SC627 Assignment 3

Motion Planning in Dynamic Environments using Velocity Obstacles

The objective of this assignment was to avoid dynamic obstacles using the velocity obstacles method. A heuristic-based approach is used to solve this problem. Based on the robot position, we will generate a collision cone, generate the feasible points, choose whether the next step is possible or not, and then move towards the goal by choosing that sample point.

I have defined a collision avoidance function that will help in moving the object towards the goal by taking an optimum step based on the obstacles and vehicle constraints. The optimum step function will find the best point which can take the robot towards the goal from the feasible next points. The feasible next step function will check the collision condition from all the points that were feasible from the vehicle constraints. The vehicle constraint includes the maximum velocity and maximum angular velocity of the bot. The collision cone function will generate the apex angles of the cones. We will sample the points that are within this collision cone.

In goal condition, we will just check whether we are in the vicinity of the goal. If the robot is within 0.3 distance from the goal position, then the code will terminate and we will flag that robot is able to reach the goal position.

According to my logic, the robot must be able to reach the goal location but sometimes it touches the last static bot while passing it. I tried tuning the gain_ang parameter in the velocity convert function. If i keep the gain_ang value high then the robot rotates fastly and takes a large amount of time to reach the goal location. I have chosen a value of 5 for it which helps it to reach to the destination.

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