

# Description

The vehicle is run by 2 motors, and AI, which referenced the Ackerman steering mechanisms. The code of the AI vehicles can be divided into 3 parts, motor part, sensor's part, and the husky lens part.

For the Motor part, 2 Stepper motors are used. The code is written with Arduino. The main idea of the motor is run by Ackerman steering with the front stepper motor which has been mentioned to turn left or right when the vehicle faced the 'Traffic light'. Its acceleration depends on the stepper motors on the back.

For the method on how to identify the 'Traffic light', husky lens is used. When the husky lens sees the traffic light, it will identify its color by AI and command the front stepper motor to turn to the correct direction. For example, when the husky lens identifies a red traffic light object, the motor at the front which is used to control the direction of the vehicle will rotate anti-clockwise 90 degree to turn left (Direction 180 in servomotor). Hence, it will rotate clockwise with 90 degrees to turn right (Direction 0 in servomotor).

In our point of view, the vehicle will be easier to operate with the vehicle always at equilibrium, middle of the two sides of the road, the motor will turn left or right, clockwise, or anti-clockwise depending on different situation which following the command of the given data of sensors by determining its own position from the equilibrium. It will turn clockwise with relative degree depending on its own position, such as 40 degrees when it is slightly on the left of the equilibrium. On the other hand, on the turning point, the motor will turn clockwise or anticlockwise 90 degrees by determining turning right or left with the sensors. It is the main idea of how the motors work and with the cooperation with the sensors and husky lens.

For sensors, we have used 3 ultrasonic sensors. One sensing the front of the vehicle, and two sensing the sides of the vehicle. There will be two situations using the sensors to help determining the next move for the motors. For, turning back to the equilibrium of the 2 sides, the sensors on the 2 sides of the vehicle will check the value of the 2 sensors and move until both sensors sense the same magnitude. For example, the sensor on the right side has a larger magnitude than on the left side sensor. The front motor will rotate clockwise and move until magnitude of both side is the same vice versa. Another situation, in the turning movements, the sensors on both sides of the vehicle will check the magnitude they sensed, if one of the sensors sensed a magnitude over 2000, it results in turning to the side which magnitude is over 2000cm and start turning when the front sensor detects a 20 cm distance. For example, the vehicle moving a long and sensed that the sensor on the right-side result in magnitude over 2000 cm, the front motor(servomotor) control the direction of the vehicle, will rotate clockwise with 90degree with direction 0 when the front sensor sensed a 20 cm distance between the front wall. And keep turning for 2s. The sensors on both sides of the vehicle will start turning back to the equilibrium again. In the turning movement the husky lens will be still functioning and check whether sensed the traffic lights, if this situation happens, the code for turning movement will stop and run the code for turning when facing traffic light.

For husky lens, it is for the use of recognizing the traffic lights with the two distinct color, red and green. It is an AI which recognizes the color traffic light the vehicle faced, trained by recognizing 1000 photos of red and green color blocks. Hence, in a result of exactly accurate traffic lights recognizing. When the husky lens sees a block, it will recognize the color of the block, and undergo different function. For example, turning to the left when seeing a red traffic light vice versa. It will start turning when the front ultrasonic sensor sensed a distance with the traffic light it saw equal or within 10cm. For another case, showed in the part of sensors, in the turning movement, during the turning if the husky lens sees a traffic light, it will stop the function turning for 2s but undergo the function of recognizing the color of the traffic light and turning to the correct direction when the front sensor sensed a distance between the traffic light and the vehicle in or within 10cm. For example, the vehicle is ready to make a turn as the sensor on the right-side sensed a over 2000cm distance, it rotates clockwise with 90 degree with the servomotor direction of 0 (front motor). During the turning movement, the husky lens sees the traffic light with red color, it stops undergoing keep turning for 2s but servomotor rotate anti-clockwise for 90 degrees, direction of 180. And after passing through the red traffic light, the both sides sensors of the vehicle will check the value again and back to the equilibrium.

For conclusion, our vehicle operates with the ultrasonic sensors, husky lens, and the motors which all the devices cooperate and ensure the car to move smoothly and stable to travel between the traffic lights by its own judgment, an auto-driving AI vehicle.