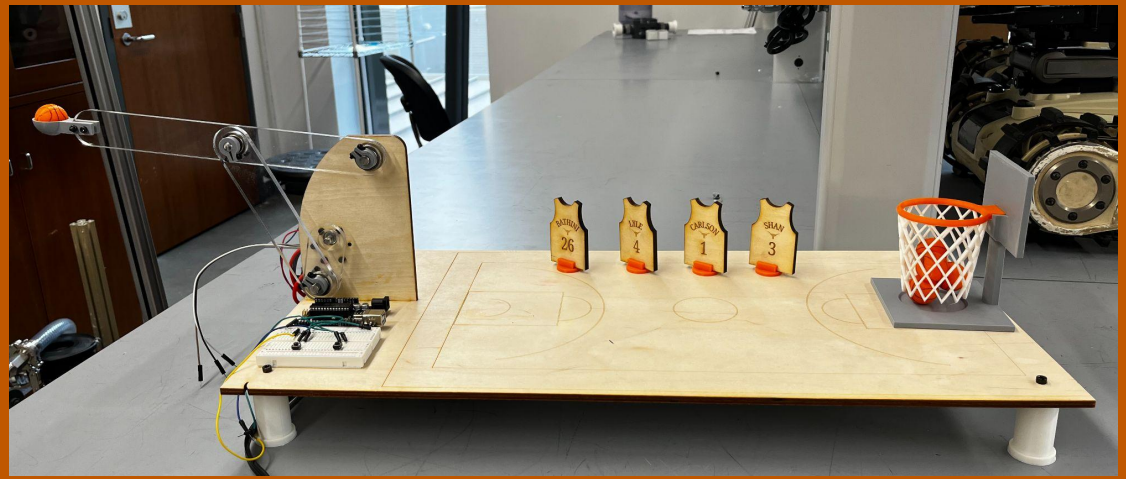
RMD SPRING 2024

TEXAS
The University of Texas at Austin



Basketball Shooter

Automated basketball shooter which allows a button to change the motor speed varying how far the basketball can be shot from.

TEAM 2
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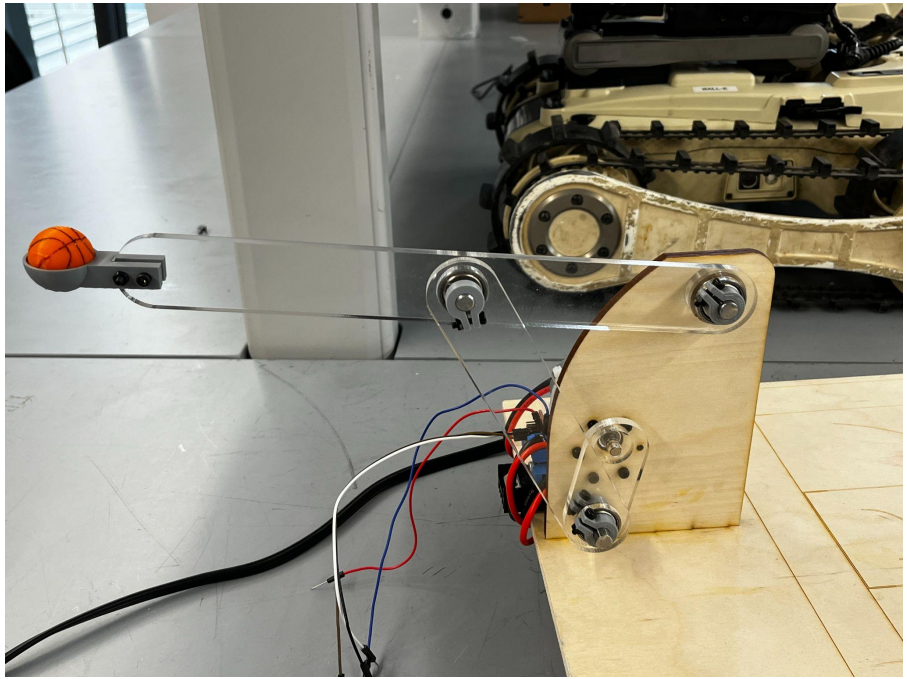
Inspiration

Our inspiration for the mechanism was a toy desktop basketball game, which we wanted to automate to consistently make shots.

