

System Design Project: Milestone 4

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1 Introduction :

I have been working on the Planning and Strategy of the robot. This involved me completing my work on A* and troubleshooting: to re-do the current A* so that it was no longer working on binary costs.

2 Methodology :

Our previous A* path finding algorithm had only binary obstacles, either a node (square) was or was not an obstacle. This presented problems as it meant that if the ball appeared inside an obstacle, or even our robot, then the A* would fail. The ball could appear inside an obstacle due to the fact that our visual system presents us with the centroid of the robot, therefore there is an area around this centroid that is in real terms a robot. To take this into account, all areas that could be considered an obstacle need to be expanded to take in the size of our own robot. We also present the ball as an obstacle to prevent our robot from driving into it, when it is trying to get to the best angle. The costing is done by including an extra cost per node, to the G and H already used in A*. This new obstacle cost is weaker for a ball obstacle, and very strong for the opposition robot's center. The costing then 'fades' in cost as it goes outwards. The G cost, which is the cost to drive from node to node from the start has to given less weighting in order to allow the obstacle cost to be used, this is due to the fact that the A* algorithm will try all options and then just give the straightest line to the ball.

3 Conclusion :

After some thorough testing the new A* out performs the old A* as it does not cause exceptions, when the ball is found near the opposition or the wall.