



**Training Kit – Rs.2,500/- INR** “The lowest price” in the Industry. Ceda `s Distance Learning Program is an effort to promote Microcontroller education within the Technical and Engineering community.

**Distance Learning Program –*Satisfaction Guaranteed***  
**Embedded Systems Design**  
**Product No:** PCBkey EDS8051

This fully interactive self-study course of embedded system design teaches the basic concepts of embedded system. The course is recommended for all individuals who want to learn embedded from scratch. PCBkey Distance Learning Program is a 25 days course that will take approximately 70 hours to complete. It is divided into 10 lessons. It includes one copy of the training workbook, a course Guide and 1 DVD with video classroom, a Reference book, and an 8051 based hardware kit with your complete course registration.

Your 5 comprehensive modules start with solid basics. You'll begin by learning the important principles that are the fundamental rules for just about whatever you may do in embedded system design. Then, you'll get detailed instructions in techniques and procedures. Step by step, we'll guide you through exciting hands-on projects.

There are no educational prerequisites to enroll. However, you should be familiar with basic electronics, and comfortable with fundamentals.

## **VIDEO SESSION**

FOLLOW THE SESSIONS IN THE ORDER GIVEN BELOW. AFTER EVERY SESSION FILL THE WORK BOOK

### **SESSION - 1**

1. Introduction of Embedded System.
2. Real time Examples of Embedded System.
3. Design cycle of an Embedded System.
4. Real-time and non real time concepts.
5. Trends & Market Scenario.
6. A detailed example of an Embedded System (Thermostat).
7. Embedded Application Programming.
8. Different types of processor with example  
(GPS system, Match Box PC Palm Top etc.)

### **SESSION - 2**

1. Introduction to Microcontroller.
2. Difference between Microcontroller and Micro-processor.
3. Introduction to MC51 Microcontroller.
4. Architecture of 8051.
  - a) Memory Architecture.
  - b) Addressing mode.
  - c) Special Function Registers.

- d) Pin Description of 8051.
- e) Additional features.
- 5. Writing program in Assembly language
  - a) What is an IDE?
  - b) Demo of UMPS
    - i) Writing program
    - ii) Assembling
    - iii) Connecting Peripherals
    - iv) Simulation & Debugging
    - v) Generating an image (hex file)

### **SESSION - 3**

- 1. Detail Description of All special function Register
  - a) Timer
  - b) Serial Communication
  - c) Interrupts
- 2. Instruction sets in 8051
  - a) Data Transfer
  - b) Arithmetic Operation
  - c) Logical Operator
  - d) Bit operation

e) Branching Instruction.

#### **SESSION - 4**

1. Introduction to Embedded C Language

a) Why Embedded C?

b) What is the use of Embedded C?

2. Introduction of Cross Compiler

a) Compiler

b) Assembler

c) Linker

d) Loader

e) Memory

3. Trade off between using C for desktop & embedded system.

4. Different Cross Compilers in Market.

5. Introduction to Keil software.

#### **SESSION - 5 and 6**

1. Embedded C Programming

a. Special keywords in Embedded C

b. Introduction of KEIL software

c. Demo of Keil Software

i. Creating projects

- ii. Writing C Program
- iii. Compiling, Debugging
- iv. Generating hex file.
- d. Memory mapping of 8051
- e. Interfacing External memory
- f. Memory specifies.
- 2. Memory models
- 3. A demo of all the keywords used in Keil.

### **SESSION - 7**

- 1. Embedded Communication Protocols
  - a. Parallel Communication.
  - b. Serial Communication.
    - i. Asynchronous Communication.
    - ii. Synchronous Communication.

### **SESSION - 8**

- 1. Introduction of I2C Protocol
  - a. I2C Protocol
  - b. I2C Implementation
  - c. A Real time example using IC DS1302.

### **SESSION - 9**

1. Introduction to SPI Protocol
  - a. SPI Protocols
  - b. Implementation
  - c. Example of SPI Protocol
2. Test Communication protocol.

### **SESSION - 10**

1. Concepts of Operating System
  - a. What is an Operating System?
  - b. What makes an Operating System?
  - c. Types of Operating System.
2. Concepts of Real Time Operating System
3. Difference between RTOS & Other OS
4. An Example of RTOS

### **SESSION - 11**

1. Tasks. Multi Tasking
2. Process.
3. Threads.
4. How scheduler works Scheduling algorithms.
5. Types of Schedulers.
6. Scheduling in VX-Works, UCOS.

7. Graff chart concepts

### **SESSION - 12**

1. Semaphores

a. Binary semaphore

b. Counting Semaphore

c. Mutex Semaphore

2. Shared Memory

3. Message Q s.

4. Notation used.

### **SESSION -13**

Introduction to ARM Processor.

1. Difference between RISC & CISC Machines

2. Memory Architecture

a. Von-neumann Architecture

b. Harvard Architecture

3. Microprocessor & Microcontroller

a. Difference between Microprocessor & Microcontroller

b. 8 bit Microprocessor & Microcontroller

c. 16 bit Microprocessor & Microcontroller

d. 32 bit Microprocessor & Microcontroller

4. How 32 bits up on uC is better?

## **SESSION– 14**

1. The ARM Processor:

a. The ARM Ltd.

b. ARM, the 32 bit Architecture

c. States of operations

d. 7 Modes of operations

e. ARM Register Sets

f. Instruction sets

\* Condition postfixes

\* Data movement Instructions

\* Arithmetic Instructions

\* Logical Instructions

\* Multiplication Instructions

\* Load / store instructions

\* Branch Instructions

\* Thumb Instruction set with examples

2. ARM 7 TDMI

## **LAB - CD**

1. Schematic of the Board.

2. Quick start manual (PDF)
3. Example programs
4. 8051 IDE
5. Data Sheets of all IC's used on Board

**System/Hardware Requirement:**

- A PC with serial (RS232) port. If serial port is not available, a USB to serial converter can be purchased from us.
- A USB port to provide power supply for the board.

**Software requirements:**

- MS Windows 98/ME/NT/2000/2003/XP/Vista

**Courseware content**

- Training Work Book
  - Evaluation board (8051 based)
  - Serial Cable
  - USB Cable
  - Jumpers
  - 1 DVD
  - 1 Lab CD
  - CEDA Text Book
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