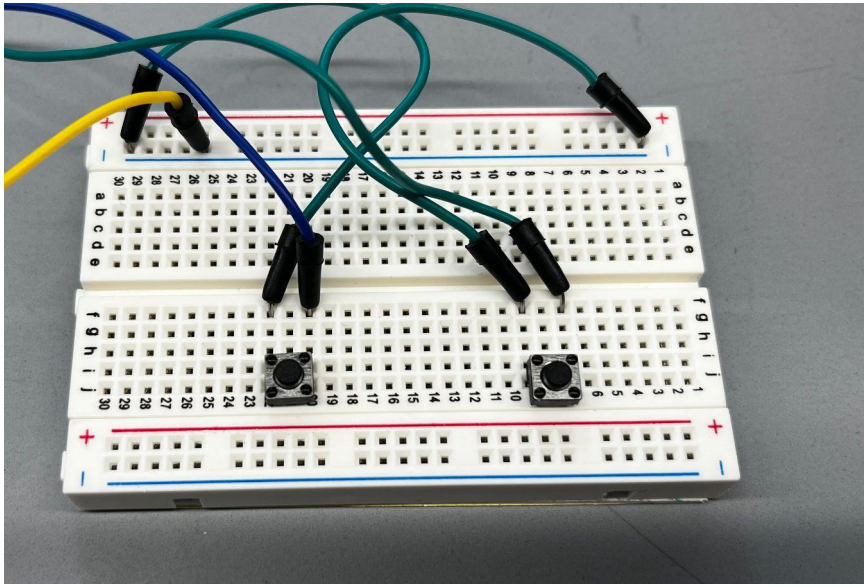
Design Details



Our court is 2 feet long, so the links are designed to have link 4 accurately shoot to the furthest point.

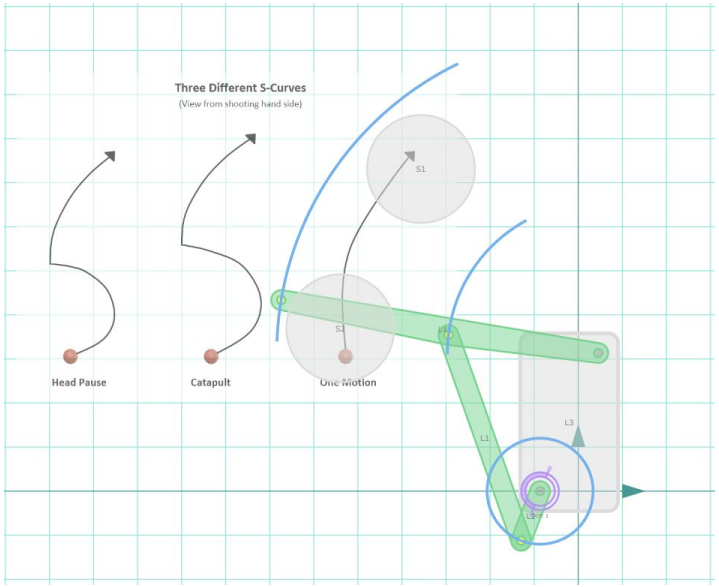
The ball holder hugs the bottom half of the 25 mm basketball, ensuring that the ball is released at its peak velocity along the trajectory.

Design Details

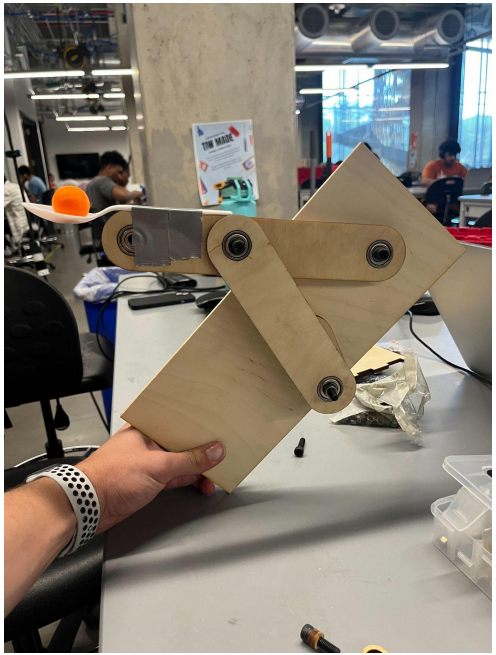


The button on the left initiates the shot, while the right button changes the motor speed.

