



Embedded Technosolutions

Venture of IIT Bombay & VJTI Alumni

3 Times IIT Bombay Robo Competition Winner

Advanced Embedded Systems

Practical & Professional Training on Advanced Embedded System

Course Objectives :

1. To provide professional and industrial standard training which will help the students to get job in the core industries
2. To learn practical orientation of actual industrial product design
3. To learn ARM7 Architecture in detail (LPC2148)
4. To learn Hardware Requirements for LPC2148
5. To learn 8051 Architecture in detail
6. To learn Hardware Requirements for 8051
7. To learn Programming of Internal Peripherals in Embedded C
8. Learn wireless communication , wireless modules & their interfacing
9. Learn Embedded Linux with advanced Raspberry Pi which is important requirement of the core market now
10. To learn the designing of Real World Projects

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Course Syllabus

ARM 7 (LPC2148)

Chapter 1: Introduction to ARM Processor

- 1.1 Introduction to embedded system and ARM Processor
- 1.2 ARM processor family
- 1.3 Application of ARM Processor
- 1.4 Compiler
- 1.5 Difference between RISC & CISC

Chapter 2 : LPC2148 Microcontroller Pin details, Memory

- 2.1 LPC2148 ARM7 microcontroller
- 2.2 Features of LPC2148
- 2.3 Block diagram of LPC2148
- 2.4 Pin diagram of LPC2148
- 2.5 Architectural overview
- 2.6 On-chip flash program memory
- 2.7 On-chip static RAM

Chapter 3 : Keil IDE

- 3.1 Introduction to Keil IDE
- 3.2 Creating project with Keil
- 3.3 Debugging



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Chapter 4 : Hardware Interface

- 4.1 Minimum system requirements for LPC2148
- 4.2 Hardware interfacing details

Chapter 5 : System Control

- 5.1 PLL
- 5.2 External Interrupt input
- 5.3 Power Control ,VPB

Chapter 6 : Pin Connect block ,GPIO

- 6.1 Pin Connect Block
- 6.2 General Purpose I/O:
 - LED and switches interfacing
 - Buzzer
 - LCD
 - DC Motor
 - Matrix keypad interfacing

Chapter 7 : Timer , ADC , UART

- 7.1 Timer
- 7.2 10-bit ADC
- 7.3 UART : Features, Serial Communication



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Chapter 8 : I2C , SPI ,PWM

8.1 2C–busserial/OController:Features&InterfacingwithAT24C04

8.2 SPI-Serial I/O Controller : Features & Interfacing with SD Memory Card

8.3 PWM



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Raspberry Pi with Embedded Linux

Chapter 1

- 1.1 Program Raspberry Pi : a credit-card sized computer
- 1.2 Python programming for Raspberry Pi
- 1.3 Interacting and configuring the RPi OS
- 1.4 ARM 11 architecture
- 1.5 Porting of Linux Kernel and booting RPi

Chapter 2

Linux programming basics

Chapter 3

- 3.1 Programming the GPIO and interfacing peripherals With Raspberry Pi
- 3.2 Generating PWM signals through the Pi

Chapter 4

- 4.1 Programming and work with UART protocol
- 4.2 Remote Login methods: HyperTerminal, Ethernet

Chapter 5

Work with I2C protocol



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Chapter 6

Developing GUI with TKinter

Microcontroller 8051

Chapter 1

- 1.1 Introduction to Embedded Systems
- 1.2 Scope in Embedded Systems

Chapter 2

- 2.1 Introduction to microcontroller 8051 series
- 2.2 Hardware architecture of controller
- 2.3 Controller I/O ports
- 2.4 Memories of controller
- 2.5 Registers and Register bank of controller
- 2.6 Concept of Serial communication ,Interrupt etc.

Chapter 3

- 3.1 Introduction of Embedded Software
- 3.2 Introduction of Embedded C Programming and programming concepts
- 3.3 Introduction of program burning / flashing software

Chapter 4

- 4.1 I/O interfacing concept



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4.2 Led Blinking logic and delay generation routine

4.3 Design of Traffic Light Controller System

Chapter 5

5.1 Character LCD 16x2 interfacing logic and concept

5.2 Introduction of LCD command and data signals

5.3 LCD based programming

5.4 Practical project based on character LCD

Chapter 6

6.1 Matrix keypad interfacing logic and concept

6.2 Introduction of key pad interfacing using polling method

6.3 Matrix keypad programming

6.4 Practical project based on matrix keypad

Chapter 7

7.1 Introduction to serial communication

7.2 Serial communication concept

7.3 Introduction of serial communication firmware and registers

7.4 Serial communication programming

7.5 Practical application based on Serial communication



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Chapter 8

- 8.1 Introduction of interrupts in controller
- 8.2 Interrupt logic and concept
- 8.3 Interrupt routines / programming
- 8.4 Key interfacing using interrupt
- 8.5 Practical application based on interrupt

Chapter 9

- 9.1 Introduction of Relay
- 9.2 Relay interfacing and comparison of relay with other switching devices
- 9.3 Relay programming
- 9.4 Practical application based on relay

Chapter 10

- 10.1 Introduction of ADC
- 10.2 ADC interfacing
- 10.3 ADC programming

Chapter 11

- 11.1 Introduction of DTMF mobile technology
- 11.2 DTMF technology interfacing in real application
- 11.3 DTMF programming



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11.4 Practical project design based on DTMF technology

Chapter 12

12.1 Introduction of RF Communication

12.2 RF technology interfacing in real application

12.3 RF module programming

12.4 Practical project design based on RF technology

Chapter 13

13.1 Introduction to RFID communication

13.2 RFID technology interfacing in real application

13.3 RFID module programming

13.4 Practical project design based on RFID technology



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Wireless Communication

Chapter 1

- 1.1 Introduction of DTMF mobile technology
- 1.2 DTMF technology interfacing in real application
- 1.3 DTMF programming
- 1.4 Practical project design based on DTMF technology

Chapter 2

- 2.1 Introduction of RF Communication
- 2.2 RF technology interfacing in real application
- 2.3 RF module programming
- 2.4 Practical project design based on RF technology

Chapter 3

- 3.1 Introduction to RFID communication
- 3.2 RFID technology interfacing in real application
- 3.3 RFID module programming
- 3.4 Practical project design based on RFID technology



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Chapter 4

- 4.1 Introduction to GSM communication
- 4.2 GSM technology interfacing in real application
- 4.3 GSM module programming
- 4.4 Practical project design based on GSM technology

Chapter 5

- 5.1 Introduction to Bluetooth communication
- 5.2 Bluetooth technology interfacing in real application
- 5.3 Bluetooth module programming
- 5.4 Practical project design based on Bluetooth technology

Embedded C Programming

Chapter 1

- 1.1 Introduction to Embedded C Programming
- 1.2 Data type, functions, conditional expression in Embedded C
- 1.3 Different flow of code writing in Embedded C
- 1.4 Testing ,Simulation & Compiling