1 Introduction

This report outlines key progress in lane detection, roundabout navigation, traffic sign recognition, and pedestrian detection. The vehicle now slows down at crosswalks and stops for pedestrians. Parking functionality is introduced but needs object detection for safer reversing. The focus ahead is refining roundabout navigation and ramp driving.

2 Planned activities

During this reporting period, we planned to focus on the following:

- Improve Lane Detection & Following
- Traffic Sign Recognition (Stop, Parking, Pedestrian Crossing, etc.)
- Pedestrian Crossing at Crosswalks & Automatic Speed Reduction & Stopping
- Parking Functionality Implementation

Team Assignments:
For the above-mentioned actives the team has been split as follows:

Team Member	Activity	Role
Kamaleshwar K K	Parking with object detection	Design & Development
Ankit Chandran R	Traffic sign detection	Algorithm Refinement
Selvadharshini S	Pedestrian detection	Sensor Integration
Chitrupa S	Physical testing	Testing & Coordination
Mugesh G	Roundabout lane accuracy	Algorithm Development
Team Effort	Fixing issues and preparing reports.	Collaborative Effort

3 Status of planned activities

Traffic Sign Recognition:

- *Status:* Completed
- *Progress:* The system can now detect stop signs, parking signs, and pedestrian crossing signs, enabling automatic vehicle responses.
- *Challenges:* Handling occlusions and lighting variations, and training the system for additional traffic signs to improve recognition accuracy.

Improve Lane Detection & Following:

- *Status:* On-going
- *Progress:* The lane detection algorithm has been improved, but additional work is required for roundabout handling to ensure smooth lane-following in complex traffic scenarios.

- *Challenges*: Maintaining stable lane tracking in roundabouts and adjusting the vehicle's trajectory for accurate entry and exit.

Pedestrian Detection at Crosswalks & Automatic Speed Reduction & Stopping:

- *Status:* Completed
- *Progress:* The system now identifies pedestrians at crosswalks. The vehicle automatically reduces speed when a crosswalk sign is detected and stops completely when a pedestrian is present at the crosswalk to improve safety.
- *Challenges*: Reducing false positives in crowded areas while maintaining real-time efficiency.

Parking Functionality with Object Detection:

- *Status:* On-going
- *Progress:* The vehicle executes parking maneuvers, but further refinement in object detection for safe parking is required to avoid nearby obstacles while reversing.
- *Challenges*: Improving object detection to identify vehicles and obstacles accurately and integrating it with parking execution.

Finalize the Physical Testing Environment:

- *Status:* On-going
- *Progress:* The physical testing environment setup is in progress, with hardware calibration underway.
- *Challenges*: Hardware availability and sensor calibration are being addressed to ensure smooth testing.

Roundabout Navigation & Smooth Ramp Driving (Future Work):

- *Status:* On-going
- *Progress:* Developing algorithms for smooth navigation through roundabouts and ensuring stable vehicle movement on ramps before highway entrances to prevent sudden speed variations.
- *Challenges*: Managing dynamic vehicle flow in roundabouts and handling inclined ramps while ensuring stable acceleration/deceleration before highway entrances.

4 General status of the project

The project has made significant strides, particularly in traffic sign recognition, pedestrian detection, and parking functionality. While lane detection and roundabout navigation require more work, the vehicle's core capabilities are progressing well. Upcoming tasks focus on refining vehicle handling in complex traffic scenarios and ramp driving for real-world testing.

5 Upcoming activities

Looking ahead, our team plans to:

- Complete roundabout navigation algorithm development.
- Ensure smooth vehicle movement on ramps before highway entrances.
- Train the system for additional traffic signs.
- Refine object detection for safe parking.
- Optimize pedestrian detection for real-world testing.