

SC 627 Assignment 2

Reference:

For quadratic potential function [Link 1](#)

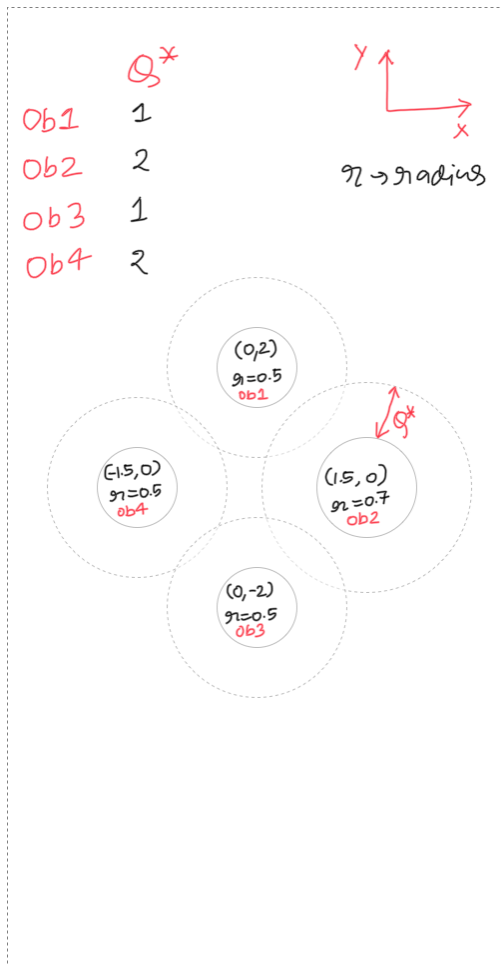
For Trapezoidal decomposition, [Link 2](#)

Problems:

1. The ROS setup is similar as assignment 1, in this assignment there are three problems that has to be attempted by each group. You can take a problem among yourself separately and compare results.
2. Problem 1: Plan a path using artificial potential field in the given world file for any start and end point.
Problem 2: Make a roadmap using Voronoi diagram in the given world and find the shortest path between start and end point.
Problem 3: Make a roadmap using vertical cell decomposition (trapezoidal decomposition) and find the shortest path between start and end point in the world.
3. There are two world files,
assignment2_voronoi_APF.world for problem 1 and 2.
assignment2_trapezoidal.world for problem 3.
4. Place the world files in world folder and launch files in launch folder of turtlebot_gazebo package.
5. When your simulation is done, we can use vicon and simpler obstacles to test it on turtlebot.

Below is the information about 2 world files:

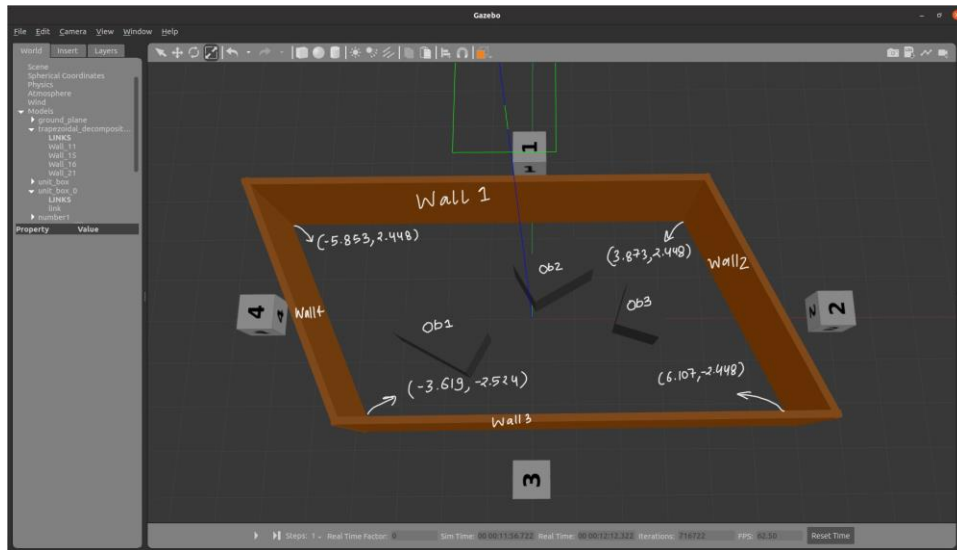
World 1:



This world has 4 obstacles(ob), all cylindrical. Here, Q^* is specified for problem 1. The same world will be used for problem 2 as well.

The dimension of the wall is 6x12 m, and is centered at origin. Thus, the (x,y) of the corners are easily found.

World 2:



This world consists of 3 obstacles, the details about dimension and pose can be found in gazebo itself.

Wall number	Start point(x,y) in m	End point(x,y) in m	Length(m)	Height(m)
Wall 1	(-5.853, 2.448)	(3.873, 2.448)	9.876	2.5
Wall 2	(3.873, 2.486)	(6.107, -2.448)	5.566	2.5
Wall 3	(6.107, -2.448)	(-3.619, -2.524)	9.876	2.5
Wall 4	(-3.619, -2.524)	(-5.853, 2.448)	5.601	2.5