Prototypes

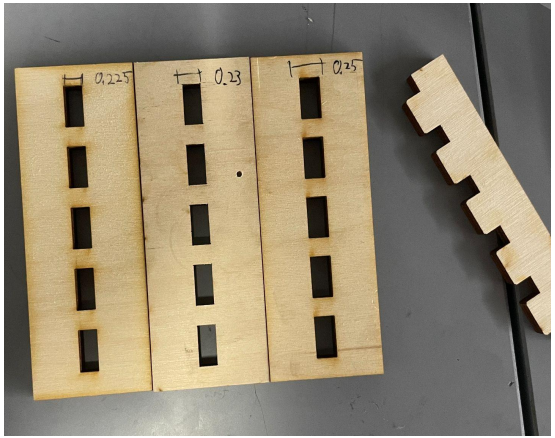


Desired Shooting Path Modeled after Steph Curry



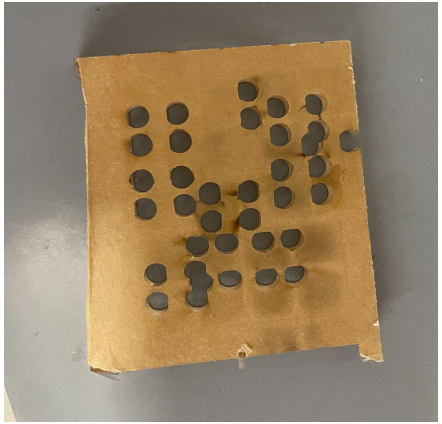
Initial Prototype Using Four Bar Linkages

Design Process



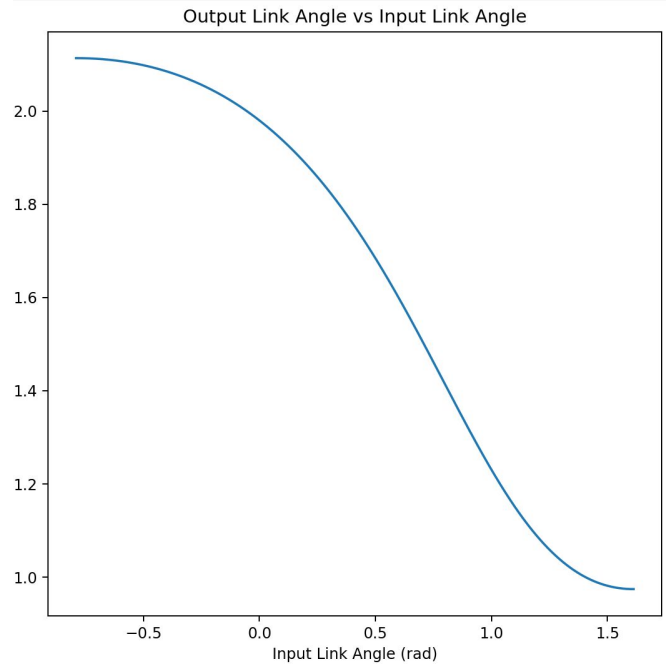
Ensuring proper press fit from the base plate to ground

