

# ROBOTICS - 3rd Sem

## A course that inspires you to create!

An exploration program with understanding design, construction, operation and use of Robots.

### Overview

This hands-on robotics course immerses students in creating impactful, sustainable products for fields like medicine, transportation, and exploration. Using development boards such as Raspberry Pi and Arduino UNO, students learn computer vision, motor control, and programming with OpenCV and Python. The curriculum includes building applications capable of obstacle avoidance and object detection, ensuring practical, real-world skills. Lab challenges encourage experimentation with physical and digital tools, promoting a fun and comprehensive learning experience. By the course's end, students are well-prepared to build diverse robotic applications, having mastered essential concepts and tools in both hardware and software domains.

### Outcome

- To be able to understand and execute programming languages.
- To understand and execute the principles of robot decision-making and robot mobility.
- To be able to apply Embedded systems for real time implementation.
- To design and build adaptable robots prototypes that can be used for real time applications.



### Course Overview (12 sessions)

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|---|---|
| 1 - Getting started with Robotics             | 7 - Object Detection using OpenCV and HSV Color space |
| 2 - Motor Control                             | 8 - Raspberry Pi GPIO Interface                       |
| 3 - Sensor Interface and Application Building | 9 - Basic Motion with Raspberry Pi                    |
| 4 - Raspberry Pi (RPi) OS installation        | 10 - Edge Detection/ Lane Detection OR Road Following |
| 5 - Fundamentals of Python Programming        | 11 - Object detection while traversing on a road      |
| 6 - Computer Vision OpenCV with Raspberry Pi  | 12 - Design Challenge                                 |

### Tools you will learn

- |               |                    |                    |
|---------------|--------------------|--------------------|
| • Python      | • HSV Color space  | • Jetbot OS        |
| • Linux       | • Object Detection | • Jupyter Notebook |
| • Arduino IDE | • Edge Detection   | • JupyterLab       |
| • Open CV     | • Mobility control |                    |