

Course Content-“Sixth Sense Botics V-1.0”

Day 1:

1. Introduction to MATLAB

- Basics of MATLAB
- Need of MATLAB in Robotics
- MATLAB GUI(Graphical User Interface)
- Tool Boxes in MATLAB

2. Programming Fundamentals

- Matrices and Arrays
- Workspace Variables
- Calling Functions
- 2D and 3D Plots
- Important Commands of MATLAB

3. Introduction to Images

- Reading and Writing Images
- Introduction to resolution and color depth
- Concept of digital pixels

4. Introduction to Digital Image Processing

- Basics of Image processing
- Images and Type of Images
- Image Formats

5. 2-D and 3-D Matrices

- Index images
- True color image
- Type of color formats in MATLAB

6. Image acquisition process

- Image acquisition devices
- Image analysis tools
- Controlling the devices
- Installation of web camera

7. Color format

- Color spaces
- Color format conversion
- Important functions of MATLAB used for color and edge detection

8. Introduction to Arduino

- Arduino board and Software Introduction.
- Introduction to different types of Arduino shields
- Interfacing input/output components like LED, Buzzer, Switch, LDR.

Day 2:

9. Real time Image processing

- Getting information about your webcam and adapters
- Setting all the image input parameters
- Starting and previewing video
- Capturing image and storing image
- Setting specific frame triggering rate

10. MATLAB communication with external peripherals

- Serial Communication
- Parallel Communication

11. Using of filters in MATLAB

- Setting of manual threshold to remove the noise
- Random threshold method
- Removing the unwanted pixels from the image
- 2-D filters

12. Projects on Image processing

- Counting of no. of objects in an image
- Live color recognition
- Live color conversion
- Edge detection using image processing

13. MATLAB interfacing with Arduino

- Interfacing MATLAB with Arduino Shield.
- Real time Programming of Arduino with MATLAB

14. GUI- Graphical User Interface in MATLAB

- Designing of GUI in MATLAB platform
- Design your own calculator in MATLAB
- Interface your GUI with Arduino

15. Vision based Robotics

- Introduction to Vision based Robots
- Controlling motion using Gestures

Hands-on Projects:

- **LED blinking and pattern generation using MATLAB**
- **Motor control using MATLAB**
- **LED flasher using MATLAB**
- **Counting the no of objects in an image**
- **Edge detection in an image**
- **Manual BOT**
- **Line follower BOT**
- **Wall Follower BOT**
- **Edge avoider BOT using MATLAB**
- **GUI based manual BOT using MATLAB**