MMR GOPHER Bin Design

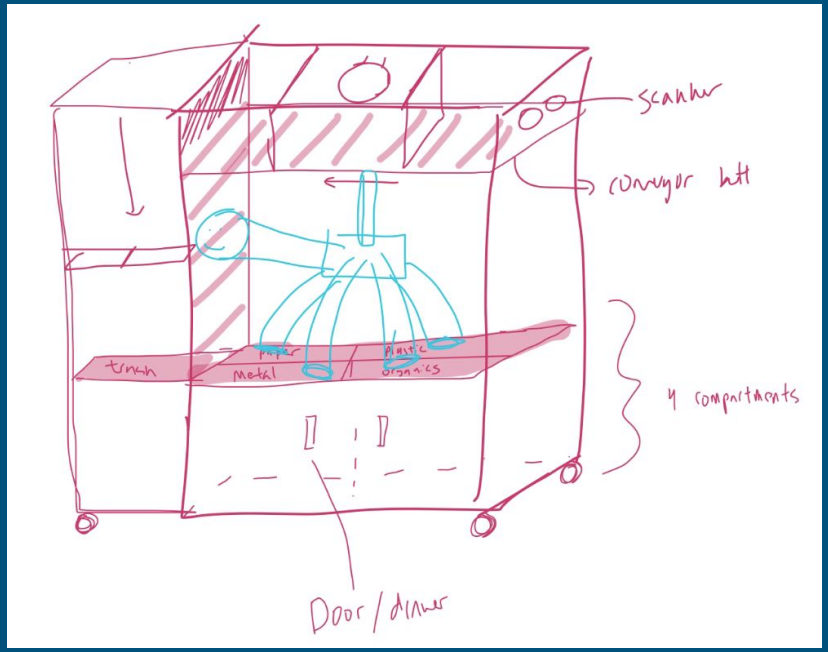
Shawn, Sydney, Dominick, Joseph, Kylie, Ryota

The Goal

- MMR was tasked with designing and building a system that could be paired with software team's design
- We decided a conveyor belt system would be best suited to sorting items placed in the gopher bin

