Name

Jingyu Li

Group Members

Jingyu Li
Shujing Yang
Siwei Zhang
Yutao Zhou
Yu Zhang

Description

This project involves using computer vision and machine learning techniques to accurately identify and classify different types of objects in the environment, such as **stop signs**, **pedestrians**, and **vehicles**.

The project simulates the real-world scenario of the vehicle. At first, the vehicle moves forward with some speed. When it gets close and encounters the stop sign/pedestrians/other cars, the vehicle will brake and stop for a while, waiting for the signal to disappear (people pass across the road or the car moves along the intersection). When the vehicle can no longer detect the signal, it will resume moving forward with the previous speed.

Overall, this is a practical and interesting project. The project combines the object detection, vehicle sensor, and pid speed control techniques. It makes the vehicle really "autonomous".

Steps

Open the 1st terminal, launch the joystick controller.

```
source devel/setup.bash
roslaunch basic_launch gem_dbw_joystick.launch
```

Open the 2nd terminal, launch the basic sensors.

```
source devel/setup.bash
roslaunch basic_launch gem_sensor_init.launch
```

Open the 3rd terminal

```
source devel/setup.bash
rosrun [PackageName] detect.py
```

Links

- Haar Cascade Classifier: https://github.com/opencv/opencv/tree/master/data/haarcascades
- Computer Vision — Detecting objects using Haar Cascade Classifier: https://towardsdatascience.com/computer-vision-detecting-objects-using-haar-cascade-classifier-4585472829a9
- Traffic Sign Detection: https://github.com/Bassel-A-Elazab/Traffic-Sign-Detection-Python-OpenCV-
- Traffic signs detection and classification in real time: https://github.com/hoanglehaithanh/Traffic-Sign-Detection
- Guide to make Custom Haar Cascade XML file for Object detection with OpenCV: https://medium.com/@vipulgote4/guide-to-make-custom-haar-cascade-xml-file-for-object-detection-with-opencv-6932e22c3f0e
- Make Your Own Object Detector using Haar Cascade (Python & OpenCv): https://github.com/Bassel-A-Elazab/Make-Your-Own-Object-Detector

Reference

- Hbaieb, Amal, Jihene Rezgui, and Lamia Chaari. "Pedestrian detection for autonomous driving within cooperative communication system." 2019 IEEE Wireless Communications and Networking Conference (WCNC). IEEE, 2019.
- Gupta, Abhishek, et al. "Deep learning for object detection and scene perception in self-driving cars: Survey, challenges, and open issues." Array 10 (2021): 100057.

Video Link

https://youtu.be/H-zuN8SHSVU