CMPUT 412

Assignment 2

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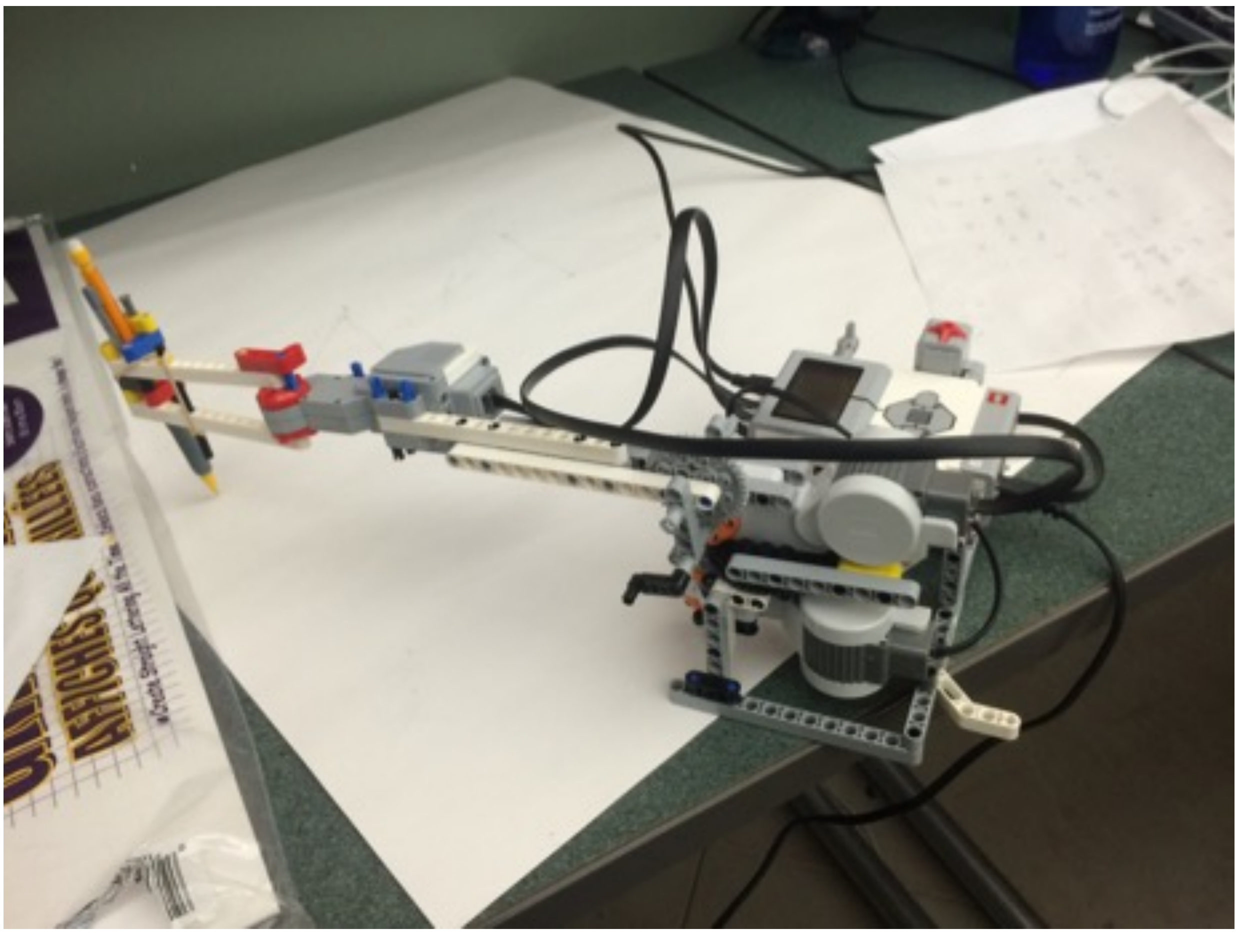
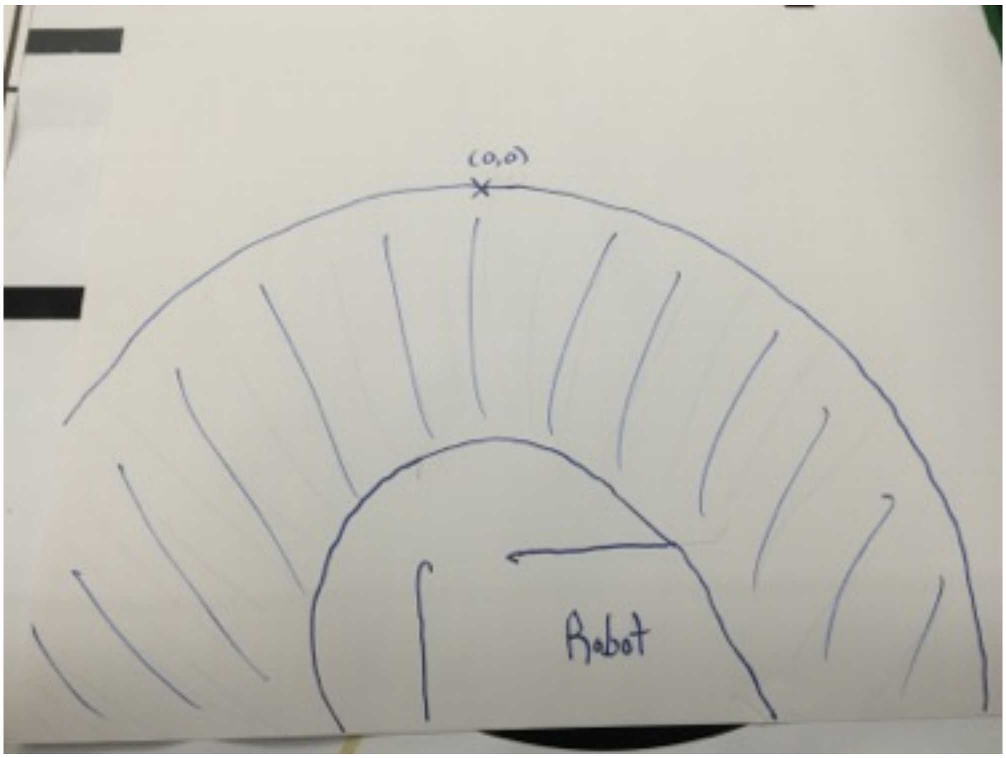
1. Robot Design:

