GEAR/TCEA Robotics

Challenge 4: Eyes of the Robot

Challenge 4.1: Color/Light Sensor

THE OBJECT:

For this part of Challenge 4, teams will add a color sensor (or light sensor) to the front of the robot. Install the sensor so it is pointing down to the floor with just a few millimeters between it and the floor surface. Wire the color sensor (or light sensor) to one of the sensor ports (1-4).

NOTE: Teams using the EV3 building kits and software will use the **COLOR** sensor for this challenge while teams using the NXT building kits and software will use the **LIGHT** sensor. The **EV3 COLOR** sensor can detect variances of up to seven colors as well as numerical values of reflected light. The **NXT LIGHT** sensor can only detect changes in values of reflected light. Either way, teams will be able to program their robots to detect changes in the color/light values of the floor surfaces that their robots travel on.

CHALLENGE TASKS:

1. On the brick, choose "Port View", select the port to which you connected the color sensor, and then select "Live Readout". Using the Halliburton mat, measure the reflected light intensity that the color sensor reports on 5 different white spots and on 5 different black spots. Write down the values and determine a threshold such that all measurements made on white surface are above the threshold and all measurements made on black lines are below the threshold.

2. Repeat the above task using different lighting conditions (open blinds, switch lights on/off). Is there a threshold that would work for all lighting conditions tested?

3. Program your robot such that it moves forward on the white surface of the Go Halliburton mat and stops at the next black line. Test your program starting the robot from various positions and facing in different directions.

Tape a closed line (square, circle, irregular shape) on white surface (bright tiles) using black electric tape. Your robot is supposed to stay inside the boundaries given by the black tape. Alternatively, you can place a large piece of white cardboard on a dark surface. In this case, the robot is not supposed to leave the white cardboard area.

4. Program your robot such that it moves forward slowly until it reaches the black tape and then stops. Test your program.

5. Expand your program to where your robot backs up and turns after stopping.

6. Add a loop to where the robot performs the following actions perpetually: move forward until black line, stop, backup, turn, and stop. Test your program.

7. Increase power levels in your program. Up to what power level does the robot stay inside the area bounded by the black tape?

Extra Credit Assignment: Program your robot such that it moves around on a table and does not fall off. Be ready to catch your robot in case your program does not work correctly.