

# Catheter Roller Robot 100% Hardware Update

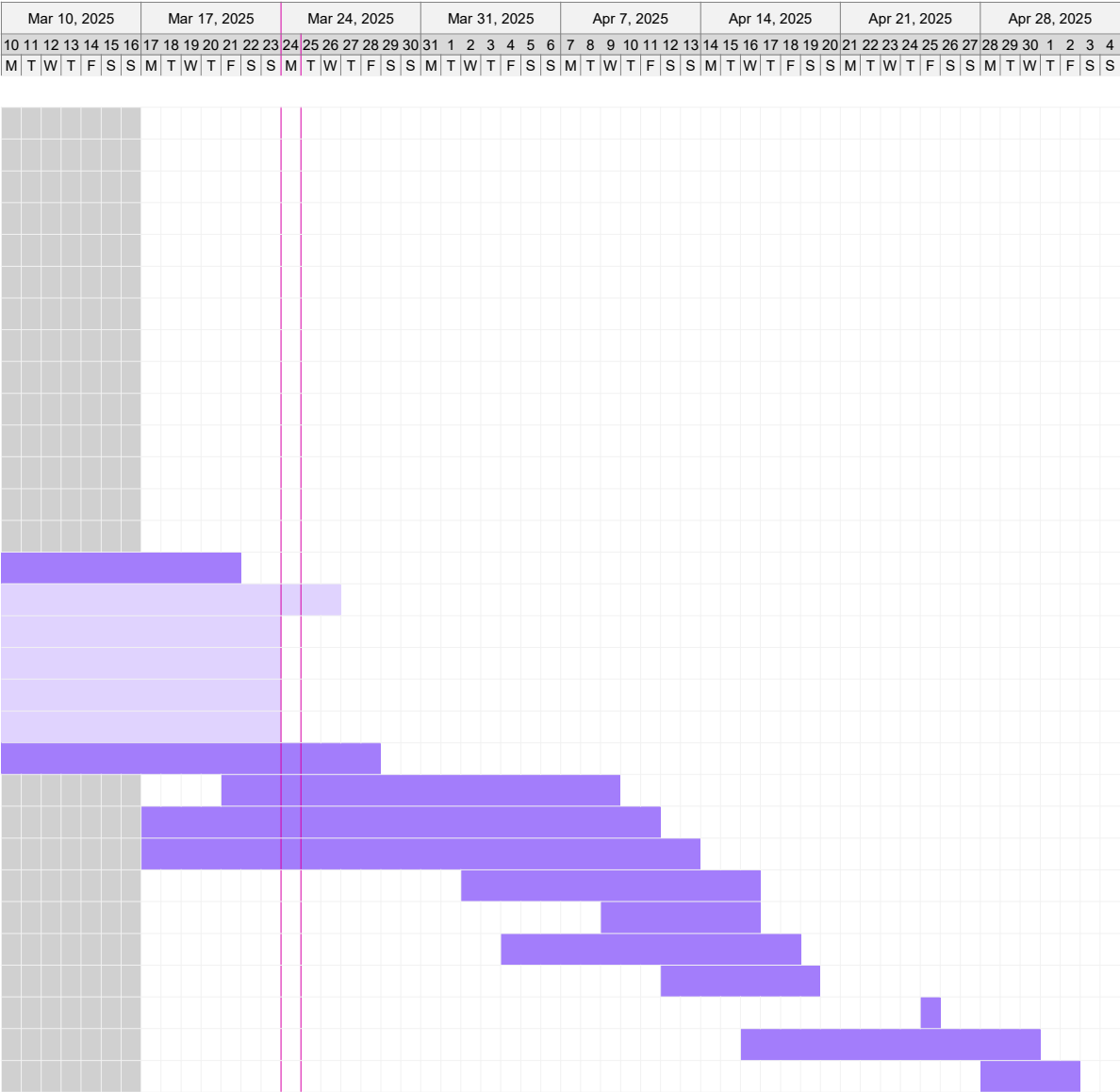
Gray Becker

