

PCB & Circuit Designing

(Winter Training Program)

6 Weeks/ 45 Days

“PRESENTED BY”



Explore > Innovate > Enjoy — Technologies Pvt. Ltd.

An ISO 9001 : 2008 Certified Company

Accredited by:



**INTERNATIONAL
ACCREDITATION
ORGANIZATION
HOUSTON U.S.A.**

RoboSpecies Technologies Pvt. Ltd.

Office: W-53G, Sector-11, Noida-201301, U.P.

Contact us:

Email: stp@robospecies.com

Website: www.robospecies.com

Office: +91-120-4245860 / 8510044806

WINTER TRAINING PROGRAM

PCB & Circuit Designing

- Course** : PCB & Circuit Designing
- Certification** : By RoboSpecies Technologies Pvt. Ltd. Accredited by International Accreditation Organization, Houston, U.S.A.
- Study Material** : Books & CDs Free to each participant
- Robotics Toolkit** : Free to Each Participant

Projects: 60 Projects Covered in 45 Days

Fees & Duration

- For PCB & Circuit Designing (**ADVANCE**)

Fees : ₹ 9,990/- per candidate

Duration : 45 Days/6 Weeks

ADVANCE MODULE - PCB & Circuit Designing	
DAYS	TOPICS
Day 1	<p>Theory</p> <ul style="list-style-type: none"> ● Introduction to Robotics ● Introduction to PCB & Circuit Designing ● Basics of hardware and software ● New and upcoming Technologies
Day 2	<p>Theory</p> <ul style="list-style-type: none"> ● Introduction to Manual Robotics ● Motor principle explained ● Different types manual robots and their applications ● Controlling of motors through switches ● Gear assembly and calculations ● Different types of chassis design ● Concept of robotic events <p>Practical</p> <ul style="list-style-type: none"> ● To make a sound connections Designing of remote control ● Manual Robotics practical session ● Assembling of a robotic car
Day 3	<p>Theory</p> <ul style="list-style-type: none"> ● Introduction to PCB design software ● Different tools used for PCB designing <p>Practical</p> <ul style="list-style-type: none"> ● Hands on PCB design software ● Making different circuits
Day 4	<p>Theory</p> <ul style="list-style-type: none"> ● Different circuit on PCB design software ● Schematic of Different circuits <p>Practical</p> <ul style="list-style-type: none"> ● Designing different circuit ● Checking for errors

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 5	<p>Theory</p> <ul style="list-style-type: none"> • Soldering Methods. • Safety Precautions • Different Methods of Soldering <p>Practical</p> <ul style="list-style-type: none"> • Soldering LED's on Zero PCB. • Checking for errors
Day 6	PROJECT
Day 7	PROJECT
Day 8	<p>Theory</p> <ul style="list-style-type: none"> • Soldering Techniques • How to solder different components <p>Practical</p> <ul style="list-style-type: none"> • LED Design Patterns • Use of Flux in soldering • Soldering Iron Precautions • Solder and Solder Materials Precautions • Checking for errors and desoldering techniques
Day 9	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to IR sensors • Op-amp operation. • Op-amp as a Comparator. <p>Practical</p> <ul style="list-style-type: none"> • Designing of IR Sensors • Testing of IR sensors • Detecting white and black surface with digital IR sensors • Monitoring analog and digital sensors
Day 10	<p>Theory</p> <ul style="list-style-type: none"> • L293D IC Explanation. • Core of L293D vis-s-vis H- BRIDGE concept . • Concept of Embedding L293D IC in MOTOR DRIVER shield. <p>Practical</p> <ul style="list-style-type: none"> • Making Connections of L293D IC on BREAD BOARD. • Driving Motors with L293D on Bread Board.
Day 11	<p>Theory</p> <ul style="list-style-type: none"> • Welcoming LINE FOLLOWER CONCEPT. • Interface Motor Driver with IR sensor. • Calibration of IR sensors <ul style="list-style-type: none"> • What is it? • Why is it Required? <p>Practical</p> <ul style="list-style-type: none"> • Calibrating IR sensors. • Make your Own LINE FOLLOWER. • Make your Own OBSTACLE DETECTOR. • Make your Own EDGE AVOIDER.

