

WINTER TRAINING PROGRAM

MATLAB & Image Processing

- Course Name** : MATLAB & Image Processing
- 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 MATLAB & Image Processing (ADVANCE)
 - Fees** : ₹ 9,990/- per candidate
 - Duration** : 45 Days/6 Weeks

ADVANCE MODULE – MATLAB & Image Processing	
DAYS	TOPICS
Day 1	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to RoboSpecies & Robotics • Introduction to MATLAB • Basics of hardware and software
Day 2	<p>Theory</p> <ul style="list-style-type: none"> • Matrix laboratory • Basics of MATLAB Programming • Digital Laboratory Explanation <p>Practical</p> <ul style="list-style-type: none"> • Mathematical Calculations using MATLAB • Command window, Workspace, Command History
Day 3	<p>Theory</p> <ul style="list-style-type: none"> • 2D-3D plots • Explanation of sub-plotting function <p>Practical</p> <ul style="list-style-type: none"> • Sub plotting the matrix functions • Editing plots
Day 4	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Arduino • Driver and software installation • Microcontroller ATMEGA 328p <p>Practical</p> <ul style="list-style-type: none"> • Digital signaling in MATLAB • Integrating LED with Arduino
Day 5	<p>Theory</p> <ul style="list-style-type: none"> • Microcontroller ATMEGA 328 • Digital signaling in MATLAB <p>Practical</p> <ul style="list-style-type: none"> • Integrating analog signals in Arduino • Analog i/p and o/p signal • Traffic light control • Pattern of LEDs • Alarm Clock

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DAYS	TOPICS
Day 6	PROJECT
Day 7	PROJECT
Day 8	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Image Processing • Resolution and game of pixels • Image arithmetic <p>Practical</p> <ul style="list-style-type: none"> • Installing webcam with MATLAB • Conversion of color images
Day 9	<p>Theory</p> <ul style="list-style-type: none"> • Image acquisition toolbox <p>Practical</p> <ul style="list-style-type: none"> • Taking snapshots from live video • Conversion of image formats
Day 10	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to IR Sensors • Working of Comparator • ADC Theory <p>Practical</p> <ul style="list-style-type: none"> • Detecting white and black surface with digital IR sensors • Monitoring analog and digital sensors
Day 11	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Motor Driver <p>Practical</p> <ul style="list-style-type: none"> • Controlling motors with these IR sensors • Integrating motors with ATMEGA 328
Day 12	<p>Theory</p> <ul style="list-style-type: none"> • Serial and Parallel communication • Explanation of serial library • Introduction to serial communication in MATLAB • Working with COM ports in MATLAB <p>Practical</p> <ul style="list-style-type: none"> • Interfacing of MATLAB with Arduino • Serial and Parallel Interface • LED interfacing in bread board with MATLAB
Day 13	PROJECT
Day 14	PROJECT
Day 15	Competition, Doubts & Practical Session

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DAYS	TOPICS
Day 16	<p>Theory</p> <ul style="list-style-type: none"> • Serial monitor and its functioning • Reading and writing of serial data in serial monitor <p>Practical</p> <ul style="list-style-type: none"> • LED interfacing with MATLAB
Day 17	<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 18	<p>Theory</p> <ul style="list-style-type: none"> • Live Videography using MATLAB • Integrating Real world with digital world <p>Practical</p> <ul style="list-style-type: none"> • Color conversion in live video • Counting pixels in live image
Day 19	<p>Theory</p> <ul style="list-style-type: none"> • Explanation of different parameters in MATLAB • Identifying area of interest in the snapshot taken from the webcam <p>Practical</p> <ul style="list-style-type: none"> • Detection of edges using Image Processing • Color recognition/detection in live video • How to divide the screen resolution using MATLAB programming
Day 20	<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 21	PROJECT
Day 22	PROJECT
Day 23	<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.

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DAYS	TOPICS
Day 24	<p>Theory</p> <ul style="list-style-type: none"> • Seven segment display device <p>Practical</p> <ul style="list-style-type: none"> • Controlling the display devices using color detection • Seven segment counter device
Day 25	<p>Theory</p> <ul style="list-style-type: none"> • Seven segment display device <p>Practical</p> <ul style="list-style-type: none"> • Integrating SSD with MATLAB Using serial communication • Seven segment controlled BOT
Day 26	<p>Theory</p> <ul style="list-style-type: none"> • Theory of screen coordination system • How to divide the resolution of screen using programming <p>Practical</p> <ul style="list-style-type: none"> • Automated control bot using hand gesture • Algorithm of line follower using image processing
Day 27	<p>Theory</p> <ul style="list-style-type: none"> • Integrating MATLAB with Seven Segment Display <p>Practical</p> <ul style="list-style-type: none"> • Interfacing MATLAB with Seven Segment Display • Controlling internet using Image processing
Day 28	PROJECT
Day 29	PROJECT
Day 30	Competition, Doubts & Practical Session
Day 31	<p>Theory</p> <ul style="list-style-type: none"> • How to work on binary images • Concept of 1-bit and 8-bit image <p>Practical</p> <ul style="list-style-type: none"> • GESTURE Controlled Web Browsing. • Gesture controlled Robot. • Gesture controlled PC Applications.
Day 32	<p>Theory</p> <ul style="list-style-type: none"> • Color difference • Explanation of Real time signal processing <p>Practical</p> <ul style="list-style-type: none"> • Detecting RGB on the same screen • Controlling multiple outputs using color detection • Controlling different devices using RGB caps in fingers