Joshua Hernandez

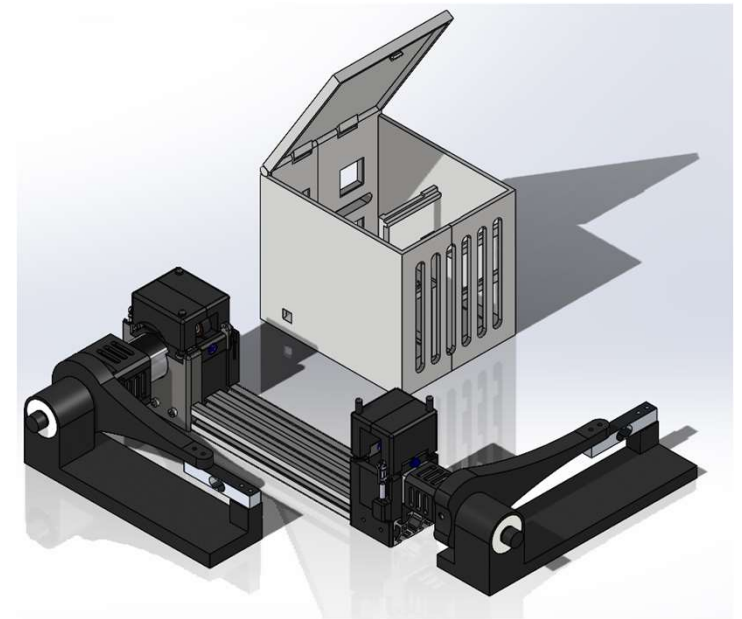
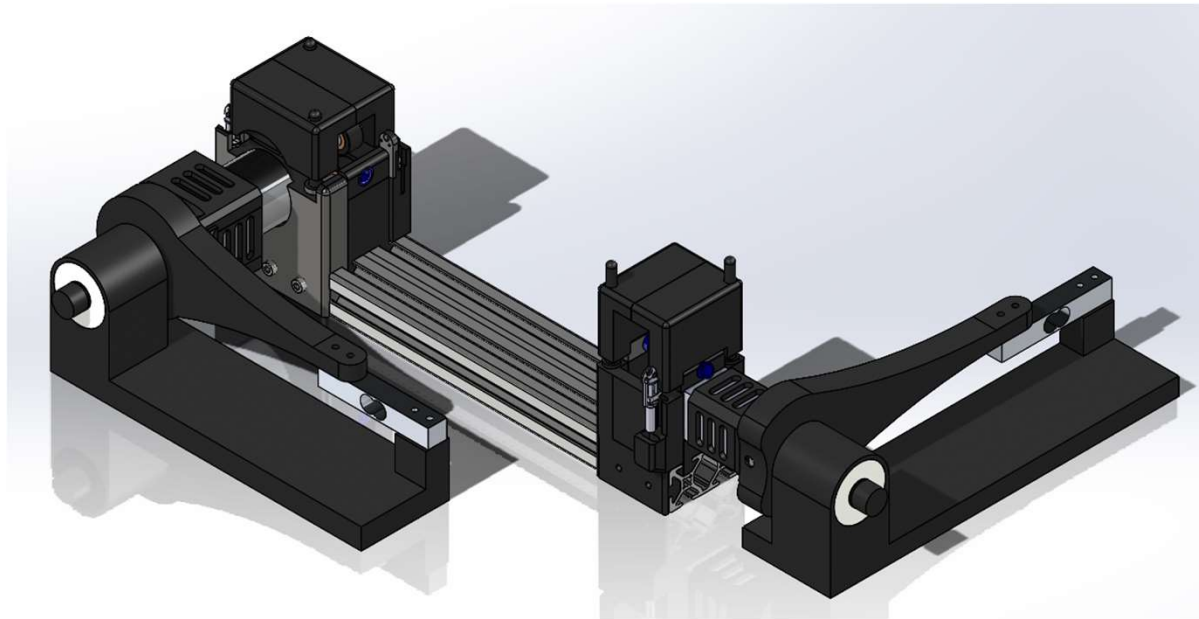
Joshua Parra