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 12	Completion of Line Follower Bot, Obstacle detector BOT and Edge avoider bot
Day 13	PROJECT
Day 14	PROJECT
Day 15	Competition, Doubts and practical session
Day 16	<p>Theory</p> <ul style="list-style-type: none"> • Microcontrollers and Microprocessor difference • Introduction to embedded system • Video sessions on advancements in Technology • Concepts of hardware and software interface • Introduction to Arduino • Arduino IDE and Overview. • Introduction to different Arduino boards and shields. • Working on digital and analog signal. • What is Future Technology Devices International Ltd.(FTDI) • Microcontroller ATMEGA 328. <p>Practical</p> <ul style="list-style-type: none"> • Introduction to BASIC PROGRAMMING. • Driver and software installation. • Better understanding using the 13th pin internal Connection.
Day 17	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Basic Shield. • What is the requirement of Basic Shield? • Operation of Analog and Digital Signals. • 8 Bit and 10 Bit Concept. <p>Practical</p> <ul style="list-style-type: none"> • Interfacing Basic Shield with Arduino. • Lighting up several LED's in a Wishful Pattern. • Working on Switch, BUZZER and implementing with Arduino for better grasping of concepts.
Day 18	<p>Theory</p> <ul style="list-style-type: none"> • Different PCB Design Software • Making circuit on PCB Design Software • Deploying basic circuits from paper to schematic window • Testing the schematic for errors • Making Board Layout • Checking for errors and finalizing layout <p>Practical</p> <ul style="list-style-type: none"> • Designing circuit on PCB software • Checking for errors in circuit • Finalizing circuit schematic

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 19	<p>Theory</p> <ul style="list-style-type: none"> • Etching process • Safety precautions before starting the etching process <p>Practical</p> <ul style="list-style-type: none"> • Getting PCB ready for etching • Etching the PCB • Checking for errors • Cleaning the PCB
Day 20	<p>Theory</p> <ul style="list-style-type: none"> • Finalizing PCB and Studying the circuit • Drilling and Soldering methods of PCB <p>Practical</p> <ul style="list-style-type: none"> • Checking the PCB circuit • Drilling holes on PCB • Soldering the Components on PCB • Testing the finished PCB
Day 21	PROJECT
Day 22	PROJECT
Day 23	<p>Theory</p> <ul style="list-style-type: none"> • Arduino and Breadboard • Operation of Analog and Digital Signals • Introduction to ADC (theory) <p>Practical</p> <ul style="list-style-type: none"> • Interfacing electronic components with arduino. • Interfacing breadboard circuits and arduino • 8 bit and 10 bit concept • Lighting up several LED's in a Wishful Pattern. • Working on Switch, BUZZER and implementing with Arduino for better grasping of concepts.
Day 24	<p>Theory</p> <ul style="list-style-type: none"> • Serial and Parallel Communication • Hello to Analog i/p and o/p <p>Practical</p> <ul style="list-style-type: none"> • Creating the LED pattern on Bread Board • Color sensor on breadboard
Day 25	<p>Theory</p> <ul style="list-style-type: none"> • Know How of connecting motor driver board with ARDUINO. <p>Practical</p> <ul style="list-style-type: none"> • Interfacing Motor Driver with ARDUINO. • Controlling motor (Direction of rotation, ON/OFF). • Speed Control of Motors using PWM

