

# Robotic Car with Line Following and Obstacle Sensing

**Course:** 4th Semester B.E in ECE (2023-24, Even Semester)

**Project Type:** Experiential Learning

**Students:**

- Kavya Shree Y (1RV22EC081)

- Neha (1RV22EC101)

**Submitted To:** Dr. Veena Devi

## Introduction

This project focuses on designing a self-driving robotic car capable of lane following and obstacle detection. Using a combination of sensors and a microcontroller, the car can autonomously navigate predefined paths while avoiding collisions.

## Motivation

- Enhance road safety by minimizing human errors.
- Improve traffic efficiency through adaptive routing.
- Increase accessibility for elderly and disabled individuals.
- Reduce congestion and parking issues with autonomous pick-up/drop-off.

## Problem Statement

The project addresses challenges in autonomous robotics:

- Reliable obstacle detection
- Precise line following
- Real-time signal recognition
- Cliff detection for safety

## Objectives

1. Autonomous Navigation – Follow a predefined line using IR/optical sensors.
2. Obstacle Detection & Avoidance – Use ultrasonic/IR/LIDAR sensors to avoid collisions.
3. Real-Time Processing – Enable quick decisions based on live sensor data.
4. Adaptability – Handle varying lighting, surfaces, and unexpected obstacles.

## Design Methodology

**Hardware:** Raspberry Pi Pico, Motor Driver, Ultrasonic Sensor, IR Sensor.

**Software:** Thonny IDE, Python/MicroPython.

**Functional Flow:** IR sensors follow trajectory → Ultrasonic detects obstacles → Motor driver controls wheels.

## Results

- Successfully demonstrated lane following and obstacle avoidance.
- IR + Ultrasonic sensor integration enabled smooth navigation.
- Feasible low-cost prototype for educational robotics.

## Conclusion

This prototype demonstrates real-time decision-making, sensor fusion, and robotics control systems. It acts as a foundation for advanced autonomous vehicle research and smart transportation innovations.

## References

1. Artificial Intelligence based Self-Driving Car
2. Design of Autonomous Line Follower Robot with Obstacle Avoidance
3. IEEE Paper on Self-Driving Robotics
4. AI-based Self-Driving Car

## Repository Structure

```
Robotic-Car-Autonomous/  
■■■ README.md  
■■■ docs/  
■ ■■■ methodology.md  
■ ■■■ literature_survey.md  
■ ■■■ results.md  
■ ■■■ references.md  
■■■ images/  
■■■ src/  
■ ■■■ main.py  
■■■ LICENSE
```