EE346 - Mobile Robot Navigation and Control

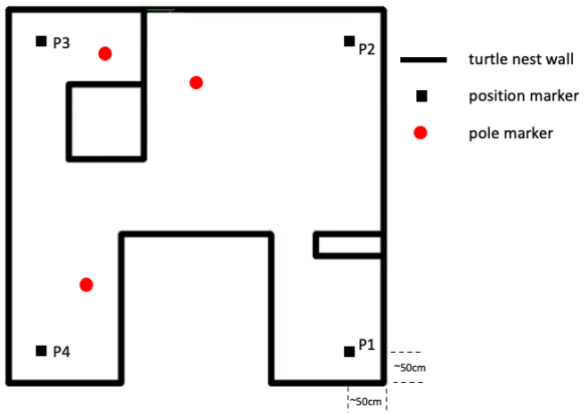
Fall 2023
Laboratory #7 (4%)
Due Date: Wednesday December 27, 2023
TurtleBot3 Task Integration (DRAFT)

Objectives:

- Integration of previous robot motion control, target homing and autonomous navigation functions of your TurtleBot3 with ROS

Details:

In this lab, you will integrate the tasks that have been built in previous two labs for the robot into a comprehensive task. Specifically, refer to the environment shown in the right figure for which you have built a map already. In addition to the static map, there are three poles placed randomly and approximately near P2, P3, and P4, shown as red circles in the figure. Their locations are not known a priori. The overall task of your robot is to visit P1, P2, P3 and P4 in turn while also visiting the three poles, as you did in Lab 4, as in front of each after it is detected. For a visit to a position marker to be successful, your robot must cover the black marker with any part of its body. For a visit to a pole to be considered successful, your robot must come to a full stop within 15cm of the pole for at least two seconds to indicate that it has parked. The complete task requires your robot to, starting from P1, visit the four location markers and three poles before coming back to P1.



When you have completed and tested your solution, demonstrate it to *the instructor* and a TA. Be prepared to answer questions regarding your implementation of the solution.

Marking:

Each successful marker (Pi) coverage is worth 10% and a pole visit 15%. (The total for this lab is 85.) If your robot did not cover a marker completely or come to within 15cm of a pole, it is a deduction of 4%. If your robot does not come to a full stop, it is a reduction of 2%. Each external manual intervention of your robot in order for it to continue its operation results in a reduction of 10%.

Submission:

Within the GitHub site (which belongs to either of the two group members), create a directory for Lab 6. Inform the TA's of the URL of your GitHub by the due date.