Gantt Chart – 2<sup>nd</sup> Half of Semester

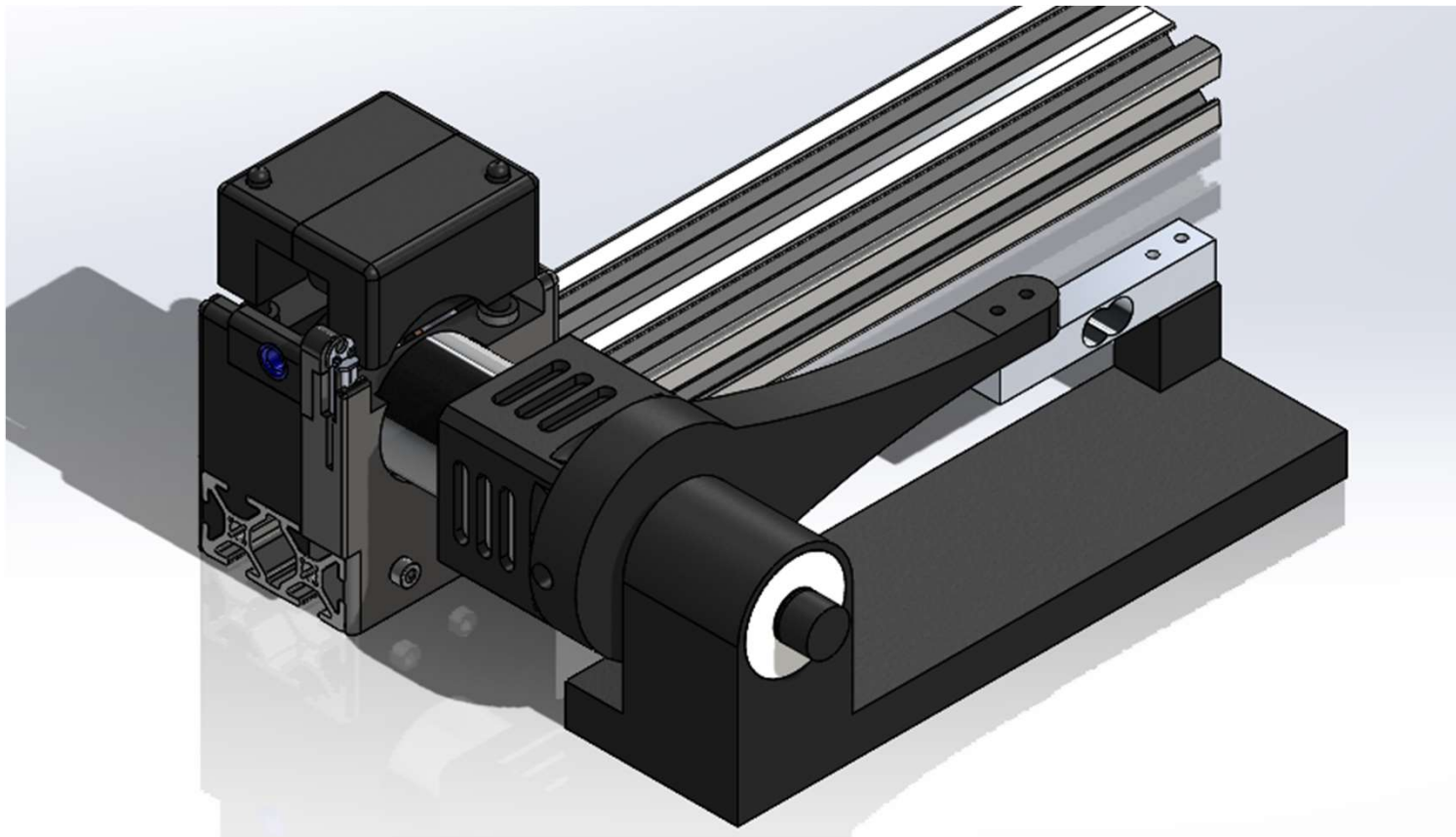
TASK	ASSIGNED TO	PROGRESS	START	END
Course Deliverables (Fall 2024)				
Project Management	All	100%	1/13/25	1/17/25
Gantt chart/WBS	Gray	100%	1/13/25	1/17/25
BOM	Josh H.	100%	1/13/25	1/17/25
Manufacturing	Josh P.	100%	1/13/25	1/17/25
Engineering Calculations Summary	All	100%	1/20/25	1/24/25
Self-Learning/Individual Analysis	Individual	100%	1/20/25	2/16/25
Hardware Status Update - 33%	All	100%	1/13/25	2/5/25
Wiring System	Josh H.	100%	1/13/25	2/2/25
Sensors CAD design	Gray	100%	1/13/25	1/24/25
Website Check 1	Josh P.	100%	2/14/25	2/21/25
Hardware Status Update - 67%	All	100%	2/6/25	2/26/25
Translation System (shafts, sleeves, and housing)	Josh P.	100%	1/13/25	2/23/25
Motor Mount and Load Cells System	Gray	100%	1/13/25	2/23/25
UGRADS Registration	Gray	100%	2/20/25	3/6/25
Finalized Testing Plan	Gray	40%	2/24/25	3/21/25
Hardware Status Update - 100%	All	100%	2/27/25	3/26/25
Rotation System (shafts, sleeves, and housing)	Josh P.	100%	1/13/25	3/23/25
Frame System	All	100%	2/27/25	3/23/25
Arduino Code	Josh H.	100%	1/13/25	3/23/25
Electronics Box	Gray	100%	2/27/25	3/23/25
UGRADS Poster Draft	All	0%	3/8/25	3/28/25
Initial Testing Results	All	0%	3/21/25	4/9/25
UGRADS Final Poster and Presentation	All	0%	3/17/25	4/11/25
Final CAD Packet	All	0%	3/17/25	4/13/25
Product Demonstration	All	0%	4/2/25	4/16/25
Final Testing Results	All	0%	4/9/25	4/16/25
Final Report	All	0%	4/4/25	4/18/25
Website Check 2	All	0%	4/12/25	4/19/25
UGRAD Symposium	All	0%	4/25/25	4/25/25
Spec Sheet/Operation Manual	All	0%	4/16/25	4/30/25
Client Handoff	All	0%	4/28/25	5/2/25



