Obstacle avoidance: Potential Fields

Approach:

1. From initial position, find degrees to turn from given X and Y coordinates. This is defined by the use of arctan(y/x) = theta.

2. Begin driving robot forward. The robot will, more than likely, sense an object in it's path.

3. Move around the object, as the obstacle is absolutely repulsive to the robot. The direction is some arbitrary angle decided by me and the magnitude it travels is dependent on (D-d)/D; once it has traveled far enough, turn back to the destination and drive straight.

    1. If the target is reached, then stop.

    2. If another object is reached, repeat.

4. When calculating repulsive fields, also calculate attractive ones so there is (somewhat) coherent movement from the robot. This is found by summing the vectors.

Goal2 could not be met. I suspect this to be due to the conflicting forces acting on the robot from the object and the goal. Because the object is directly below the robot, in-line with the goal2 position, it imposes the robot to move up and down. Once it reaches the upper limit of the boundary, the robot gets stuck.

Goal1 was met perfectly. Sometimes, noise will result in the robot hitting an obstacle. During most runs, this does not happen.