



Vi Microsystems Pvt. Ltd.,

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Printed Circuit Board Design

Course Objectives.

1. Gain a fundamental understanding of electronics, circuits, and the principles of PCB design.
2. Component Selection and Footprint Creation: Learn how to select appropriate electronic components for a given application and create accurate footprints (symbols and layouts) for those components.
3. Design for Test (DFT): Learn techniques for designing PCBs that are easily testable, with an understanding of various testing methodologies and best practices.
4. Understand Industry Standards: Familiarize oneself with industry standards, such as IPC (Association Connecting Electronics Industries) standards, for PCB design.
5. To Study about Embedded controller and Interfacing Devices and Application

Unit 1: Introduction to PCB Design

Basics of electronics component and circuits-Introduction to PCBs design and Its types - Single layer - Double layer -Multiplayer PCB and their applications-Overview in the PCB design process- Creating component footprints and symbols-Electronic Components and Footprints- Identification and selection of electronic components- Understanding component data sheets-Creating component footprints and symbols.

Unit 2: PCB Layout Design.

Introduction to schematic design- Introduction to PCB design software (e.g. Eagle,KiCAD and CircuitMaker) -Drawing circuit schematics using EDA (Electronic Design Automation) tools-Net-list generation and connectivity verification- Understanding PCB layer stack up and board materials- Placement and routing techniques-Grounding and power distribution considerations.



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Unit 3: PCB Design Tools.

PCB layout and routing using software tools-Generating manufacturing files (Gerber files) - Testing methodologies and techniques-Troubleshooting and debugging common issues- Creation of accurate and comprehensive design documentation-PCB design review and validation processes.

Unit 4: Embedded Controller and Software

Introduction to Embedded system and Raspberry pi Pico - Microprocessor and Microcontroller Classification : Different between microprocessor & Microcontroller - Classification based on Architecture-Memory Classification , Embedded system board architecture - Identify Embedded Platform / simulator – Digital I/O interface, Analog to Digital Converter and Digital to Analog Converter – Interrupts – Timer – PWM , Supporting Embedded IDE and Programming Languages.

Unit 5: Embedded Peripherals and Sensors Interfacing

LED blinking – Buzzer, Relay and switch Interfacing, Different Types of Display system - 7 segment Display and LCD Display Interfacing - PWM Generation, different types of Analog and digital sensors are interfacing – LM 35 Temperature Sensor – Ultrasonic – LDR – IR –Potentiometer and Servomotor , Introduction to Wireless Technology and its Types - RF-Bluetooth-Wi-Fi -Zigbee - LoRaWAN - RFID and IoT.



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Course Outcomes.

1. Able to Understand PCB Design Principles: Gain a solid understanding of the principles, terminology, and concepts related to PCB design, including circuit layout, component selection, signal integrity, power distribution, and grounding techniques.
2. Able to PCB Layout Design Skills: Acquire the ability to design and optimize PCB layouts, including component placement, routing, layer stack-up, and impedance matching techniques.
3. Able to Develop the embedded system board to acquire the data from sensors like temperature, Ultrasonic and IR Sensor .
4. Able to Design and Develop various Embedded Application
5. To Develop PCB design then converting to PCB hardware Prototypes

20 USE CASES

1. PCB Design of 8051 Microcontroller with interfacing LCD in Double layer
2. PCB Design of Street light Control system
3. PCB Design of Digital Logic Circuit Trainer kit
4. Raspberry Pico Based Home Automation system
5. Development of Temperature monitoring and control systems
6. Automatic Irrigation System using Embedded controller
7. Automatic Traffic light control systems using Microcontroller
8. Energy Monitoring and control systems

9. Automatic water Tank level control system using ultrasonic sensor
10. Automatic Door Opening Based on Motion / IR Sensor
11. Health care Monitoring system using Bluetooth technology
12. Wireless Based Robot Controlling systems
13. Pulse Width Modulation based Motor Speed control systems
14. RFID Based Security System
15. Design and development of Mobile phone Charger
16. Human Counting based Auditorium Automation system
17. Weather Monitoring systems
18. Mobile App Based Device control system using IoT
19. To Development of Real time Logic Gate Trainer kit
20. Emergrncy Alarm System using IoT