Stage 1: Prototyping

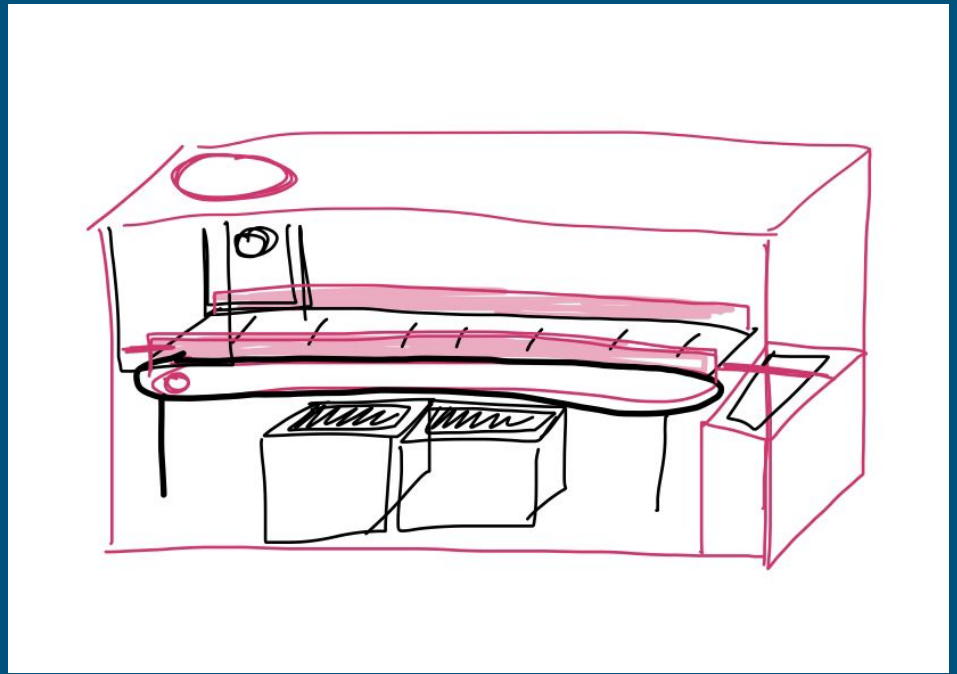
Initial Ideas



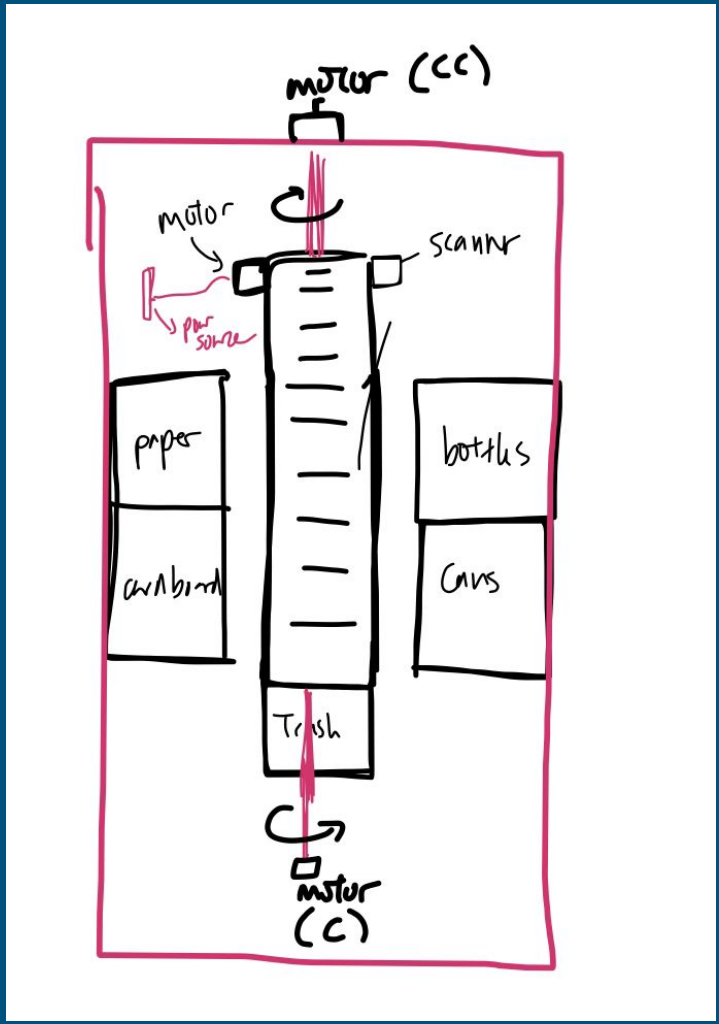
- Many of our earlier designs involved a more complex, self-contained system
- In the process of developing various prototypes, we noticed several common features, including a conveyor belt to move objects along a length and mechanical components to divert objects into their respective containers

Prototyping

- The original prototype we settle on was designed to be paired with 6 bins
- In this design, the conveyor belt system would be able to rotate left and right to deposit items