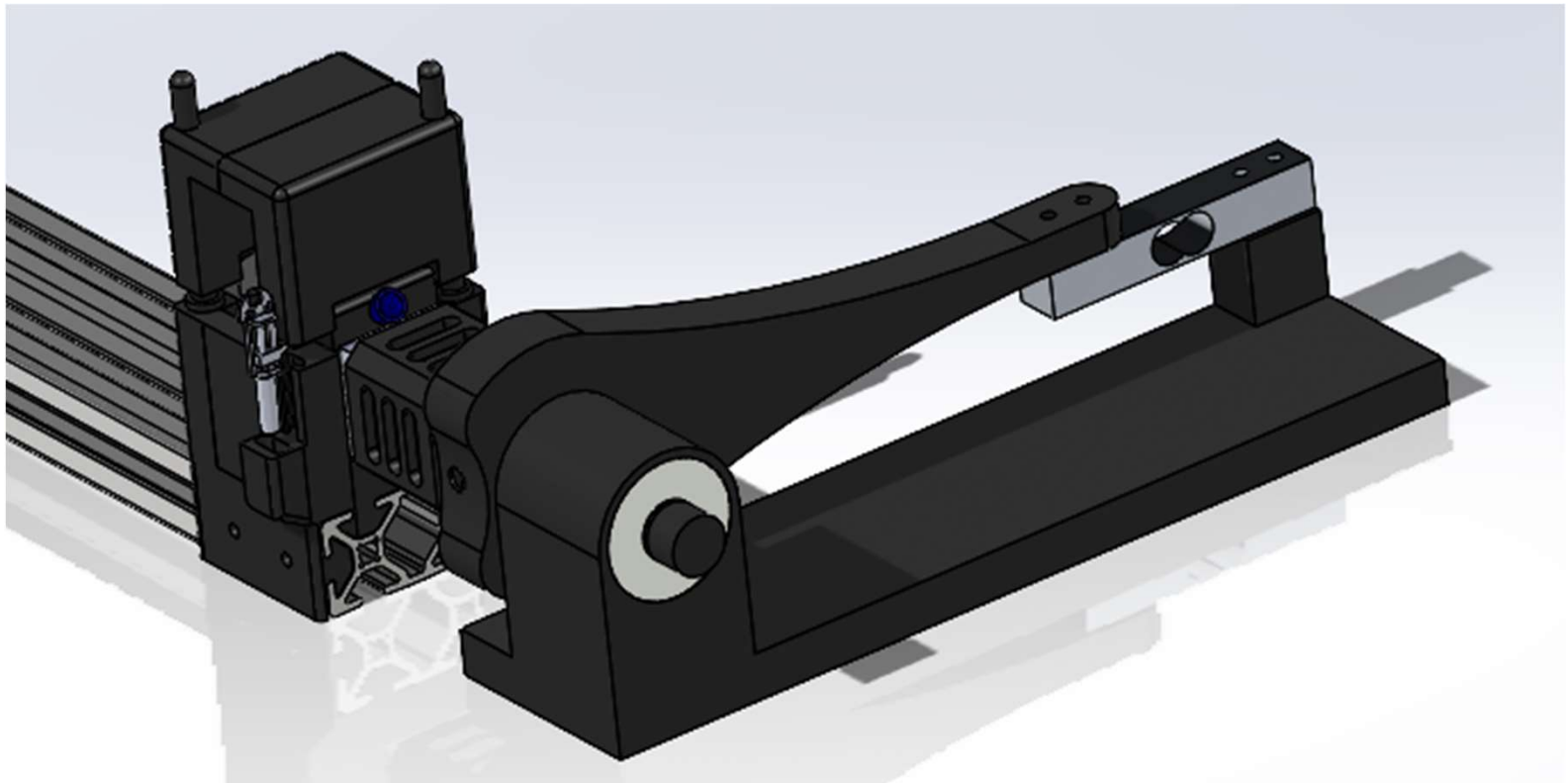
# Final CAD Assembly



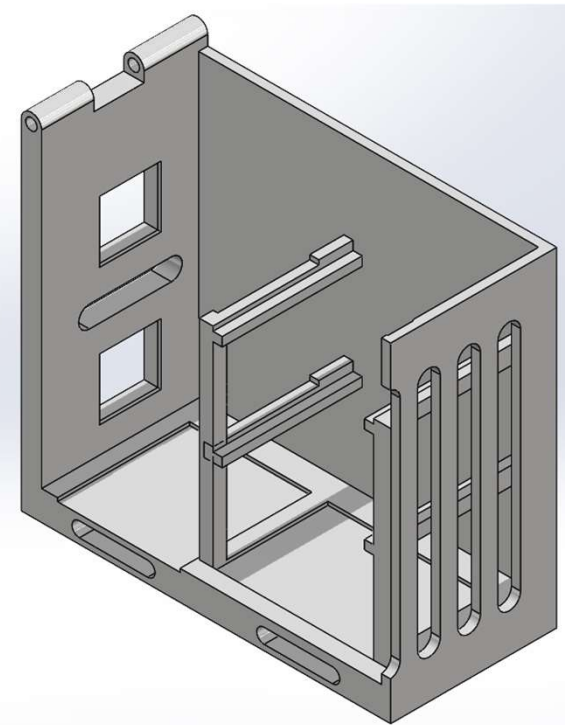
