



**Robosapiens**<sup>TM</sup>  
**INDIA**

**Course & Kit Content  
Of  
PCB & Circuit Designing  
Duration 15 Days**

**Kit Partner**

**ROBOMART.com**

**Corporate Office**

Robosapiens Technologies Pvt. Ltd.  
B 5, Block 'C', Sector-31,  
Noida-201301

Email: [info@robosapi.com](mailto:info@robosapi.com)

Website: <http://www.robosapi.com>

Course Name : PCB & CIRCUIT DESIGNING  
Certification : By Robosapiens Technologies Pvt. Ltd.  
Toolkit : **FREE** to Each Participant

## **Detailed Course Content**

### **1. INTRODUCTION TO CIRCUIT DESIGNING**

- 1.1. Need of Circuit Designing
- 1.2. Basic Electronic Components
  - 1.2.1. Resistors, Capacitors, Inductors, Diodes
  - 1.2.2. Transistors, Relays, Connectors
- 1.3. How to select components
- 1.4. Basic Circuit Designing Process

### **2. Eagle SCH**

- 2.1. Beginning a New Schematic
- 2.2. Placing Items in the Schematic
- 2.3. Placing Symbols and Ports
- 2.4. Labeling components
- 2.5. Editing the Schematic
- 2.6. Creating New Components
- 2.7. Working with Sheets and Ports
- 2.8. Checking the Schematic for Errors

### **3. INTRODUCTION TO THE PCB**

- 3.1. Definition and Evolution of the Printed Circuit Board (PCB)
- 3.2. Purposes of a PCB
- 3.3. Types of PCBs
- 3.4. Applications
- 3.5. Typical Development Flow for a PCB
- 3.6. PCB Problems and Root Causes

## **4. Printed Circuit Technology**

- 4.1. Printed Circuit Board Characteristics
- 4.2. PCB Materials
  - 4.2.1. Fillers, resins, laminates
  - 4.2.2. base material characteristics
  - 4.2.3. Dielectric, conductors
  - 4.2.4. Design and Analyses
- 4.3. Design and Environmental Requirements
  - 4.3.1. Functional
  - 4.3.2. Thermal
- 4.4. Electrical Engineering
  - 4.4.1. Analog and digital signals
  - 4.4.2. Signal integrity
  - 4.4.3. Grounding concepts
  - 4.4.4. Current carrying capacity
  - 4.4.5. Layout rules of thumb
- 4.5. Mechanical Engineering
  - 4.5.1. Panels, Standard board sizes, Packaging
- 4.6. Thermal Design
  - 4.6.1. Heat transfer basics
  - 4.6.2. Convection, Conduction
  - 4.6.3. PCB Thermal Design Features
  - 4.6.4. Thermal modeling
  - 4.6.5. Cycling and fatigue
- 4.7. Component Vibration Fatigue
- 4.8. Vibration Models and Terminology
  - 4.8.1. Combined Thermal and Structural Fatigue

## **5. Eagle PCB**

- 5.1. Padstacks
- 5.2. Creating New Components in Library
- 5.3. Starting a new design
- 5.4. Developing the board outline
- 5.5. Placing Items in the Layout
- 5.6. Editing the Layout
- 5.7. Placing Power and Ground Planes
- 5.8. Assigning Nets
- 5.9. Linking the Schematic and PCB
- 5.10. Routing
  - 5.10.1. Vias vs Free Vias
  - 5.10.2. Sliding traces
  - 5.10.3. Finishing the route

- 5.11. Keyboard Shortcuts
- 5.12. Troubleshooting errors

## **6. PCB PRINTING AND ETCHING**

- 6.1. Introduction to printing process
- 6.2. Gerber Generation
- 6.3. PCB Layout and Artwork
- 6.4. Fabrication
  - 6.4.1. Machining Operations
    - 6.4.1.1. Blanking, Cutting, Punching, Drilling
  - 6.4.2. Laminating Techniques
  - 6.4.3. Plating, Etching, Surface Finishing
  - 6.4.4. Conformal Coatings
- 6.5. Inspection and Checkout
- 6.6. Specifications and Standards
- 6.7. Placing of circuit on copper clad
- 6.8. Etching process for final PCB

## **7. DRILLING AND SOLDERING**

- 7.1. Drilling of designed PCB
- 7.2. Soldering Process of Components
- 7.3. Testing & Troubleshooting

## **8. Assembly**

- 8.1. PCB Assembly Drawing Examples
- 8.2. Component Considerations
  - 8.2.1. Component mounting and support
  - 8.2.2. Mechanical Devices
- 8.3. Soldering Technology
- 8.4. Nonsolder Connections
- 8.5. Cleaning
- 8.6. Parts Staking
- 8.7. Conformal Coating Removal
- 8.8. Repair and Rework
- 8.9. Safety Considerations
- 8.10. ESD protection
- 8.11. Specifications and Standards

## **9. Testing**

- 9.1. Common PCB Production Faults
- 9.2. Bare Board Testing
- 9.3. Electrical Performance Testing
- 9.4. Assembled PCB Testing

## **10. Contamination Control/Environmental Control**

- 10.1. Contamination Control
- 10.2. Conformal Coatings
- 10.3. Polluting Agents
- 10.4. Safety Controls
- 10.5. Pollution Controls
- 10.6. Recycling
- 10.7. Standards

## **LIVE Projects Covered**

1. POWER SUPPLY.
2. Blinking LED Using 555 Timer
3. Dark Detector
4. SOIL Moisture Detector
5. Light Detector Circuit

## **15 Day Kit Contains:**

1. Copper Clad PCB
2. Hand Held PCB Drilling Machine
3. Robosapiens Paper Bag
4. Software Suit.
5. Solder Wire
6. Flux
7. Nipper