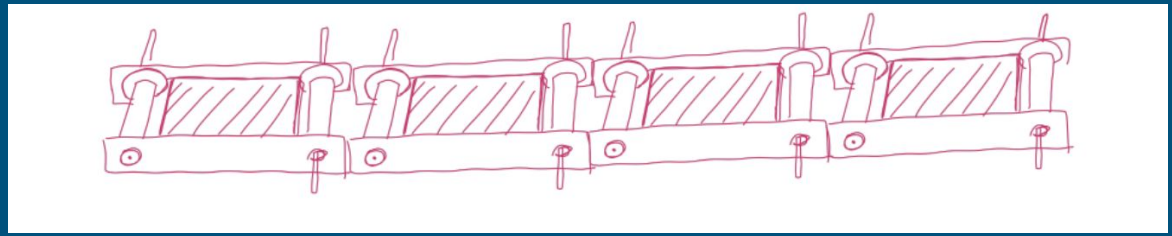


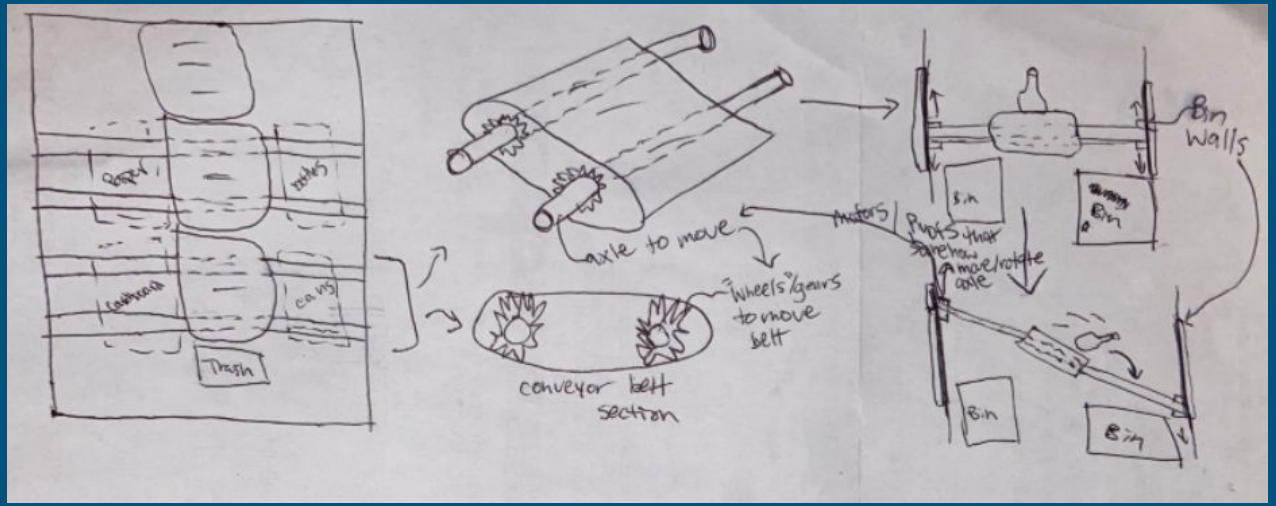
- This prototype was designed to rotate around one axis connected to motors at each end
- Due to uncertainty regarding the strength of the motors, this plan was discarded



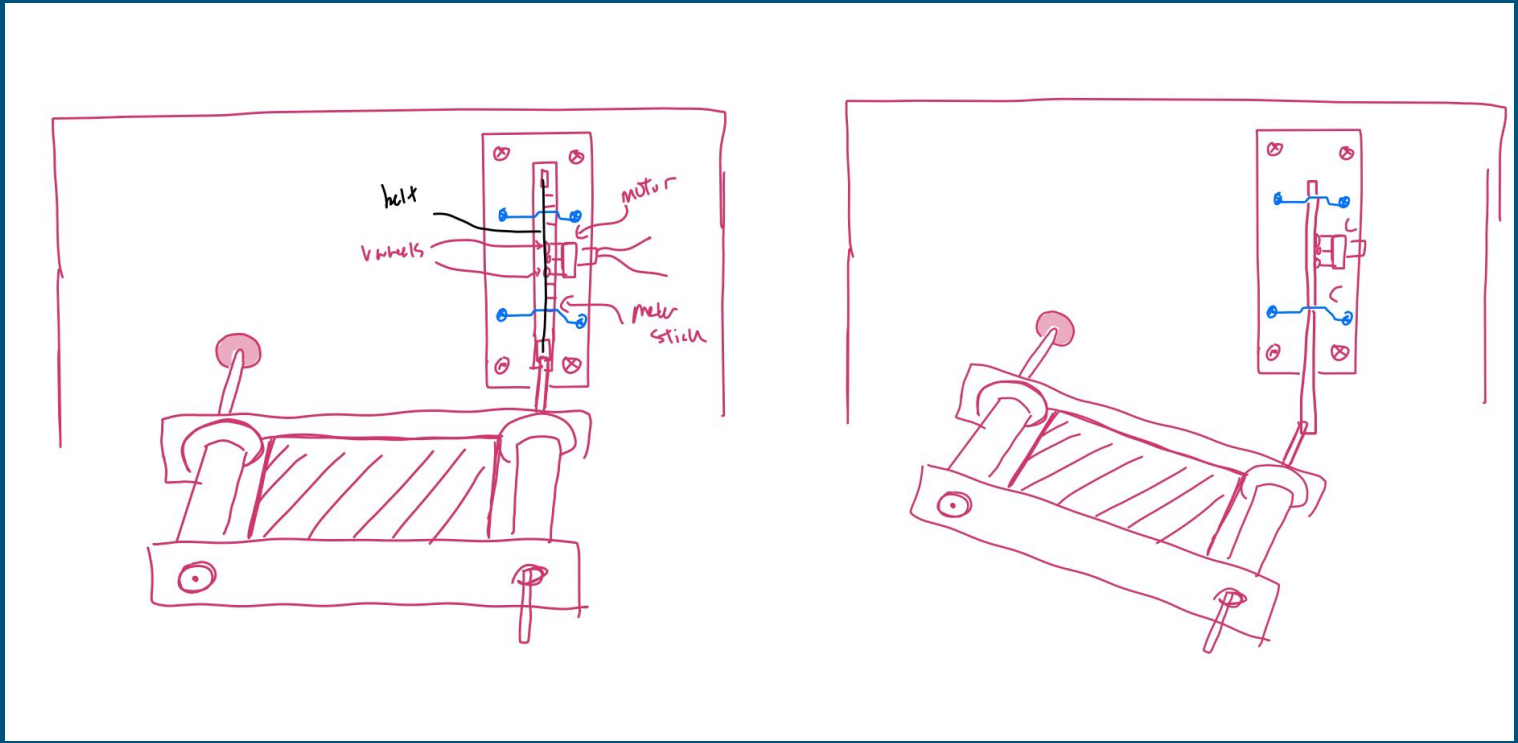
Prototype #2

- We devised a segmented approach to reduce the work needed to be done by each motor
- Each segment would be able to rotate to allow material to fall into bins below

