

Preliminary Lab and Final project information

We are approaching the end of the semester, and I want to have you do some programming on the robot in my lab. At this point, we will have just a single lab which I'd like to have you do in the week of 8–12 (though this could spill over into the following week depending on scheduling). Instead of a “prepackaged” fourth assignment, I'd like you to do a final project on a topic of your choice (with my approval).

The lab and the final project will be done in teams of two or three students. I would have insisted on two student teams except that we have an odd number of students and that there is only one robot (so scheduling may be a problem at the end of the semester).

Your assignment is to:

- form a team for the lab and final project (same team for both)
- decide on a tentative topic for the final project and write a very short project proposal, including some detail about the scope of the project, expected results, and which team member will do what

Over the next week or two, I will work with each team to develop this tentative proposal into a more detailed (and acceptable) project proposal.

You should email me this information (just once per team) to me by this Friday by noon. If you need assistance finding a team, let me know and I will play “matchmaker.”

See the “final project” section below for some suggested topics.

Lab information

The lab will consist of some exercise(s) that involve using and programming the robot. It will be designed to take approximately one hour, and your team will need to arrange a time outside of class to come to do this lab. There will probably be a few written questions for you to complete before doing the lab.

This lab will be “supervised” by a TA who will be in the lab in order to get you started, make sure you know how to use the robot properly, to answer any questions, and to verify that you have completed the lab.

Times will be available for doing the lab starting Monday April 8 though a sign up for time slots will hopefully be available earlier.

Final project information

Once you have completed the lab and have an approved final project proposal, you will be able to get into the lab and use the robot any time you can get into the building. (I will add your student ID to the access list for the card reader.) We will have to coordinate use of the robot; I hope to have some sort of online signup system in place. I also expect to have some sort of simulator available so you can test your code remotely.

Final projects should implement or apply some general techniques to particular situations or problems. In other words, I want you to formulate a reasonably general solution to a problem rather than hack something together for a specific situation.

Here are a few suggestions for final project topics:

- navigate from the lab to my office (or to other offices) using either:
 - a map and a Kalman filter to correct odometry errors, or
 - a behavior based approach

- travel down a hall (staying to one side or in the middle) while avoiding (static and dynamic) obstacles (like boxes and people) using either:
 - a hybrid approach (reactive obstacle avoidance with deliberative higher level control)
 - a behavior based approach
- topological mapping — we have been creating metric (i.e. geometric) maps so far; topological maps consist of nodes and edges between them (with some limited information stored with each node and edge)
- explore and solve a maze — you will need to address simultaneous mapping and localization