Exercise 3: Controlling the distance to a person

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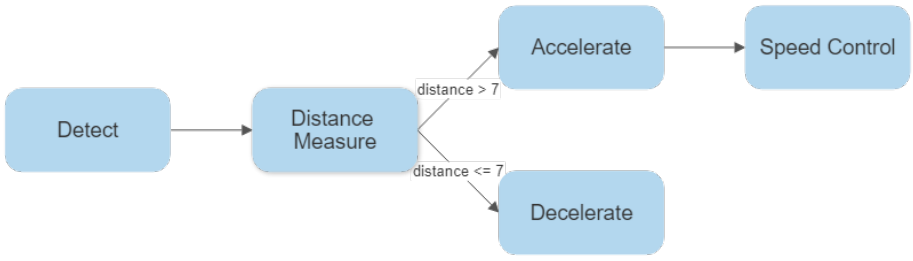
Purpose

In this exercise, the main purpose is to cause the vehicle to follow a person at a fixed distance. The vehicle should contain the capability of following person even when the person moved fairly fast. If the person moves toward the vehicle, the vehicle should be able to reverse to keep the distance constant. Zed camera was used as sensor for this exercise.

Method



Detect: Camera YOLO pre-trained network is used to detect pedestrians, a bounding box was returned as detection information. And the mean value of depth values in this bounding box was calculated as the distance value from the vehicle to the pedestrian. The CvBridge() is then used to send this distance value to ROS.

Distance Measure: Get the distance from pedestrians obtained through subscribing topic object_detection in ROS and perform a simple judgment on that distance.

Accelerate: If the detected distance is larger than 7 meters, the system will publish message to accel_cmd to keep the vehicle moving forward.

Speed Control: To prevent difficulties and ensure safety caused by the rapid movement of the vehicle, direct assignment of values to the accelerator is not used in this section. PID is used in this system to control both acceleration and

desired speed to ensure the actual velocity of the vehicle maintain an relatively slow value.

Decelerate: If the detected distance is less than or equal to 7 meters, the system will publish message to brake_cmd to control the vehicle to brake.

Unsolved Problem

Due to the inherent delay in the YOLO algorithm for detecting and transmitting information to the GEM Vehicle, we need to ensure that the vehicle operates at a relatively low speed throughout the entire experiment to allow sufficient time for the system to react. However, if the vehicle moves too quickly, it can result in situations where the vehicle is unable to decelerate or accelerate to the intended values in a timely manner.

Video Link

Outside view backward: http://www.youtube.com/watch?v=bhDDjIfz5ZUlist=PL5IM62rCQfXrOYlQUh9
AyZ2Xzz-sQe6index=4My YouTube Video
Outside view forward: http://www.youtube.com/watch?v=VeiP9m8i7-8list=PL5IM62rCQfXrOYlQUh9B-
AyZ2Xzz-sQe6index=5My YouTube Video
In-car view: http://www.youtube.com/watch?v=nhXCU-oXxkIlist=PL5IM62rCQfXrOYlQUh9B-
AyZ2Xzz-sQe6index=6My YouTube Video