Our robot's design was largely from a design that was listed in the assignment page. We chose it because it had a heavy base and tried to accomplish both 2 and 3 DOF in one design. (As you will see in #12, this design did not work for 3DOF for us, since the mid joint revealed around the y axis and complexed the math for the third joint motor.) The pencil could be added to the end effector by an elastic and a couple lego pieces. Since the base was so heavy and the arm was reasonably short, the end effector was not overly strained by the addition of the pencil. Most of our programs for this robot implement a reset feature that returned the arm to it's fully extended arm position on the x axis at coordinate (0,0).



2. Work Space:



(0,0) is marked with an X. Implying the lower left is positive y and negative x, the lower right is negative y and negative x.

5. Video showing the working angles function:
http://youtu.be/AbCeRGQSZUU

11. These are the Denavit Hartenberg Parameters for our robot above:

i	alpha	a	d	theta
0	0	0	0	theta0
1	-90 deg	24mm	95mm	theta1
2	90 deg	200mm	8mm	theta2
3	0	112mm	0	0

12. We built another arm to complete the 3DOF Inverse Kinematics requirement analytically. You will see in the code that Newton's Method was used in one of the two solutions we have for 2DOF inverse kinematics. Here is a video of the 3DOF analytical solution for the coordinates (z,y,x) (80mm, -100mm, -100mm) from its starting location at the end effector (0,0,0): http://youtu.be/xaWHacfdOws