P2 Cyan Team Winter 2020 Resource Document

Modern Robotics Playlist
https://www.youtube.com/playlist?list=PLggLP4f-rq02vX0OQQ5vrCxbJrzamYDfx
This playlist provides a good overview of how to conduct rigid body transformations for robots and other important concepts such as serial manipulators, degrees of freedom of a rigid body and rotation matrices. These concepts will be important to understand as we design our robot simulation and we will use some of these mathematical tools to orient our robot arm and construct our robot's autonomous plans.

Six Degrees of freedom
https://en.wikipedia.org/wiki/Six_degrees_of_freedom
We used this to understand the different six degrees of freedom and to learn the proper naming convention for the three directions of rotational motion: yaw, pitch and roll. This terminology and understanding degrees of freedom is important as we communicate ideas to each other and to define the motion of our robot joints.

Forward Transformation Matrices
https://studywolf.wordpress.com/2013/08/21/robot-control-forward-transformation-matrices/
This is an article on forward transformation matrices which are used to characterize the position of a robot's components or links with respect to its origin or world frame. This is important as we have multiple arm segments and joints that rotate in different directions, and we need a uniform way to define their positions and movements so we can adjust the robot arms in a desired way to position our end effector.

Past Projects

Project 2 Design Typologies
https://wiki2.eecs.umich.edu/hrb/index.php/Project_Base#Project_2-_Design_Typologies
This shows the typical designs that teams have used in the past for project 2. We looked at this to get an idea of what the robots looked like in full physical form as we tried to determine our robot arm design.

2019 Maize P2 Final Report
https://wiki2.eecs.umich.edu/hrb/images/3/31/2019-P2-maize-final-GRADED.pd
This report had a detailed results section that showed more clearly how the robot is evaluated on its ability to draw a square. This gave us a better understanding of what P-Day could look like, what teams did last year, and what went well and didn't go well. Maize team talked about how their pen got stuck in place on the paper, and in our simulation our pen stroke will lag behind our pen position, so we'll have to address this in some way while still drawing an accurate square.

2014 P2 Robots Youtube Playlist
https://www.youtube.com/playlist?list=PLoTf3uddDG5txKW67NjThG7Vp98N5Epjg

We looked at this for some inspiration and to see the various ways these robots accomplished the task of drawing a square. This gave us a better sense of what this robot that we are simulating might look like and how it would behave in real life.