**Report No: 3**
**Team : Fusionfleet**
**Date:17.2.2025**

# 1 Introduction

This report discusses the progress achieved in the third month of our project, following the success of the previous months. Our main emphasis was on enhancing and optimizing lane detection, tracking, and traffic sign recognition algorithms, thus enhancing accuracy and efficiency. One of the key developments in this month was the integration of vehicle motion algorithms in ramp and parking scenarios. This activity included solving issues like incline detection, speed modulation, and precise maneuvering for parallel and perpendicular parking scenarios..

# 2 Planned activities

The activities planned are as follows:

- lane detection algorithm
- Ramp and parking alogrithm

- **lane detection Algorithm**

***Status*:** completed

***Implementation*:** The assignment was to create a program that tracks the lane using video input of a track present in BFMC and detects lane.

***Difficulties:*** The lane detection algorithm has been significantly improved, and it is now capable of detecting lanes with high accuracy, even on curved roads. While the performance of the model has significantly improved, there are continuous efforts to improve it further, particularly in terms of varying light conditions. High ambient light conditions are still a problem, which negatively affects the efficiency of lane tracking. Improving the algorithm, and fine-tuning the system to provide improved performance and reliability.

- **Ramp and parking algorithm**

**Status:** Completed

**Implementation:**
The project successfully developed and implemented algorithms for vehicle movement on ramps and parking scenarios, supporting autonomous navigation in complex environments**. The ramp algorithm handles incline detection, speed adjustment, and trajectory planning**, while the **parking algorithm enables precise maneuvering for both parallel and perpendicular parking, incorporating obstacle detection and path optimization**. After rigorous testing, both algorithms demonstrated flawless performance, meeting the project's requirements and ensuring reliable functionality in real-world conditions.

**Difficulties:**
During development, integrating real-time sensor data for accurate ramp navigation and parking posed initial challenges due to the complexity of dynamic environments. However, these issues were resolved through iterative testing and optimization. The system now operates seamlessly, adapting to varying conditions and ensuring accurate execution of ramp and parking maneuvers

## 3 General status of the project

The project has made significant progress, with real-time challenges persisting in making critical decisions on add-ons and improvements to enhance performance. We have successfully completed the traffic sign detection system and are now focused on improving lane detection for both straight and curved paths. Additionally, we have been working on developing algorithms for ramp navigation and parking, addressing challenges such as incline detection, speed adjustment, and precise maneuvering. These efforts aim to improve the system's adaptability to dynamic environments, including varying lighting conditions, and ensure robust performance in real-world applications.

## 4 Difficulties faced during this month

While working on our project, we encountered an issue with the front wheel alloy not functioning properly. Initially, we noticed that the wheel was not rotating as expected, despite the motor and other components appearing to be in working order. Upon closer inspection, we found that the alloy wheel was misaligned, causing friction and preventing smooth rotation. further contributing to the problem.

To address this, we first realigned the wheel to ensure it was properly seated and balanced, which significantly improved the wheel's performance. After these adjustments, the front wheel alloy began to function correctly, allowing us to proceed with our project on lane and traffic sign detection without further issues