROCONTROLLER ● Architecture Difference Between Pic & 8051, ● Features of Pic 16f877a MC ● Hardware Architecture Of Pic 16f877a
PROGRAMMING THE PIC MICROCONTROLLER(L) ● Programming the PIC microcontroller ● PIC Programming Using CCS & Mplab Compilers, Creating, Editing, Compiling & Running a Program Using CCS & Mplab Compilers. ● Burning the program into the microcontroller
REGISTERS IN PIC 16F877A(L) ● Memory Architecture Of Pic 16f877a, ● Flag Register ● Data Direction Registers, ● I/O PROGRAMMING ● Port Programming ● I/O Bit Manipulation Programming
SERIAL COMMUNICATION(L) ● Pic 16f877a Connection To Rs 232 ● Timers In Pic16f877a, ● Serial Port Programming In C ● TIMERS IN PIC 16F877A ● Prescalar And Post Scalar,   ● Watch Dog Timer, Delay Using Timers
INTERFACING LCD,KEYBOARD WITH PIC(L): ● LCD Interfacing, ● LED ● Seven segment ● Buzzer ● KEYPAD Intetrfacing
INTERFACING SENSORS WITH PIC(L): ● Sensor Interfacing & Signal Conditioning ● IR sensor ● LDR sensor ● Gas detector ● Temperature sensor ● Humidity   sensor ● PIR sensor
INTERFACING WIRELESS TECHNOLOGIES WITH PIC(L): ●Rf Module(433mhz,2.4ghz) ●Rf Reader ●Gsm Modem ●Zigbee ●Blue Tooth ●Gps **Encoders/Decoders** Introduction of various Encoders & Decoders Examples HT12E/HT12D Interfacing circuits-Real time implementation using encoder/decoder Programming Encoder-Wireless data transfer using HT648 Decoder
PROTOCOLS COMMUNICAION USING PIC(L): ●   Introduction To Protocols, SPI, I2C, CAN, RS232,RS422 ●Overview About Protocols
SPI,I2C PROTOCOL COMMUNICATION USING PIC(L): **I2C Protocol –** ●Programming for I2C Protocol ●Real time application using RTC ●Advantages & Disadvantages of I2C Protocols.
CAN PROTOCOL COMMUNICATION USING PIC (L): ●Programming for CAN Protocol ●Real time application using RTC ●Advantages & Disadvantages of CAN Protocols
UART, RS 232,RS422 INTERFACING USING PIC (L):
--PROJECT BASED ON PIC CONTROLLER---
REVISION ON PIC CONTOLLER
EXAM ON PIC CONTROLLER
MODULE VI - ARM PROCESSOR
INTRODUCTION TO ARM PROCESSOR : ●Introduction to embedded system and ARM Processor. ●ARM related Companies and its opportunities. ●ARM processor family. ●Application of ARM Processor. ●Compiler. ●Emulation and Debugging. ●Difference between RISC & CISC. **Programming the ARM PROCESSOR** ARM PROGRAMMING USING KEIL, CREATING, EDITING, COMPILING AND RUNNING A PROGRAM USING KEIL.

CONTENT
INTRODUCTION ABOUT LPC2148 ARM PROCESSOR ●LPC2148 ARM 7 microcontroller. ●Features of LPC2148. ●Block diagram of LPC2148. ●Pin diagram of LPC2148. ●Architectural overview. ●On-chip flash program memory. ●On-chip static RAM.
INTRODUCTION ABOUT LPC2129 ARM PROCESSOR ●LPC2129 ARM 7 microcontroller. ●Features of LPC2129. ●Block diagram of LPC2129. ●Pin diagram of LPC2129 ●Architectural overview. ●On-chip flash program memory. ●On-chip static RAM.
SYSTEM CONTROL (L): ●Crystal Oscillator. ●PLL. ●Reset and Wake-up Timer. ●Brownout detector. ●Code Security. ●External Interrupt input. ●Memory Mapping Control. ●Power Control, VPB.
I/O PROGRAMMING(L): PORT PROGRAMMING, I/O BIT MANIPULATION PROGRAMMING **LCD INTERFACING** LCD INTERFACING, KEYBOARD INTERFACING
TIMERS IN ARM(L): TIMERS IN ARM, PRESCALAR AND POST SCALAR, WATCH DOG TIMER, DELAY USING TIMERS **SERIAL COMMUNICATION** ARM CONNECTION TO RS 232, SERIAL PORTS IN ARM, SERIAL PORT PROGRAMMING IN C
INTERFACING MOTOR CONTROL, RELAY, PWM, DC/STEPPER MOTORS WITH ARM LPC 2129(L): ●RELAYS AND OPTO ISOLATORS, ●DC MOTOR INTERFACING AND PWM ●STEPPER MOTOR INTERFACING ●INDCUTION MOTOR INTERFACING
INTERFACING ADC AND SENSORs ARM LPC 2129(L): ●PARALLEL AND SERIAL ADC, **SENSOR INTERFACING AND SIGNAL CONDITIONING** ●IR sensor ●LDR sensor ●Vibration sensor ●Temperature sensor ●Humidity sensor ●Heart Beat sensor
INTERFACING WIRELESS TECHNOLOGIES WITH ARM LPC2129(L): ●RF MODULE(433MHZ,2.4GHZ) ●RF READER ●GSM MODEM ●ZIGBEE ●BLUE TOOTH ●GPS
I2C, SPI, COMMUNICATION WITH ARM LPC 2129(L): ●I2C – bus serial I/O Controller ●SPI- Serial I/O Controller
RTC,CAN BASED COMMUNICATION USING ARM LPC 2129(L): ●Programming for CAN Protocol, ●CAN-CAN communication using ARM LPC2129 ●Real time application using RTC ●Advantages & Disadvantages of CAN Protocols
--PROJECT BASED ON ARM PROCESSOR---
-EXAM ON ARM PROCESSOR-
SPIRO ITA CERTIFIED EMBEDDED PROGRAMMER EXAM