CS 491/691X – Topics: Introduction to Robotics

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Lab 4 – Handout

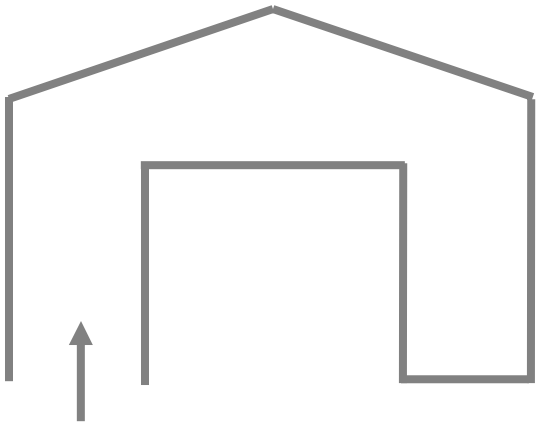
During the first 20 minutes of the lab you will have time to test and refine your "corner escape" programs. After that time we start the contest. Make sure that you have the robots ready to run, as we have only 5-6 minutes during which each team could compete with their robot.

Corner Escape Contest:

This lab will rely on the obstacle avoidance capabilities you developed in the previous lab. In the **corner escape** contest, you are supposed to write a program for your robot to go through a tunnel with a dead end and come out of it from where it started and not get stuck in it.

Contest Rules:

- In this contest, there is again no winner or loser. Every group's robot should come out of the tunnel in a reasonable amount of time.
- Your robot should back up whenever it bumps to a wall (obstacle avoidance).
- After backing up, it should turn in an angle not greater than 45 degrees.
- Your robot should make a RANDOM turn when the number of consecutive bumps in a 4 seconds range of time exceeds 4. You may adapt these values by experimenting with your robot in a "stuck" situation.
- The turning angle for the random turn should be more than 45 degrees. The upper limit of this angle is up to you.
- You should minimize the number of bumps to the opposite wall after your robot backs up from a particular wall.
- Keep in mind that the angle in which your robot will start going through the tunnel is not known to you prior to the contest. Your robot should perform satisfactorily regardless of this angle.
- Every time your robot reverses its direction in the tunnel, you will get negative points.
- The tunnel shape is like in the figure:



Programming tips:

a) Use the concept of Meta-Sensing in your program. Meta-Sensing is basically the ability of your robot to monitor its own performance and decide to solve the problem that it senses. For example, when it reaches the dead-end, it can sense it (e.g., the robot bumped more than 4 times in 2 seconds) and decide to do a random turn to get out of the trouble.

b) You can get ideas for your program from the Randomness concept (pages 87-89) and Meta-Sensing (pages 89-94).

c) Try to implement a way in your program to show when it's doing the random turn. For example you can use the LCD screen to print a message on it or use the beeper.