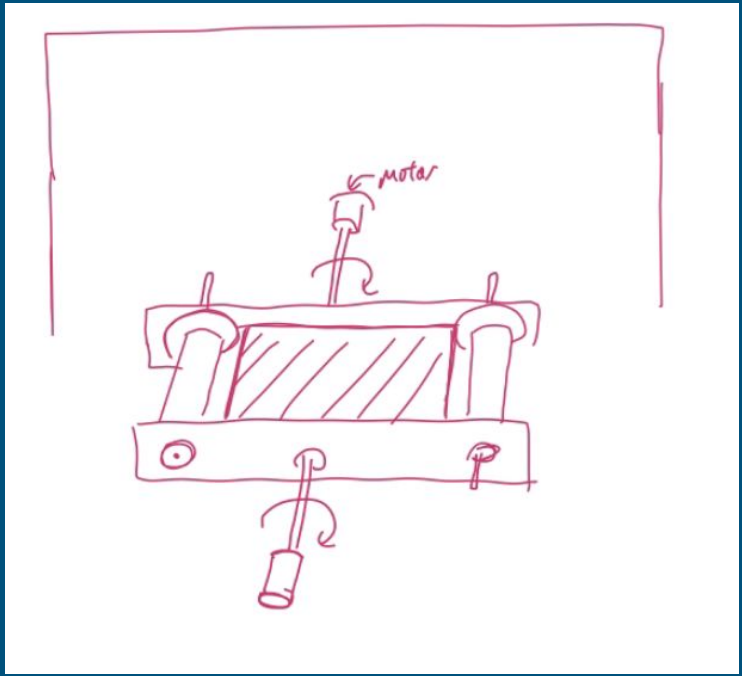


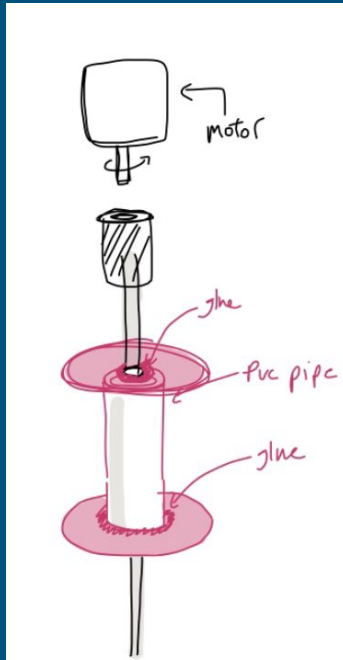


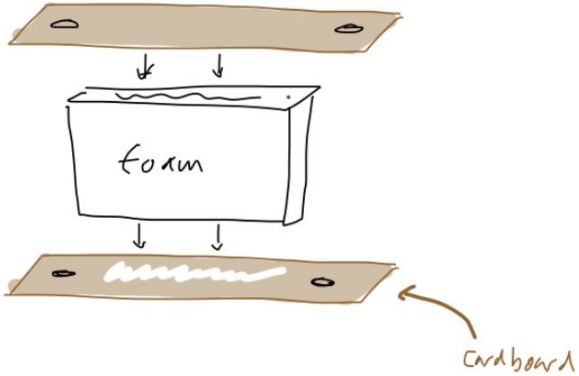
Idea 2: Mechanism 1



Idea 2: Mechanism 2

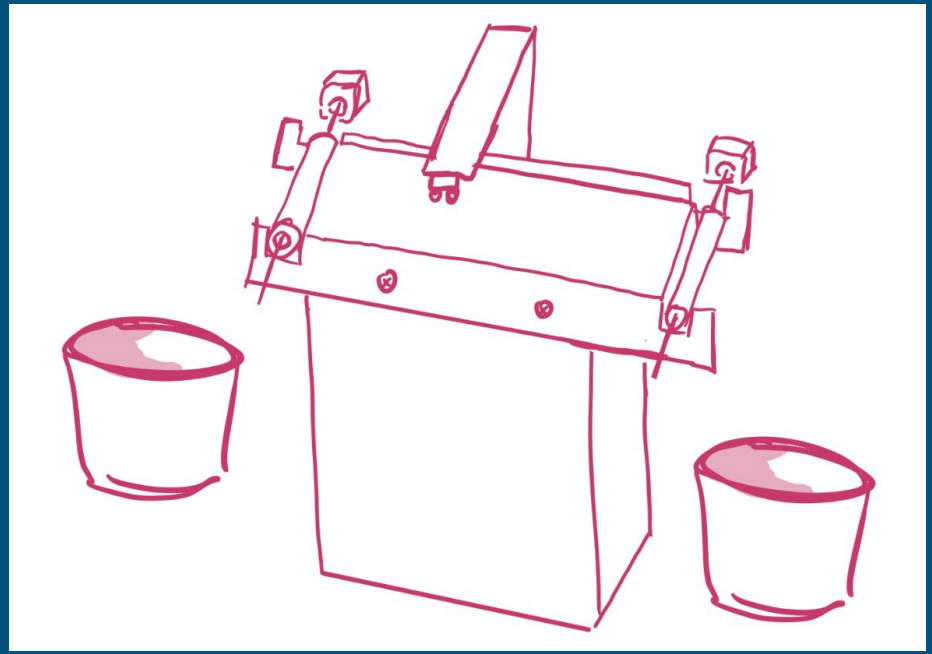






Prototype 3 - Final Design