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 26	<p>Theory</p> <ul style="list-style-type: none"> • How to integrate motors through sensors. • Why Arduino required interfacing Motors through Sensors. <p>Practical</p> <ul style="list-style-type: none"> • Interfacing Motors through sensors via Arduino. • Making your own INTELLIGENT LINE FOLLOWER using ARDUINO. • Proper Calibration for efficient line following.
Day 27	<p>Practical</p> <ul style="list-style-type: none"> • Making of Line Follower BOT • Wall Follower BOT using ATMEGA 328 • Automatic obstacle avoider BOT
Day 28	PROJECT
Day 29	Doubts, testing and competition session
Day 30	PROJECT
Day 31	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to DTMF Technology. • Effectiveness of This Technology. • Several Mobile controlled applications. <p>Practical</p> <ul style="list-style-type: none"> • Testing of DTMF • Integrating DTMF with Basic Shield
Day 32	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to GSM based technology • Effectiveness of This Technology. • 8870 Decoder IC <p>Practical</p> <ul style="list-style-type: none"> • Integrating DTMF with motors. • Remotely controlling of robots.
Day 33	<p>Theory</p> <ul style="list-style-type: none"> • Advanced circuit on PCB design software • Testing the schematic for errors • Making Board Layout • Checking for errors and finalizing layout <p>Practical</p> <ul style="list-style-type: none"> • Designing Advanced circuit on PCB software • Checking for errors in circuit • Finalizing circuit schematic
Day 34	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to electronics • Applications of electronics • Electronics components explanation • Voltage divider rule <p>Practical</p> <ul style="list-style-type: none"> • Interfacing components like LED, Resistor etc • Generating different colors from LED

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 35	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to analog Circuits • Introduction to breadboard • Basic Circuit Development • Input output processing in electronic circuits • Operation of Active and Passive components <p>Practical</p> <ul style="list-style-type: none"> • LDR based Automatic light control • Transistor as an amplifier • Transistor as a NOT gate • Transistor as a Touch Switch • Controlling brightness of LED using potentiometer • Interfacing 555IC for LED blink
Day 36	PROJECT
Day 37	PROJECT
Day 38	<p>Theory</p> <ul style="list-style-type: none"> • Seven Segment Display. <p>Practical</p> <ul style="list-style-type: none"> • Making Connections of SSD with Arduino. • Integration of SSD with analog and digital signals. • Digital Clock Designing. • Making Own pattern of Displaying numbers on SSD.
Day 39	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to MATLAB • Basics of MATLAB Programming • Digital Laboratory Explanation • 2D-3D Plots <p>Practical</p> <ul style="list-style-type: none"> • Mathematical Calculations using MATLAB • Command window, Workspace, Command History • Subplotting the Matrix functions, Editing Plots
Day 40	<p>Theory</p> <ul style="list-style-type: none"> • Integrating MATLAB with Microcontroller • 2D-3D Plots • Image Processing • Basics of Image Processing <p>Practical</p> <ul style="list-style-type: none"> • Serial and Parallel data interfacing • Transfer of Bit by Bit data • Controlling actuators using MATLAB • Reading and Writing Images

WINTER TRAINING PROGRAM

PCB & Circuit Designing

DAYS	TOPICS
Day 41	<p>Theory</p> <ul style="list-style-type: none">• Introduction to Image Acquisition• Live Videography using MATLAB• Integrating Real world with digital world <p>Practical</p> <ul style="list-style-type: none">• Installing Web cam with MATLAB• Clicking image using MATLAB• Live Edge detection• Object Tracking Robot
Day 42	<p>Theory</p> <ul style="list-style-type: none">• Understanding Ultrasonic sensor.• Utilising to detect range or distance.• Range or distance calculations. <p>Practical</p> <ul style="list-style-type: none">• interfacing with ARDUINO.• Reading values of Ultrasonic sensor at several points in SERIAL MONITOR
Day 43	PROJECT
Day 44	Doubts and competition session
Day 45	Certificate Distribution Cum Farewell Ceremony

Number of Projects Covered in ADVANCE MODULE

1. Blink a LED using a switch
2. Glowing LEDs in pattern of your own choice.
3. Designing of RGB color pattern
4. Automatic light control system
5. Transistor as a touch switch
6. Transistor as a NOT Gate
7. Transistor as an amplifier
8. Daily alarm clock
9. Flood control alarm system
10. Generation of MIDI tones
11. Intelligent blind stick
12. Manual robotic car
13. Automatic line follower Robot
14. Automatic obstacle detection System

