

ME/CS 132: Lab #1

(Due Thurs, May 16, 2013)

This lab exercise is primarily aimed at getting you ready for the final project. The conceptual goal is to have you “close the loop” between sensing and motion control in the lab robots. That is, this lab will require you to repeat the process of acquiring sensory data, minimally processing the sensory data, and then executing a small motion in response the acquired data. It is recommended that you work in groups of 2-3 students.

Wall Following: A basic operation that is important to some robotic motion planning schemes is termed “wall following.” In a wall following operation, the robot should move sequentially along a wall, maintaining a fixed “stand-off” distance between the robot and the wall. For this lab a simple straight line wall with a corner will be constructed in the lab.

Your goal is to use one of the robot’s onboard sensors (which could be a camera, or ladar, or a mounted RGB-D sensor) to find the nearby wall, determine the wall’s orientation, and then execute a small motion parallel to the wall. By repeating this procedure, the robot will crawl along the wall at a roughly fixed distance. Generally, your algorithm will follow the sequence:

- scan the robot’s nearby environment.
- find the wall, and fit a straight line through the wall’s data to determine the local wall direction.
- move a small step parallel to the wall’s direction, in a consistent direction.

To complete this homework, you must

- develop and implement on the ME/CS 132 lab robots an algorithm for wall following
- turn in your commented code
- demonstrate a motion to a class T.A.. This demonstration can be “live” or captured on video.