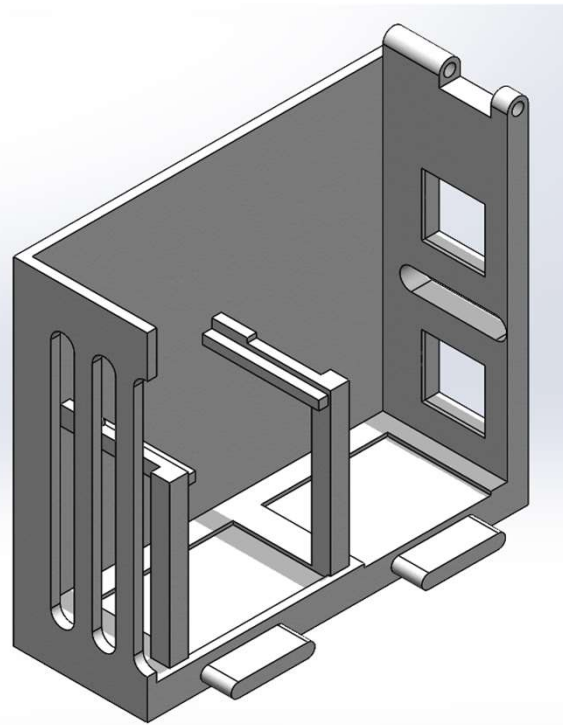
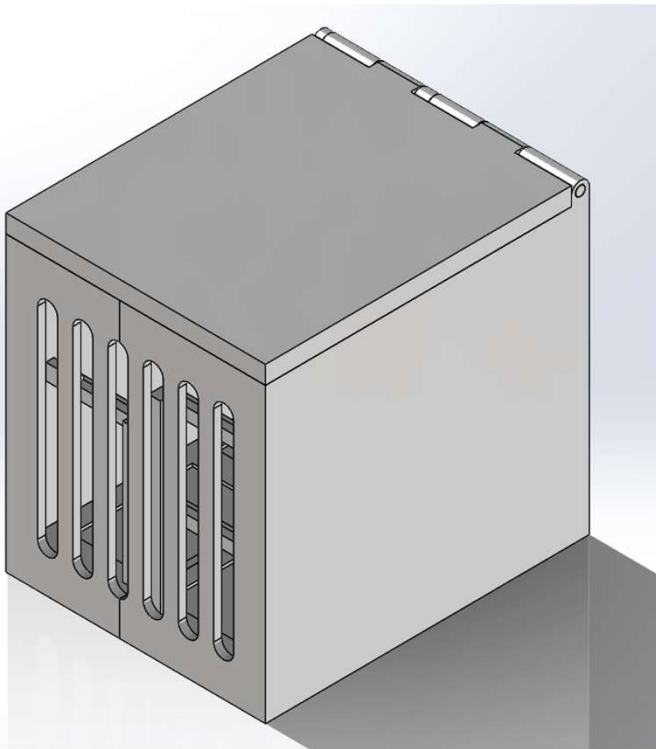
# CAD: Translation System