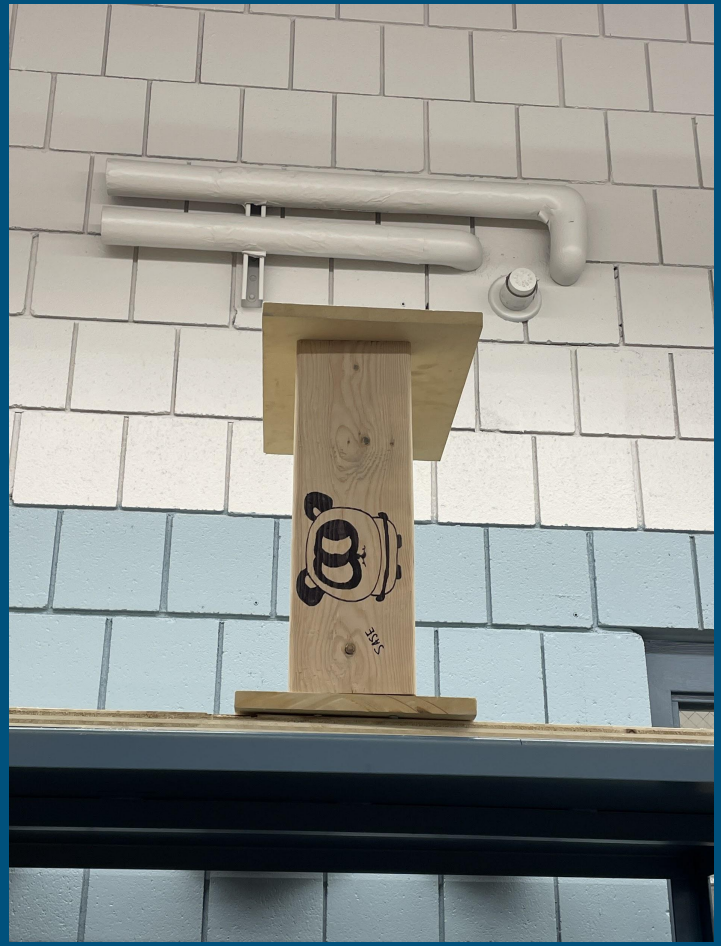
- We determined that the software was effectively sorting between two categories
- A simplified conveyor belt design using a dual motor system was devised to allow for movement in two directions



