To: David Willy

From: Gray Becker, Joshua Hernandez, Joshua Parra

Date: 12/4/24

Re: ME 476C F24toSp25_01 Catheter Roller Robot Prototype 2

For prototype 2, the team created a physical prototype of the catheter rotation system and a physical prototype of the driver with code to run the stepper motors. The catheter rotation system has a 3D-printed housing with roller bearings purchased from McMaster-Carr. The motor prototype contains a breadboard, driver, wires, a NEMA 17 motor, a NEMA 11 motor, and Arduino code.

Rotation Prototype

For this prototype, we asked whether our rotation system can effectively rotate a catheter. The results of this test demonstrated that the roller system provided enough friction to rotate the catheter. The housing structure had supports to attach the top roller to the system that were too fragile and did not fit the top roller system, and the catheter had the ability to slip out of the system. Future changes include creating circular pillars with 100% infill, increasing the hole diameter of the top structure to allow for a loose fit, and adding holes to line up and thread the catheter through the rotation system. Josh H. created the CAD model, Josh P. printed and assembled the model, and Gray oversaw catheter acquisition and testing. The CAD model for the prototype's housing is shown in Figure 1.
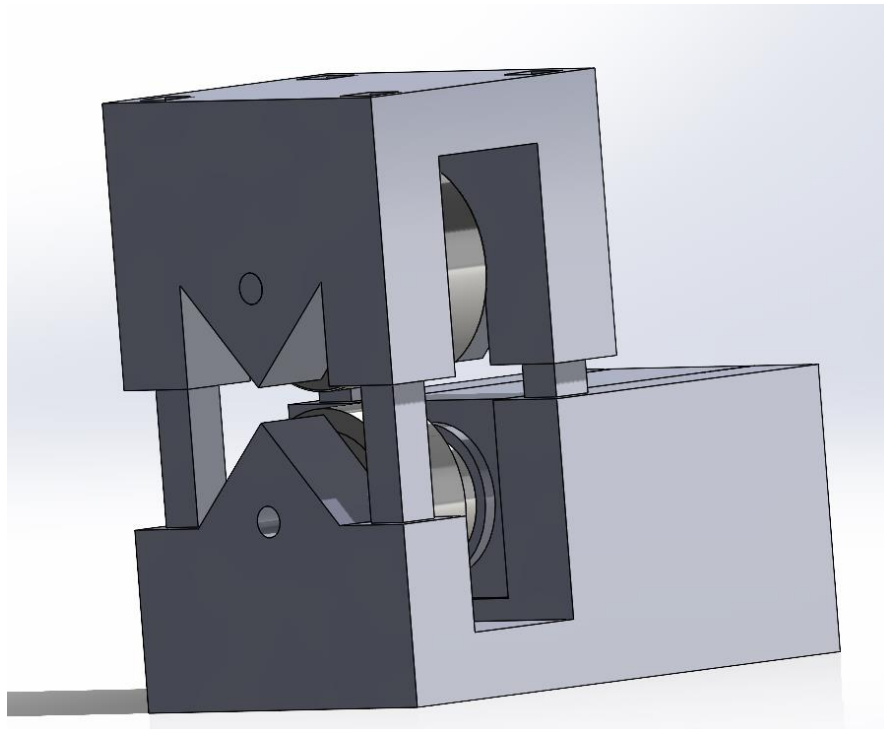

Figure 1. SolidWorks Model of Catheter Rotation System

Motor Driver Prototype

For this prototype, the team asked if we could get our Arduino code to properly control our stepper motors. The answer was that we were able to get both motors running with our drivers and code. At one point during testing, the computer attached to our system forcibly shut off, which we think can be fixed by adding a diode. For future iterations, a heat sink will be added to the driver to prevent overheating of the system and allow for a longer runtime, and wire connections will be improved for increased safety. Gray soldered the drivers, Josh H. created the code and wired the driver to the motor, and Josh P. helped with troubleshooting and testing the system. Figure 2 shows the driver and wiring to the motor.
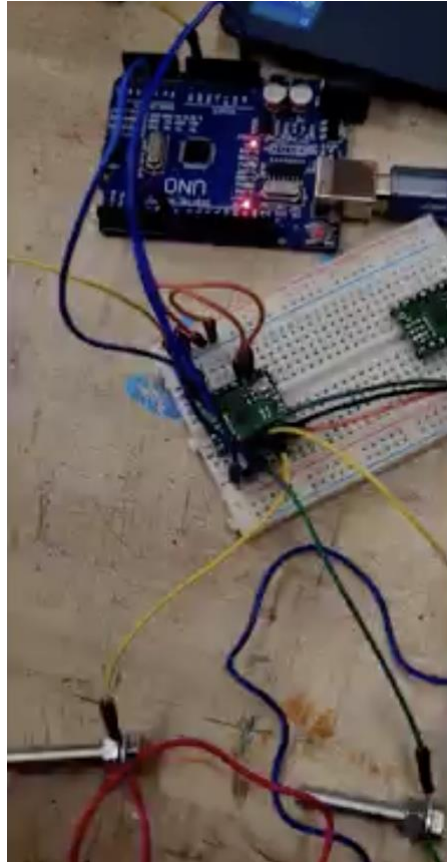

Figure 2. Driver Motor Prototype Wiring