Problem Statement: Computer Vision for Formula SAE Driverless Racing Car

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Abstract

The collaboration team of Oregon State University (OSU), US and Duale Hochschule Baden-Württemberg-Ravensburg (DHBW), Germany will be competing in the driverless racing car category of the Formula SAE (FSAE) – an international Formula-style car racing competition for student in universities around the world. In this category, a driverless racing car must drive itself quickly within a race course limited by cones on both sides. LiDAR and camera will be attached onto the car to collect data about the environment around the car. This project aims to develop a computer vision solution via Robot Operating Systems (ROS) nodes that can detects the correct shapes of the course and localize the car using the data collected from the LiDAR and the camera.

1 Problem Description

The very first and one of the most important task of a driverless car, is not only being able to collect the data about world around it but also correctly make sense from that data and provide useful and meaningful input for its decision so the car can drive correctly as intended.

In this competition, this task for the competing driverless racing car is being able to collect visual data about the racing course, and then determine the boundary and the correct path of this course before sending it to the localization and mapping components of the car. The solution to the former problem (visual data collection) has been figured out by the team. The team's car will be using LiDAR and a camera to collect data. The next problem, making sense of the data, is the problem we are addressing: where is the left boundary, where is the right boundary? Obstacle? What is the shape of the course ahead and the map in overall? Where is the car right now in relative to those boundaries?

2 Proposed Solution

3 Performance Metrics

References

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