ROS-based Framework for Autonomous Driving Demo Cars

Description

Demo cars are great tools in realizing the algorithms which are developed for autonomous driving. However, there is no generic framework which provides a flexible substrate for easy integration of different intelligent components in these cars.

ROS-based solutions have shown that can be a reliable approach for such issues due to their publish and subscribe mechanism. The main objective of this work is to design and develop a generic software framework which is based on ROS, hardware independent, while providing room for data collection, test scenarios and integration of safety limiters.

Developed framework is expected to provide an environment for controlling the car, managing the sensors, covering the visual and sensory-based perception beside the safety assurance measurements.

Tasks

This student project consists of the following tasks:

- Setting up a demo car with 4 RPI as the main ECUs, cameras and sensors,
- Designing an architecture based on ROS for the backbone,
- Developing and integrating the basic autonomous driving algorithms,
- Designing the framework to facilitate the further integrations,
- Enabling the integration of safety limiters for NN-based components,
- Evaluating the framework on a real scenario of autonomous driving (end-to-end),
- Testing the whole set up, benchmarking the evaluations and documenting the work