SC 627
Assignment 3

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At every instant we are given the position and velocities of the obstacles. We know the position and velocity of the robot. Hence, we can construct collision cones with the instantaneous position and velocity of the robots and the obstacle. We are also given the set of reachable velocities at every instant which are dependent on the instantaneous pose of the robot.Our task is to pick velocities from this set of reachable velocities such that it is outside all the collision cones and takes a direction closest to the one towards the goal.

Since it is difficult to check such conditions for continuous variables, the set of reachable velocities have been discretized. We define a discretization factor for both the velocity and angle and derive a set of finite possible velocities {(Vx, Vy)}. We treat this as our workspace. We test each of these possible velocities with the calculated collision cones at that instant. This gives us the free space available to the robot. Over this space, we optimize to obtain the velocity direction that takes us towards the goal. For this angle between the command velocity and the direction towards the goal is minimized.

The iterations are run till the distance between the goal and the robot is below a given threshold value.

Error in the code: The code is successfully avoiding all the obstacles but at the end, the bot has a positive angular velocity and is deviating from the goal location.

Simulation Results: