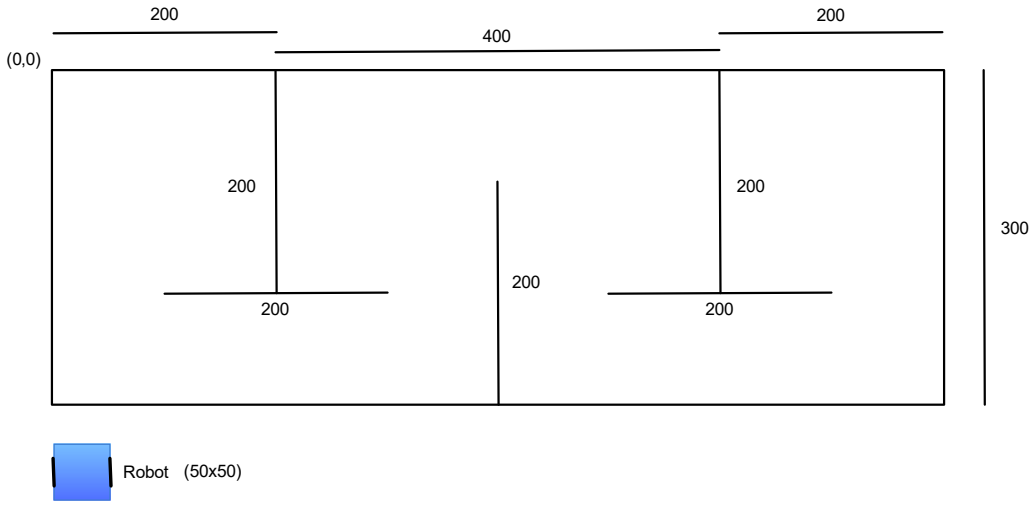
Homework 5 - CSE 276 - Math for Robotics

Due: Friday, 6 December 2024

The world model is shown in figure 1. The robot is a differential drive system with a square geometry of size 50x50.



1. Generate the configuration space for the robot with a grid size of 2x2 and 5 deg in angular resolution. Generate an illustration of what the configuration space looks like with the robot at orientations 0, 45 and 90 deg.

2. Use greedy search to find the shortest path between start-point (50,50) and end-point (750,50). Illustrate the path and provide its length.

3. Compute the safest path from start to finish (hint: medial axis transform/Voronoi). Illustrate the path and provide its length.

4. Use probabilistic roadmaps (PRM) to compute a path between startand end-points with 50, 100 and 500 sample points. What is the difference in path length? Illustrate each computed path.

5. Do the same with Rapid exploring random trees (RRT). What are themain differences in performance between PRM and RRT? Illustrate each path.