CS 491/691X – Topics: Introduction to Robotics
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Lab 6 – Handout

Line Following Contest

In this lab you will write a program that uses reflective sensors on your robot to follow a line on the floor. You will use the pad in your Lego Kit, which has a black line contour on a white background. During this lab you will develop and test the programs mentioned below, the actual contest will take place at the beginning of the next lab meeting.

References and general instructions

a) At this lab each team is provided with two reflective sensors. For the *line following* task you should mount them on your robot toward the front, and facing downward to the floor. More information about reflective sensors (optosensors) can be found in Section 3.6: pages 118-127.

b) You can get ideas for your program from your book (pages 286-292).*

Line following program

a) Using one reflective sensor on your robot, write one program for line following using either the *thresholding with hysteresis* concept (pages 288-290) or the *sensor histories* concept (pages 291-292). How does your robot perform?

b) Mount the second optosensor on your robot, such that the robot now has information from two sensors. How can you improve the performance of your robot in line following by using this additional information? Write a program that uses both optosensors for the line following task.

For the contest you should use the program that gives you the best performance from the above two.

Contest rules

a) Your robot will start away from the line to be followed, facing it at a random angle. The robot should detect when it reaches the line, then it should start following it, continuing for at least one full turn. There is no need to detect when one full turn has been completed. We will stop the robot once it achieve the task.

b) Each time your robot goes completely off the line, you will get one negative point.

c) If you get 3 negative points during the contest, you will have to do it again until you finish the contest with less than 3 negative points.

d) The winner is the one who finishes the contest faster and with less negative points. The time has 50% of your total score (i.e. if you finish the contest the fastest, you will get 50% of the total score). The other half of the score is determined according to your negative points (i.e. you will

lose 15% with each negative point). For example if you finish the fastest with 1 negative point, your total score will be 50 + (50 - 15) = 85.

e) The gear reduction of your robot has to be 1-1. You are not allowed to use another gear train on your robot. You can only improve your speed by your program (software not hardware). For example the way you manage to follow the line affects your speed.

* For information about how to use Multitasking capabilities of IC and the Processes, refer to your book (pages 419-421).