Stage 2: Base Assembly

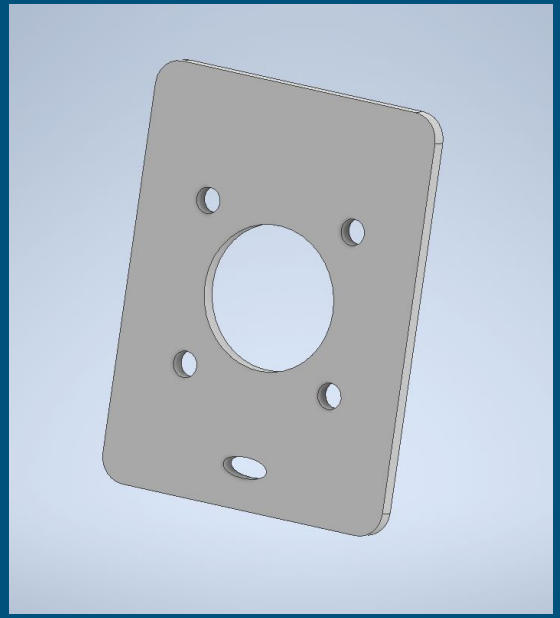
Base Design

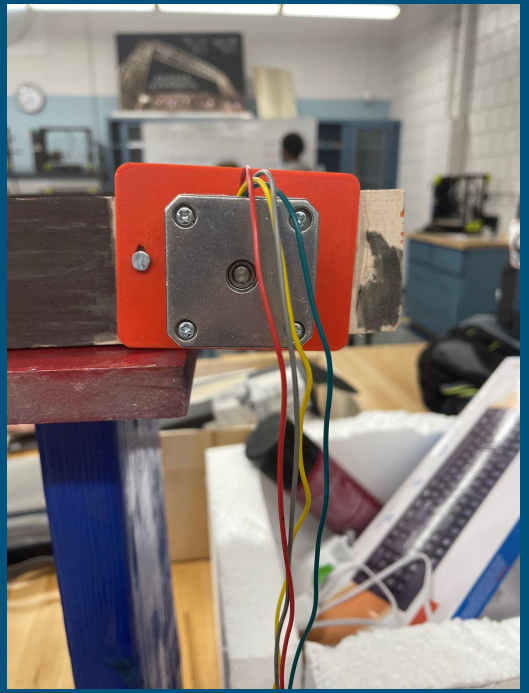
- Component essential to elevating conveyor belt
- Short table design for stability and necessary height
- Screws used to construct the base
- Top board long enough to hold conveyor
- Table height tested to ensure 3 gallon trash cans fit underneath both sides
- Panda design added to represent SASE