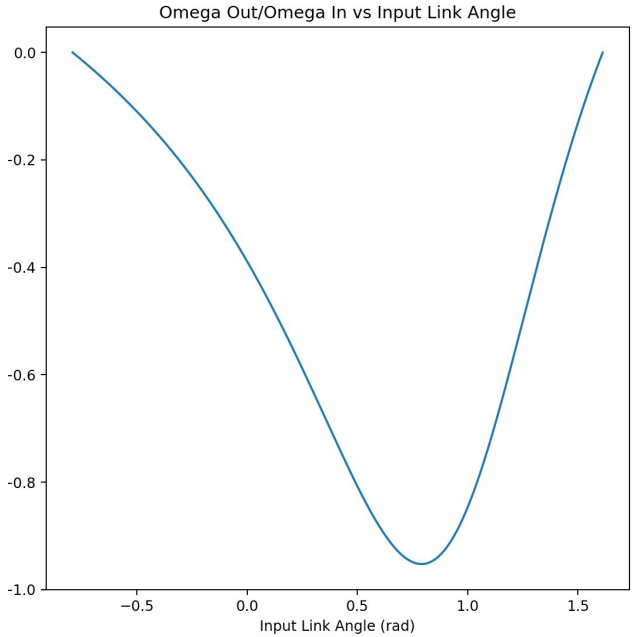
Final ball holder (left) and initial ball holder (right); modified so the end effector isn't cantilevered