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DAYS	TOPICS
Day 33	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Liquid Crystal Display • Pin description of LCD <p>Practical</p> <ul style="list-style-type: none"> • Interfacing of motors with LCD and LED • Creating simple animations on LCD • Scrolling texts on LCD
Day 34	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to Accelerometer • Working on 2-3 Axis using Accelerometer <p>Practical</p> <ul style="list-style-type: none"> • Interfacing Accelerometer with Microcontroller • Reading data on Serial Monitor • Interfacing Basic Shield with Accelerometer
Day 35	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to soldering. • Introduction to LED Matrix. • Explanation of several combinations to make a pattern display. <p>Practical</p> <ul style="list-style-type: none"> • Soldering LED's on Zero PCB. • Display digits on LED Matrix. • Generating patterns on LED Matrix (e.g. SMILEYS). • Display of text on LED Matrix.
Day 36	PROJECT
Day 37	PROJECT
Day 38	<p>Theory</p> <ul style="list-style-type: none"> • Introduction to the concept of centroid • Explanation of region of interest • Integrating MATLAB with LED matrix <p>Practical</p> <ul style="list-style-type: none"> • Tracking different colors using image processing • Traffic control cameras to track number plates • Anti-theft system
Day 39	<p>Theory</p> <ul style="list-style-type: none"> • Concept of Color threshold • Creating analog environment between MATLAB and LCD <p>Practical</p> <ul style="list-style-type: none"> • Toll gate system using color tracking • Making of toll gate system using LCD

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DAYS	TOPICS
Day 40	<p>Theory</p> <ul style="list-style-type: none"> • Explanation of speed control of a DC motor <p>Practical</p> <ul style="list-style-type: none"> • Motion control system • Display the pixel values of live video on LCD • Gaming control systems using analog systems
Day 41	<p>Theory</p> <ul style="list-style-type: none"> • Explanation of object tracking logic using programming <p>Practical</p> <ul style="list-style-type: none"> • Object Detection Bot • Web browsing using image processing • Ball Tracking Bot • Control the speed of motor using color tracking
Day 42	<p>Theory</p> <ul style="list-style-type: none"> • Signal processing in MATLAB • Wave read and write using MATLAB <p>Practical</p> <ul style="list-style-type: none"> • Design of a counter using MATLAB • Scrolling text in LCD using object detection • Music tracking Bot Using image processing
Day 43	PROJECT
Day 44	Doubts and competition of line follower bot
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. Color detection in still image
5. Edge detection in still image
6. Cam-shots
7. Serial communication in MATLAB
8. MATLAB interfaced manual BOT
9. Controlling power through MATLAB
10. Automatic light control system
11. Flood control alarm system
12. Generation of MIDI tones
13. Intelligent blind stick
14. Manual robotic car
15. Automatic line follower Robot
16. Security system based module
17. Black and white surface detection using IR sensor
18. Automatic opening and closing of door
19. Automatic obstacle detection System
20. LDR based Darkness activation system
21. LDR based Light activation system
22. Daily Alarm Clock Color detection in live image
23. Converting the graphical format of live video
24. Gesture controlled device
25. Real time color absorption
26. Seven segment based counter/timer
27. Seven segment display through MATLAB
28. Music player using color detection
29. Video player using color detection
30. Automatic gesture controlled BOT
31. Radar Using Ultrasonic Sensor
32. Ultrasonic BOT
33. Mobile switching device
34. Mobile (DTMF) controlled BOT
35. Line follower BOT using image processing

36. Intelligent color follower BOT
37. Color differentiator software using MATLAB
38. Power control through gesture
39. Multiple switching device through gestures
40. Edge detector BOT
41. Gesture controlled web browsing
42. Motion controlled device
43. Number plate tracking system
44. Traffic control cameras
45. Antitheft device
46. Home security system
47. Toll gate system
48. Object Detection using Image processing
49. Virtual switching system
50. Object Tracking BOT
51. Color tracking display device
52. LCD based counter
53. LCD based line follower BOT
54. Gesture controlled BOT using accelerometer
55. Music tracking BOT
56. Controlling Audio player using MATLAB
57. Gesture Controlled PC applications
58. Controlling multiple devices using Hand Gesture
59. Design a pattern on LED matrix with MATLAB
60. Accelerometer based security system

Image Processing Using MATLAB Kit Content for ADVANCE MODULE

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

SUMMER TRAINING PROGRAM MATLAB & Image Processing

Why MATLAB & Image Processing 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
 - 8 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.

Pre-Requisites

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

Recommendation

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

Who Could Attend this Training?

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