

Lab Report

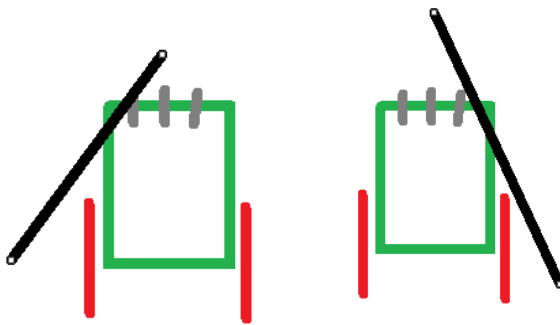
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In this experiment, we attempt to solve a robot problem. Our goal is to have the robot run under a specific environment without failing the task. Most of the time, my robot can finish the task perfectly. However, as of currently my solution still has some issues caused by hardware.

My robot has three sensors in front of it. This sensor can detect color. The robot detects white when the number of the detected sensor value is less than 100. Similarly, it will notice black, when the number of the value is higher than 500. In my solution I take advantage of this feature as it is used to detect my “map” edge. My map is made of four whiteboards and some back lines created using black tape. Note that I am using the whiteboards instead of my room floor as I wanted to increase the contrast between the white and black colors. Doing this will aid in counteracting any ‘noise’ caused by my dark flooring.

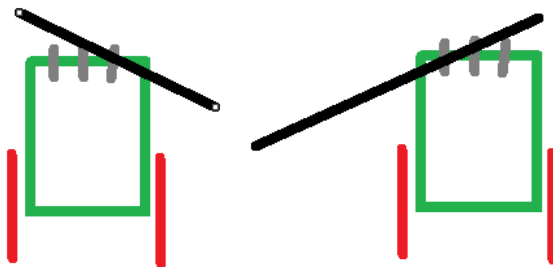
Let's introduce my **algorithm**.

When the left sensor detects a blackline, the robot will move backward a bit and turn **less than 30 degrees towards the right**. (Assuming the edge is on the left side of the robot.)



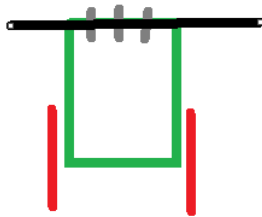
When the right sensor detects a blackline, the robot should move backward a bit and turn **less than 30 degrees towards the left**. (Assuming the edge is on the right side of the robot.)

When the right and middle sensor detects a blackline, the robot will move backward a bit and turn 180 degrees towards the left. (Assuming the edge is the robot's right side, and there is an end road in front of the robot.)



When the left and the middle sensor detect a blackline, the robot should move backward a bit and **turn 180 degrees towards the right**. (Assuming the edge is the robot's left side, and there is an end road in front of the robot)

When the left, right and middle sensor detects a blackline, the robot should move backward a bit and **turn 180 degrees towards the right**.



Although my robot successfully passes the majority of the cases it still has a problem; the robot wheel crosses over the black line from the figure below. Under a unique angle, the robot moves forward, and the sensor does not detect the black line. This causes the wheel at the back to cross over the black line. The reason is the front of the three sensors can't account for the wheel location. When the back wheels cross over the edge, the sensor will not realize it.



To solve this **problem**, we can increase the number of sensors. The gray lines represent the sensors, specifically light detectors. Note we can have two extra sensors next to the robot's wheels (as indicated in the figure below). This will help the robot know where its wheel is located. When left/right wheel sensors detect the black line, we should move backward and turn right/left to avoid that edge.

