

Abstract

Group 7 AI CAR

Our group is planning to explore AI car based on automated driving system. An automated driving system is a complex combination of various components that can be defined as systems where perception, decision-making, and operation of the automobile are performed by electronics and machinery instead of a human driver, and as introduction of automation into road traffic. According to technology of the computer vision, our capstone design focuses on small parts of perception. Also, recognition is an important part of this system because it is the start of whole system. From the previous design group, they have already recognized the stop signs and human, then the car can make proper decisions. Our goal is to enable the AI car could keep safety while lane change and safety of swerving at intersection. We use computer vision and route optimization to keeping safety distance from other cars and avoiding barrier. This project would help users to drive more safely on road. We have three main ideas, lane change, safety distance, and safety of swerving at intersection.

- Lane Change

On a two-lanes road, there will be two AI Cars driving on different lanes. When one of the cars decides to change into the other lane, firstly, it will detect if there is any car or barrier on that lane. If there is nothing on that lane, it will change the lane directly. Otherwise, it will light up its signal light on the side. The other car will detect the signal light by its camera, and then it will stop and allow the car to pass through it and to change the lane. Of course, if there is a barrier that can't move, the car will keep driving on its own lane, and then, when it passes through the barrier, it will change the lane.

- Safety Distance

In the situation where two cars are driving on the same lane, there must be a problem of safety distance. The program we design for the car's front camera will detect if there is any car or barrier in front of it and then calculate a safety distance between them. When the distance between the two cars is smaller than the safety distance calculated, the behind car will choose to stop to avoid the traffic collision.

- Safety of Swerving at Intersection

In the situation where two cars are driving from the directions forward to each other and meeting at an intersection, there may be a traffic collision if one car decides to turn left at the intersection and the other decides to drive forward. Thus, we will design the left turning car to stop at the intersection to allow the other car to pass through the intersection at first. After that, the car makes a left turn. Of course, all the decisions made by the cars will be based on the camera detecting.