Introduction to Robotics - Final Project Proposal

Final Project

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1 Introduction:

The following sub-sections list our goals and proposed approach. We have also written some lines with regard to the difficulties that we might face during the execution of our project in brief.

2 Team Members:

(i) Aditya Jayant Ganapathiraju.

(ii) Saptarshi Sadhu.

(iii) Dheeraj Bhurewar.

3 Goal:

Our goal is to match the performance, and implementation difficulty of our opponents and possibly come up with a solution that is the most optimal amongst all the participating teams. In order to achieve this, we'd assume that our opponents will target scoring the maximum number of points, i.e they would try to pick-up as many dynamic blocks as possible and at the same time look for blocks that are more elevated from the ground level than others. We will make sure that our implementation will take into account these factors so that our robot is competitive when pegged against our opponents.

4 Approach:

We will attempt to make two to three stacks of 2-3 blocks each. First, we will move the arm over the dynamic and stationary blocks and once we have the camera input for a block position, our plan is to solve for IK to reach and grab the blocks and obtain the joint angles necessary to grab it and then solve FK equations to shift the block to the designated location determined by our goal strategy. The position of each block that is placed will be logged and the next target position will be set accordingly.

5 Difficulties and Challenges:

One of the challenges is having the robot perceive the static and dynamic blocks, and creating a trajectory to intercept the block. Time is also a important factor here as if two teams have the same points, then the team with the lesser stacking time. Hence an algorithm with the cleanest and fastest possible path will have an edge. Block orientation is also important, as altitude (height if the stacked blocks) is a vital for victory. A block must be carefully placed atop another block, any weird angles or orientations will result in the tower of blocks falling apart. The speed of the rotating table is also an important factor so is the camera's field of vision; our computations must account for sensor errors and be fast enough to catch up to the the dynamic blocks.