WINTER TRAINING PROGRAM

PCB & Circuit Designing

- 15.LDR based Darkness activation system
- 16.LDR based Light activation system
- 17.Voltage divider system
- 18.Pulse generation using 555
- 19.Automatic blinking of light
- 20.LED Control using Switch
- 21.DC motor speed control using PWM
- 22.Automatic speed controlled BOT
- 23.Mobile switching device
- 24.Automatic home sweeper device
- 25.Line Follower BOT
- 26.Edge avoider BOT
- 27.Wall Follower BOT
- 28.Obstacle avoider BOT
- 29.Intelligent Line Follower BOT
- 30.Traffic control system
- 31.PCB Circuit designing
- 32.Remote Control Designing
- 33.PCB Fabrication
- 34.Soldering Techniques
- 35.Safety Precautions
- 36.Eagle CAD Circuit Designing
- 37.Error Checking & Rectification Methods
- 38.Advance PCB Designing
- 39.Arduino and Breadboard
- 40.Arduino Circuit Designing
- 41.Visitor counting application
- 42.Display digits on seven segment display
- 43.Keypad operated BOT
- 44.Mobile phone keypad prototype
- 45.Password controlled application
- 46.Display text on LED Matrix
47. Radar using Ultrasonic sensor.
48. Ultrasonic BOT
- 49.Mobile controlled BOT
- 50.Automatic power control system
- 51.Automatic home sweeper device

WINTER TRAINING PROGRAM

PCB & Circuit Designing

52. Multiple device switching through mobile phone
53. Line Follower BOT displaying the directions
54. Multiple device switching through mobile phone
55. Color detection in still image
56. Edge detection in still
57. Cam-Shots
58. Serial Communication in MATLAB
59. MATLAB interfaced manual BOT
60. Controlling power through MATLAB

Advance Module Kit Content

- RoboSpecies Chassis (1)
- BO Motors (2)
- Wheels (2)
- Caster Wheel (1)
- Screw packet (1)
- Screw driver (1)
- Remote Controller (1)
- Electronica Kit (1)
- Arduino Uno
- Basic Arduino Shield(1)
- IR Sensor Board (2)
- Motor Shield(1)
- DTMF Board (1)
- DTMF Jack(1)
- LCD Shield (1)
- Seven Segment Display Shield (1)
- Ultrasonic (1)
- Keypad Matrix
- Robotics Made Easy- Robotic eBook CD(1)

WINTER TRAINING PROGRAM

PCB & Circuit Designing

Why PCB & Circuit Designing Training from RoboSpecies Technologies?

1. **Lot of Major Projects** will be covered in this training.
 - 20+20 Projects are covered in BASIC Module
 - 20+20+20 Projects are covered in ADVANCE Module
 - 9 optional major projects
2. Our syllabus is professionally designed to cover **Basic** as well as **Advance** aspects of Embedded Systems & Robotics
3. Each day of our training is well planned to provide you with **Theoretical** as well as **Practical** knowledge of the module.
4. Each day will come up with **New Practicals & Projects** which makes the training interesting and exciting.
5. Time to time **Practical Assignments** will be provided to the students, which will help them in doing practice at home.
6. **Revision Time & Query Sessions** are provided to the students which help them in clearing previous doubts.
7. **Exam** will be conducted at the end of **basic** as well as **Advance** module to test the knowledge level of the students.
8. Time for **Project Work** will be provided to the students, in which students will develop a project of their own choice. This will encourage **Innovative Ideas** among students.

NOTE: Pre-Requisites

1. **Basic knowledge of C\C++ Programming.**
2. **Basics of Electronics.**
3. **Eagerness to learn new innovative things.**

Who Could Attend this Training?

- Ñ **Students from B.E/B.Tech/M.Tech/Diploma (ECE/EEE/CSE/IT/MECH) can join this training.**
- Ñ **Anyone who have interest in this field and have pre-requisite knowledge**

Recommendation

It is strongly recommended to bring your own LAPTOP during the training so that you can easily practice the exercises at home.