Multiple Sensor Detection Algorithm Developed on Autonomous Vehicle System

Wei-Ting Chen† Jyh-Ching Juang‡

Department of Electrical Engineering

National Cheng Kung University, Tainan, Taiwan, R.O.C.

In this thesis, a multi-sensor data fusion system for multiple computers autonomous vehicle is developed. The accurate detection and classification of obstacles is a critical aspect of autonomous driving, and multiple sensors provide the feasibility and complementarity for this goal.

The overall system contains the vehicle, lidar, radar, camera, computers including NVIDIA Drive PX 2 and AStuff Nebula. To improve the system architecture, this thesis proposed a parallel computing mechanism on two computers with master/slave architecture based on Robot Operating System (ROS).

Camera provides image data which can be used to detect obstacle type using deep learning. Lidar provides point cloud data and that can be utilized to estimate the range. Radar provides long-range coverage and object tracking information. Integration of these sensors is the main contribution of this thesis, Single Shot MultiBox Detector (SSD) is for object detection in real-time and the obstacle can be tracked with label Integrated with point cloud data. Radar tracking data will be included to optimize the performance in the end.

Sensor fusion mechanism of autonomous vehicle is experimented on the campus road with vehicles and pedestrians. In order to increase safety and decrease road accidents of autonomous vehicles, tests in a controlled environment and/or open fields are essential. In the future, we will make efforts on adapting the system from the campus road to the urban road.

† The Student

‡ The Advisor