# CAD: Rotation System



# CAD: Electronics Box



# Budget

Income		
From Sponser		\$5,000
From Fundraising	\$500 Current:	\$350.00
Total:		\$5,350
Expenses		
Order Number	Description	Cost
Order 1	Idle and driver rollers for translation	\$110.96
Order 2	NEMA 17 stepper with gear ratio 5:1	\$43.84
Order 3	NEMA 11 stepper motor	\$26.31
Order 4	driver roller 25mm	\$43.84
Order 5	Stepper motor drivers	\$27.13
Order 6	30mm driver roller	\$74.89
Order 7	Translation 3D print 1	\$39.40
Order 8	Rotation 3D print 1	\$18.44
Order 9	Nema 17 back 3D print 1	\$34.64
Order 10	Nema 17 back 3D print 2	\$30.24
Order 11	Nema 11 back 3D print 1	\$26.06
Order 12	Translation 3D print 2	\$21.20
Order 13	Translation special 3D print 1	\$116.58
Order 14	Translation 3D print 3	\$55.28
Order 15	Shafts, frames, load cells	\$108.60
Order 16	Screws and USB	\$26.08
Order 17	Bearings and snap rings	\$21.12
Order 18	Arduino and electronics	\$186.76
Order 19	Screw terminals and H bridges	\$18.54
Order 20	Idler roller	\$25.30
Order 21	Rotation 3D print 2	\$23.24
Order 22	Translation special 3D print 2	\$75.44
Order 23	Sensor parts final	\$30.79
Order 24	Electrical box	\$50.96
Total Expenses:		\$1,235.64
Budget Left:		\$4,114
Percent used:		23.10%



