Light Seeking and Obstacle Avoidance Lab

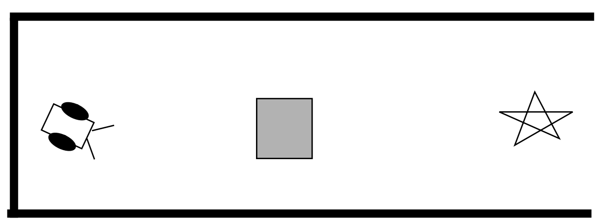
Checkpoint: Your lab section the week of March 3th, 1999
Due: Your lab section the week of March 10th, 1999

In this assignment, you will be building a robot that seeks light (going toward the light and stopping in front of it) and also avoids obstacles on its way toward the light. Use the microswitches to make whiskers, long bump switches, short bump switches, etc. We have a limited supply of infra-red sensors. If you want to use them, please contact a TA as soon as possible, and we can try to outfit you with a pair of them. We can also get you more bump switches, if you decide you want them. Beware, however, that as the number of sensors increases, so does the complexity of planning and accurately predicting the behavior of your robot.

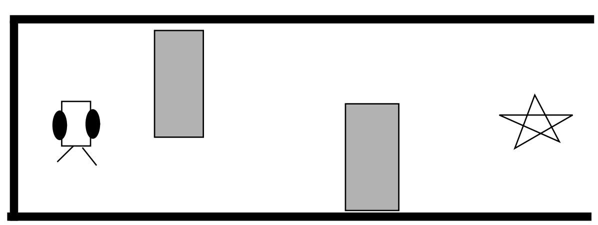
Your robot will be tested in a hallway with obstacles in a series of progressively more difficult configurations. They will be either in the fourth floor atrium in a cardboard "hallway" or in a real hallway on the fourth floor. The light will be a light of your choosing, and the obstacles will be bricks covered with white paper. The configurations will be approximately as follows:

Test 1:

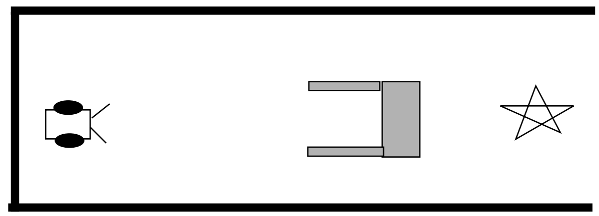
Test 2:



Test 3:



Test 4:



Notes

i) The starting orientation of your robot is arbitrary; it may not be directly facing the light but it will be within the range -90 to 90 degrees from the direction of the light.

ii) The diagrams shown are approximate drawings; the actual arena will be similar. Lights, bricks, “hallways”, etc. are available in the Lego Lab for testing purposes. Please do not “check them out” of the lab. Use them, and return them immediately when you are done.

Your individual grade will be based on the overall functionality of your group’s robot and on your individual lab report. Your robot should be able to pass tests 1, 2, and 3 above but test 4 is extra credit. Speed (within reason) is not an issue.

The Checkpoint

The checkpoint for this lab will be in your lab section. By that time, all of the sensors you plan to use should be built, in place, and well-braced on your robot, and your obstacle avoidance-light seeking strategy should be roughly coded in Rex. You should use the checkpoint both as a milestone to work toward and as an opportunity for your group to bounce ideas off of other groups and to learn from their experiences.

What to hand in?

Your group will demo your robot during your lab section. Please bring your robot with your program in place on your robot to lab. Also, please bring a hard copy of the code you used, along with where it can be found if we need to access it electronically. You need only hand in one set of code per group.

However, you should write your own lab report which includes any information you think necessary for someone to reproduce your work. Among other things, it should include a description of the expected behavior of your robot and its resulting actions in each of the four configurations. Here are some sample questions to consider: What is your strategy for avoiding walls? For detecting and going around obstacles? How do you use the sensors to detect conditions in the world? How did you integrate obstacle avoidance behavior into your light seeking behavior? What conditions in the world would cause your scheme to fail? Hand in your lab report at the contest, and be sure to include any changes you made since the first demo.

The Contest

It is not necessary to participate in the grand CS148 Light Seeking-Obstacle Avoidance Contest, date to be announced, but we will be awarding extra credit points, fame, and prizes.