Report No: 2
Team : Fusionfleet
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1 Introduction

This report highlights the progress made during the second month of our project, building upon the foundation established in the first month. Our primary focus has continued to be on advanced software development, with significant advancements in the algorithms for accurate lane detection, tracking, and traffic sign identification. In addition, the manual tasks outlined in the first month have been successfully completed, contributing to the refinement and optimization of our system. Our team has maintained effective collaboration, both remotely and in the lab, and has managed to meet time constraints while ensuring steady progress. This document reviews our accomplishments over the past month and sets the stage for the upcoming tasks and milestones.

2 Planned activities

The activities planned are as follows:

- Lane detection and tracking
- Sign detection and classification

- **Lane detection and tracking**

***Status*:** Straight lane(completed) curved lane (ongoing)

***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 developed program is capable of accurately identifying lanes in a straight line, and we have successfully extended its functionality to detect lanes on curved paths as well. However, we are currently focusing on enhancing the model's accuracy to ensure more reliable performance in real-world conditions. One of the key challenges we are addressing is the impact of higher ambient light intensity, which affects lane tracking efficiency and makes optimization more complex. Our team is actively working on refining the system to improve its robustness and adaptability across varying lighting conditions.

Traffic Sign Detection and Classification

Status: Completed

Implementation:
The project focused on detecting and classifying traffic signs to support autonomous vehicle navigation. The dataset was expanded by including images captured under various lighting conditions to enhance model reliability. After training, the model achieved an accuracy of 96% during testing. The system successfully detects traffic signs and reacts accordingly, meeting the requirements outlined by the Bosch Future Mobility Challenge (BFMC).

Difficulties:
Integrating real-time video footage for object detection was a significant challenge due to its complexity. However, this was resolved, and the system now operates seamlessly in real-time, ensuring accurate detection and response.

The traffic sign detection model has been completed and fulfills all BFMC specifications, identifying all required signs and adapting its behavior dynamically.

3 General status of the project

The project has made significant strides since controlling the vehicle in manual mode. Real-time challenges persist in making crucial decisions on addons and improvements to elevate the project's performance, especially in a high-end competition setting. We have completed the traffic sign detection and are currently working on lane detection for both straight and curved paths. The ongoing real-time challenges involve decisions on strategic addons to enhance adaptability to dynamic lighting conditions.

4 Difficulties faced during this month

During our project, we encountered multiple issues with the powerboard. Initially, the board experienced a short circuit, despite not using a variable supply. Upon investigation, we found that the IC2 TPS61288RQQR boost converter had short-circuited, causing abnormal resistance values—0 ohms between the + and - terminals of CON3 and 86 ohms between the + and - terminals of the battery. Additionally, all connectors were found to be short-circuited. After removing the faulty IC, the powerboard started functioning normally, but CON3 still showed 0V, indicating a potential underlying issue. Since the powerboard was operational after the IC removal, we proceeded with our project on lane and traffic sign detection, which we successfully completed. However, we still seek insights into the root cause of the initial short circuit