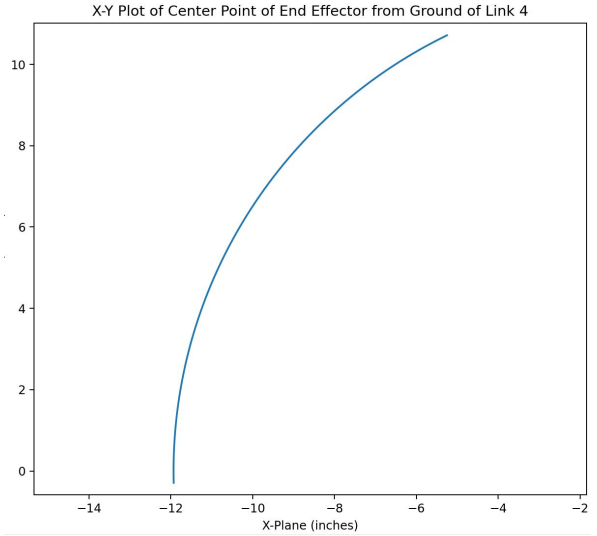


Ensuring proper press fit into the D shaft of the motor

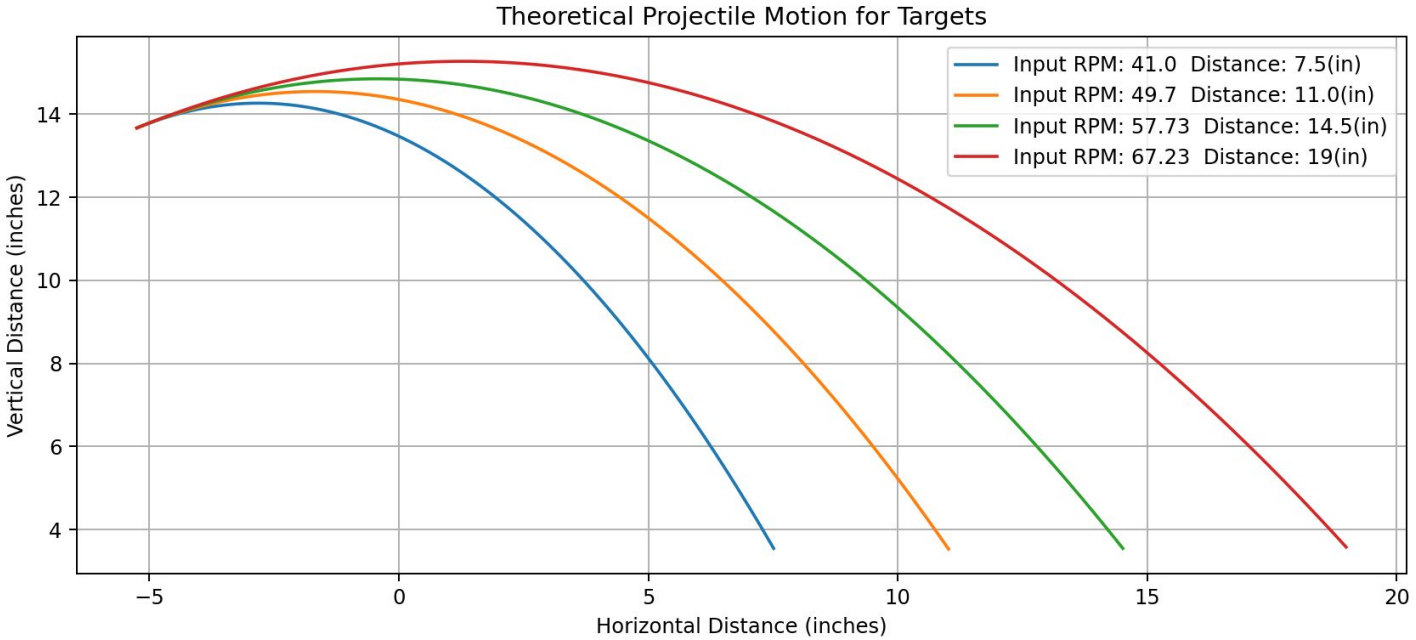
Analysis


Output Link Angle vs Input Link Angle
2.0
1.8
1.6
1.4
1.2
1.0
−0.5
0.0
0.5
1.0
1.5
Input Link Angle (rad)

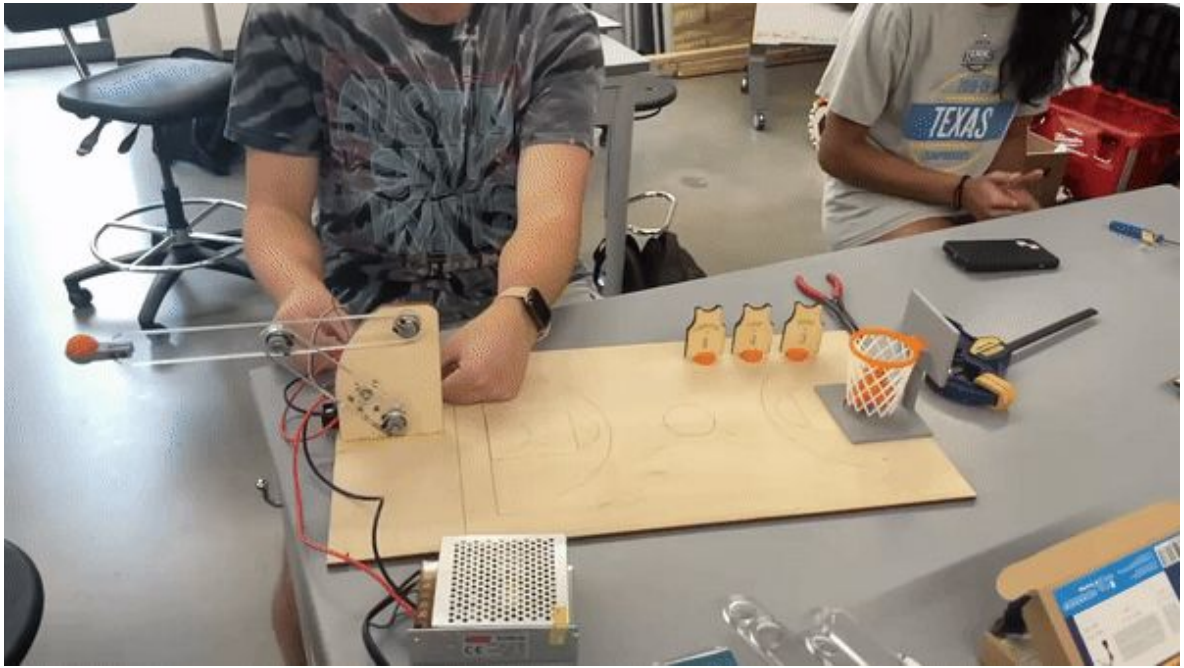

Omega Out/Omega In vs Input Link Angle
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
−0.5
0.0
0.5
1.0
1.5
Input Link Angle (rad)


X-Y Plot of Center Point of End Effector from Ground of Link 4
10
8
6
4
2
0
−14
−12
−10
−8
−6
−4
−2
X-Plane (inches)

Target Trajectories and Theoretical Input Velocities



Motion Profile



Range of motion (shown at ~100 rpm)

Future Work

- Reloading mechanism
- Change to 2 DOF to shoot at different angles
- Scoreboard that counts shots made
- Digital display indicating current shooting distance
- Evaluate discrepancies in theoretical RPM vs. experimental RPM