Qualification

Report

Team : Fusionfleet

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1 Introduction

This report discusses the progress achieved in the fourth month of our project, following the success of the previous month. Our main emphasis this month was on enhancing and optimizing lane detection, tracking, and traffic sign recognition algorithms, further improving accuracy and efficiency. One of the key developments was the integration of vehicle motion algorithms in ramp and tunnel scenarios. This activity involved solving challenges such as incline detection, speed modulation, and precise maneuvering. Additionally, we made significant advancements in the detection of curved lanes, improving the system's ability to navigate complex road geometries with greater precision. These developments contribute to a more robust and adaptable system for real-world driving conditions.

The activities planned are as follows:

- Curve lane detection algorithm
- Ramp and Tunnel algorithm

• Curve lane detection Algorithm

Status : completed

Implementation : The task was to develop a program that detects lanes using video input from a track at BFMC. The lane detection algorithm has been successfully implemented using the Canny edge detection technique. Furthermore, we enhanced the system by transforming the video input into a bird's-eye view, allowing for more accurate lane detection and improved performance, especially on curved paths.

Difficulties : While the Canny edge detection method has proven effective in identifying lanes, challenges remain with high ambient light conditions, which continue to affect the efficiency of lane detection. Despite this, the overall system performance has been significantly improved, and continuous efforts are being made to optimize the algorithm further, ensuring better reliability and robustness under varying lighting conditions.

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- **Ramp and Tunnel algorithm**

Status: Completed

Implementation:
The project successfully developed and implemented algorithms for vehicle movement on ramps and tunnels, supporting autonomous navigation in complex environments. The ramp algorithm handles incline detection, speed adjustment, and trajectory planning, ensuring smooth and stable navigation.

The tunnel algorithm focuses on maintaining lane stability, adjusting lighting conditions, and ensuring uninterrupted navigation through enclosed spaces. 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 and tunnel navigation 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 tunnel maneuvers.

General status of the project

Our project has made significant progress, overcoming real-time challenges and implementing key improvements to enhance overall performance. We have successfully completed the traffic sign detection system, complex lane detection for both straight and curved paths, and the algorithm for navigating ramps and tunnels.

With these developments, our system can now efficiently handle inclines, adjust speed, maintain lane stability, and adapt to changing lighting conditions. These advancements ensure greater adaptability to dynamic environments, making the system more reliable for real-world scenarios

Difficulties faced during this month

While the Canny edge detection method effectively identified lanes, high ambient light conditions impacted its efficiency. This challenge required continuous algorithm refinements to enhance reliability and robustness across varying lighting conditions.

Accurately detecting lanes in ramps and tunnels posed initial difficulties due to changes in illumination and road structure. These issues were addressed through iterative testing and optimization, allowing the system to adapt seamlessly and ensure precise navigation in such environments.