# Purchasing Plan

Part	Details	Status	Link	Supplier	Price per Unit	Quantity	Total Price	Picture
Translation Idler Roller	3/4in roller	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$20.73	3	\$62.19	
Translation Driver Roller	25mm roller	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$31.81	1	\$31.81	
Rotation Driver Roller	30mm roller	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$31.93	1	\$31.93	
Translation Stepper Motor	NEMA 17 with 5:1 gear ratio	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$40.15	1	\$40.15	
Rotation Stepper Motor	NEMA 11	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$24.10	1	\$24.10	
Motor Driver	DVR8483 stepper motor driver	Delivered	<a href="https://www.polo">https://www.polo</a>	Pololu	\$9.95	4	\$39.80	
Arduino Mega	Arduino Mega 2560 REV3	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$52.34	1	\$52.34	
Arduino Mega terminal block sheild	screw terminal block breakout module for Arduino Mega	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$32.37	1	\$32.37	
Arduino basic starter kit	Arduino basic starter kit LEDs, resistors, buttons, capacitors, transistors, diodes, wires, breadboard, power supply	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$10.81	1	\$10.81	
5V mini fan	4pcs 30mm 5V fans	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$10.81	1	\$10.81	
DC 12V relay module	4pcs DC 12V relay module	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$7.57	1	\$7.57	
PCB board kit	82 pcs PCB board kit with connectors	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$12.98	1	\$12.98	
22 gauge wire	33ft/10m wire	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$14.06	1	\$14.06	
Micro lead screw	4mm 5V 2-phase 4-wire stepper motor micro lead screw	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$5.92	4	\$23.68	
Load cell kit	4 sets 1kg load cells and HX711 boards	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$15.49	1	\$15.49	
Roller Shafts	4.5in x 1/4in stainless steel shaft	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$6.86	2	\$13.72	
T-slotted frame	1ft T-slotted framing rail	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$7.57	1	\$7.57	
Idler Roller	1 1/2in roller	Delivered	<a href="https://www.mcm">https://www.mcm</a>	Mc-MasterCarr	\$55.77	1	\$55.77	
Load cell bearings	4pcs 15x35x11mm deep groove ball bearings	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$8.33	1	\$8.33	
Snap rings	145pcs external retaining rings 15-28mm	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$12.79	1	\$12.79	
H bridges	4pcs mini L298N 2 channel H bridge DC motor driver board with MX1508 chip	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$7.99	1	\$7.99	
USB cable	USB cable type A male to B male, 20ft	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$13.99	1	\$13.99	
M4 screw kit	300pcs M4 hex socket head cap screw assortment with nuts and washers, 6, 8, 10, 12, 16, 20, 25, 30mm (black)	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$8.99	1	\$8.99	
PCB terminal block connectors	70pcs 2 pin & 3 pin 5mm/0.2inch pitch PCB mount screw terminal block connector	Delivered	<a href="https://www.ama">https://www.ama</a>	Amazon	\$8.99	1	\$8.99	



# Manufacturing Plan

Part	Details	Status	Manufacturer	Lead Time (hours)	Material	Components	Manufacturing Location	Price per Unit	Quantity	Total Price
Prototype Translation Housing	Translation Housing	Complete	Josh P.	15	3D-printed PLA	1	Cline Library	\$39.40	1	\$39.40
Prototype Rotation Housing	Rotation Housing	Complete	Josh H.	10	3D-printed PLA	1	Cline Library	\$18.44	1	\$18.44
Shafts (metal)	Metal shafts for bearings	Complete	Josh P.	1	Stainless Steel	6	Engineering Machine Shop	\$0.00	6	\$0.00
Prototype mount for back of NEMA17	load cell housing	Complete	Josh P.	12	3D-printed PLA	4	Cline Library	\$34.64	1	\$34.64
Mount for back of NEMA17	load cell housing	Complete	Josh P.	28	3D-printed PLA	4	Cline Library	\$30.24	1	\$30.24
Mount for back of NEMA11	load cell housing	Complete	Josh P.	28	3D-printed PLA	4	Cline Library	\$26.06	1	\$26.06
Electronic Wiring	Circuit board wiring	Complete	All	20	Wires, solder	5	Cline Library	\$0.00	1	\$0.00
Prototype 2 Translation Housing	Translation Housing	Complete	Josh P.	10	3D-printed PLA	18	Cline Library	\$21.20	1	\$21.20
Translation Prototype Special Components	Small components or different material	Complete	Josh P.	1	Vero and Agilus	14	Bioengineering Devices Lab	\$116.58	1	\$116.58
Translation Final Housing	Translation Final Housing	Complete	Josh P.	22	3D-printed PLA	15	Cline Library	\$55.28	1	\$55.28
Rotation Final Housing	Rotation Final Housing	Complete	Josh P.	10	3D-printed PLA	12	Cline Library	\$23.24	1	\$23.24
Translation Final Special Components	Small components or different material	Complete	Josh P.	1	Vero and Agilus	10	Bioengineering Devices Lab	\$75.44	1	\$75.44
Sensor Parts Final	load cell housing	Complete	Josh P.	19.5	3D-printed PLA	8	Cline Library	\$30.79	1	\$30.79
Electronic Box	electronics housing	Complete	Josh P.	28	3D-printed PLA	4	Cline Library	\$50.96	1	\$50.96

# Hardware

# Project Summary

## CAD Model

100% complete

100% built

## Bill of Materials

100% purchased

100% delivered

## Manufacturing Plan

100% complete

# Demonstration

# Thank you

**NAU** NORTHERN ARIZONA UNIVERSITY