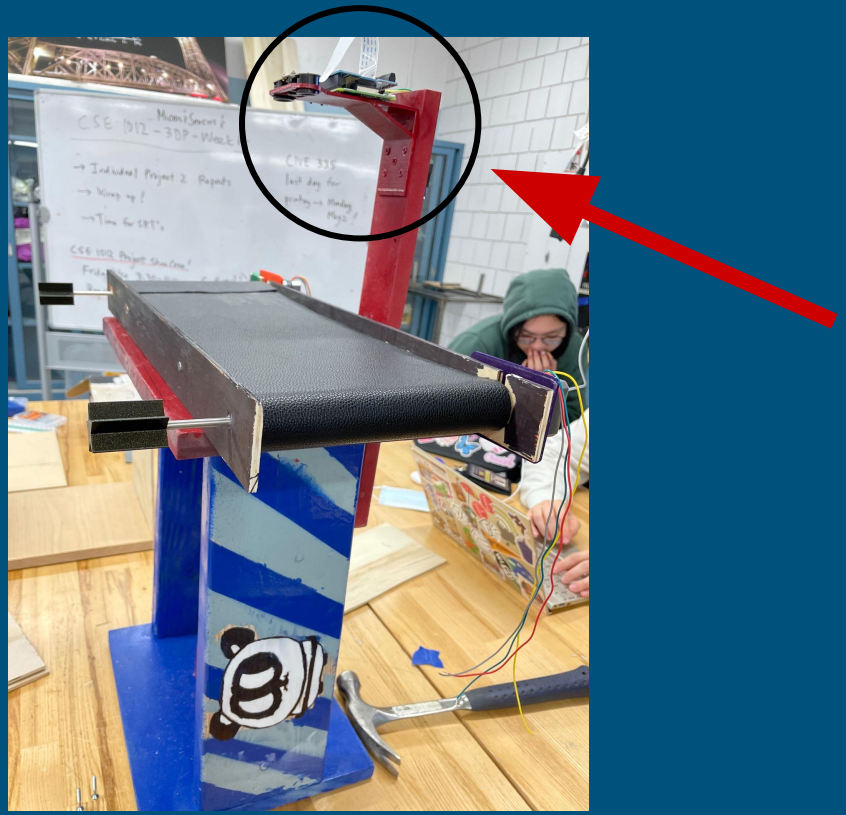
Stage 3: 3D printing

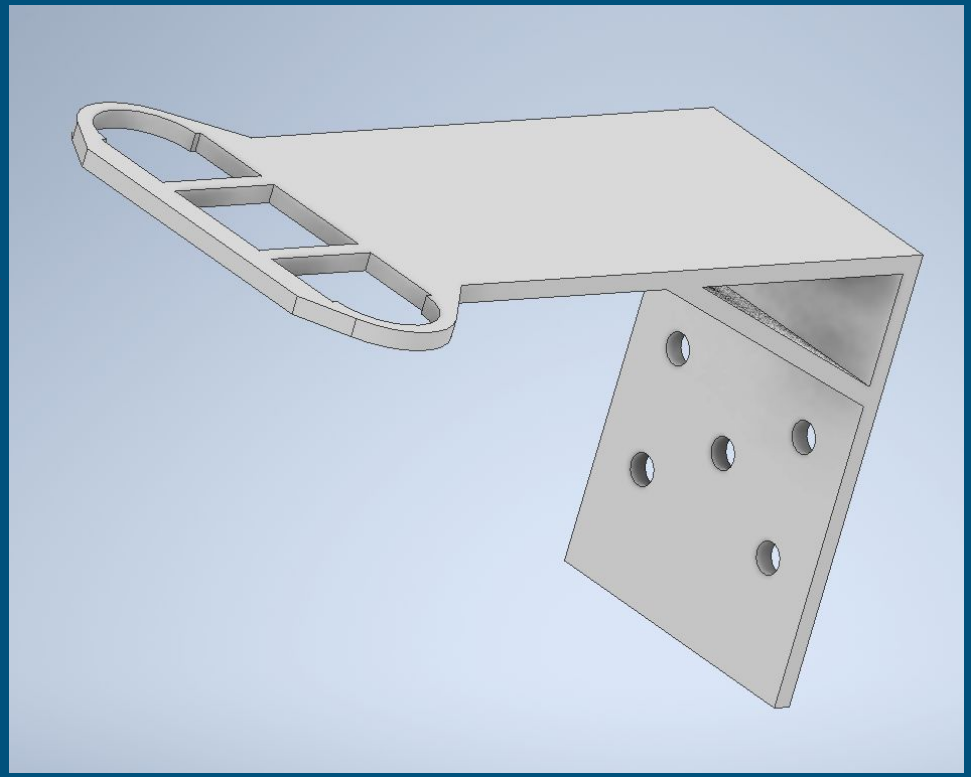
Motor mount

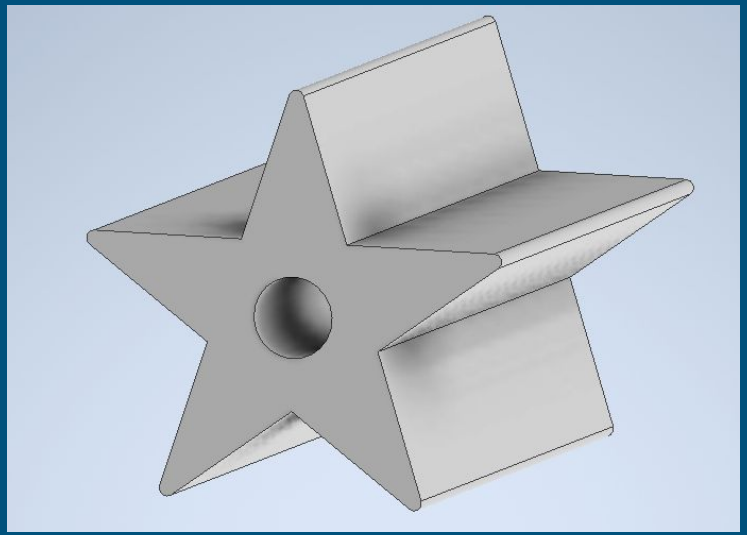




Camera mount



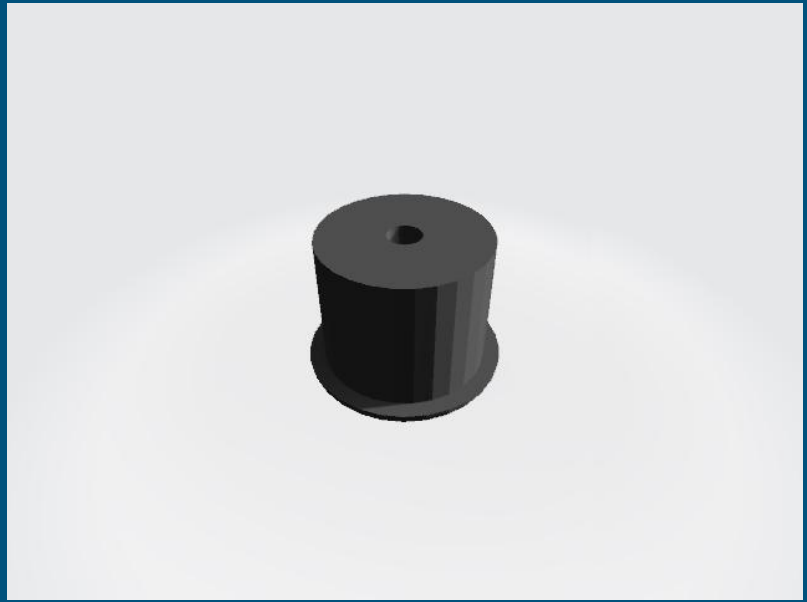




Stage 4: Belt Assembly

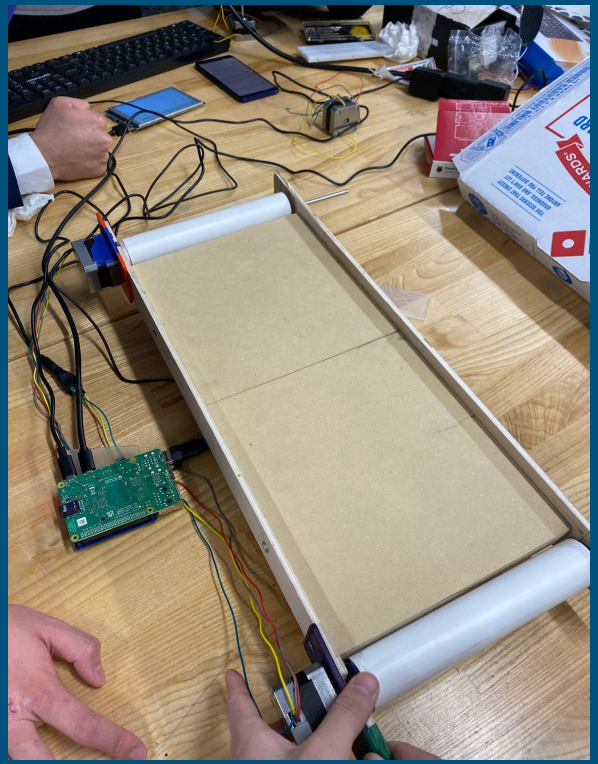
Conveyor Belt Design

- Moving system of belt constructed using PVC pipes, mushroom caps, metal axles, and programmable motors
- Longer piece of wood used as centerpiece of design so belt would have something to wrap around
