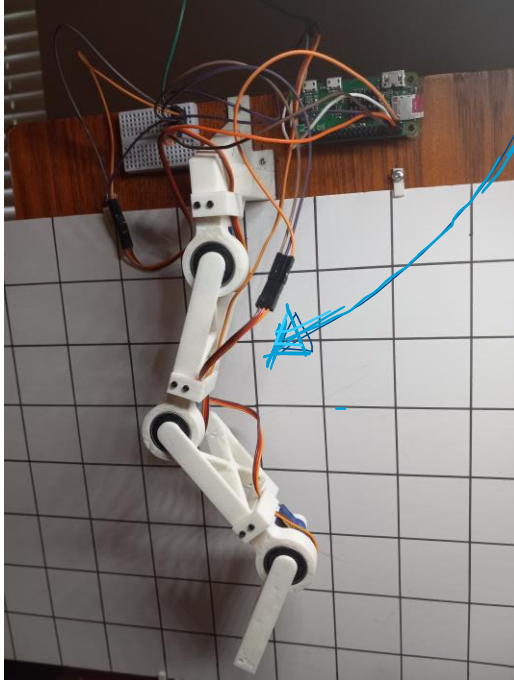# KIRA robotic arm project summary

Why?

- My aspiration of becoming a great roboticist entails my mastery of many of the concepts, programming languages, software, and hardware used in the field of robotics.

- Concepts I wanted to learn from working on this project:

    - Kinematics (Forward and Inverse)

- Software and programming language skills I wanted to further develop while working on this project:

    - Autodesk Fusion 360

    - Python (Using NumPy library)

- Hardware I wanted to Utilize on this project:

    - Raspberry PI computer

    - 3D printer

ADDITIVE MANUFACTURING = COOL!
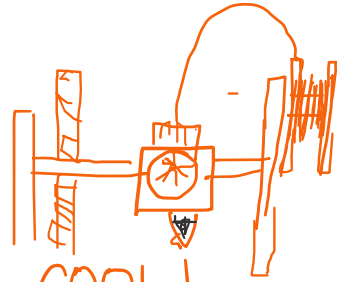
What?

- I chose to design, assemble and program a robotic arm in order to develop myself towards mastery in the aforementioned concepts, programming languages, software, and hardware.

- My plan was to build a robotic arm with 3-rotary axes that could move its tip or end-effector to a specified coordinate (Inverse kinematics) and that could calculate its tip's/end-effector's position when the joints are set to some angle (Forward kinematics). I would design the robot in Fusion 360, print it using a 3D printer, and implement Kinematics in a Python program running on a Raspberry Pi Zero.

- I later named this robotic arm KIRA.

KInematic Robot Arm

How?

- I first set out to learn Kinematics using a couple of online tools: YouTube and Alison. I then learned how to use the NumPy library in Python.

- Once I had gathered the necessary knowledge, I brainstormed and later settled on a design for KIRA. The design I chose was that of a modular arm with each module being composed of a joint and a link. I then designed the robot in 3D using Fusion 360.

- I used my 3D printer to print the parts of the robot that I designed in Fusion 360 and assembled the arm.

- Once the robot was assembled, I wrote my own Forward and Inverse Kinematics algorithms in a Python script that used the NumPy library (along with some other needed libraries). I then transferred the script onto the Raspberry Pi Zero.

What I accomplished.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- Learned about Kinematics, and how to use the NumPy library.

- Operated a Raspberry Pi computer.

- Used the concept of vector dot product from my Calculus III class in developing my inverse kinematics algorithm.

- Designed, assembled, and programmed a functional robotic arm with the ability to demonstrate forward and inverse kinematics.

Conclusion.

- From working on this project, I gained a solid understanding of Kinematics, I sharpened my skills in CAD and Python, I exposed myself to new hardware, and had a ton of fun - I worked toward my goal of becoming a renowned roboticist.

ALL IN ALL