Group 2: Alex Medellin and Nick Rummel

CSC463

Dr. Girard

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**Maze Sensor Fusion Lab**

1. No significant changes were made to our robot design. The only difference between this design and our previous designs was the way we mounted the sensors. For this robot we ended up using two IR sensors and two photo sensors. All sensors were mounted on the front of the robot to the left and right sides of the robot. This gave us an IR and photo value for the the left and right side of the robot.
2. The only disadvantage to this design is that our robot can not sense how close a wall is to either side of it. Since all sensors are facing forward from the front of the robot it is possible that our robot will hit a wall, turn and then, if it hits the wall at the correct angle, will begin move parallel with the wall without moving away because the sensors are not facing to the right or left of the robot. Therefore there is no way for the robot to sense how close it is to the wall on either side of it.
3. The reflective-opto sensors were used to determine if the robot was approaching a wall. When the wall was detected, the robot would determine which reflective-opto sensor was closer to the wall and turn in that direction. This technique worked initially in the maze, but as it approached the light, the IR emitted from the lamp distorted the “actual” IR values. By mounting a photo sensor on top of each IR sensor, we created “true” values for the reflective-opto sensors. As more light is detected by either sensor, a larger percentage of the light is calculated and added it to the IR values. Essentially, the robot is calculating an estimate of what the reflective-opto sensor values should be without the IR interference from the lamp.
4. A ultrasonic sensor could be used with reflective-opto sensors. Similar to this lab, the reflective-opto sensors would determine whether the robot was approaching a wall. The ultrasonic sensor could determine whether or not the robot was navigating towards the end based on the volume level of the sound. As the robot would get closer to the maze’s exit point, the volume would get louder. The robot would also know if it detects that the volume has significantly decreased, it was heading in the wrong direction. The sensor fusion would allow the robot to navigate out of the maze without having to guess turns as much.