- Sideboards added to either side of middle wood piece to create space between the base and moving belt
- Conveyor belt glued together with 3M spray to ensure adequate tightness around rotating axles for efficiency of movement

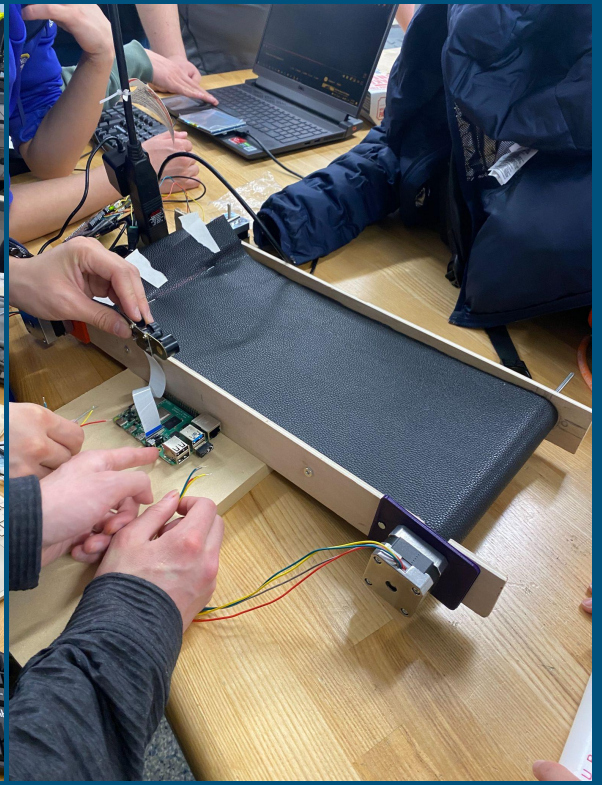


Assembly process of the final model

- Our assembly process began directly after finalizing our simplified design and confirming specifications with the software team
- We prioritized functionality of the motor belt through frequent testing



Belt mechanism testing



MMR Team