



Robotics Traveling Van - 3rd Hardware Status Update

100% Milestone Check-in

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03/26/2026

Gantt Chart & Schedule

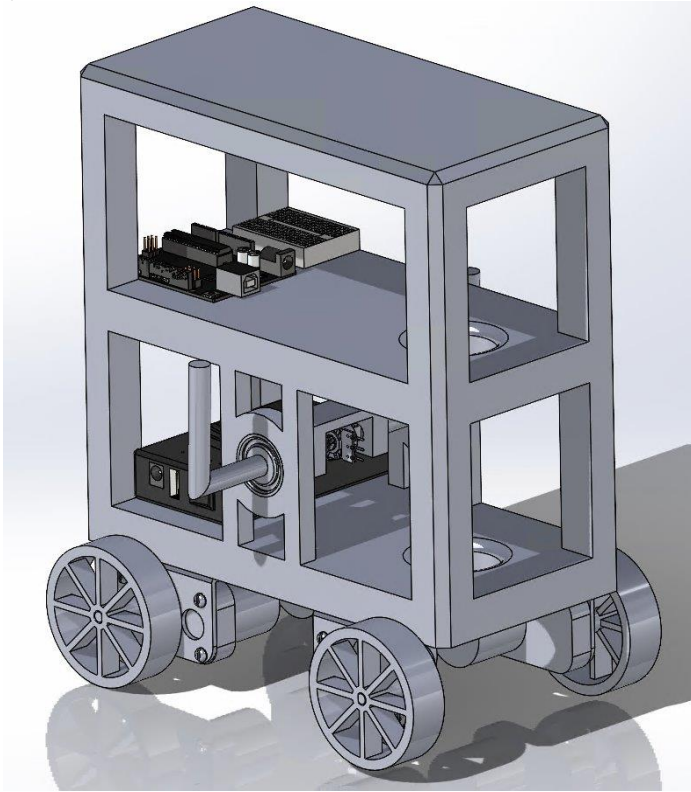
- 1) Client demo April 1st
- 2) Final Poster
- 3) New robot quantity goal (one of each until mass production green light)

A	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK
Month	Assignment Name	Feb 23	Feb 26	Feb 27	Mar 3	Mar 5	Mar 6	Mar 16	Mar 19	Mar 20
	Staff Meeting #4 (Wk5)									
	Timecard Wk5									
	Staff Meeting #5 (Wk6)									
	Website Check #1									
	Timecard Wk6									
	Hardware Status Update (67%)									
	Peer Eval 2									
Mar	CLIENT DEMO									
	Staff Meeting #6 (Wk8)									
	UGRADs Registration									
	Timecard Wk8									
	Staff Meeting #7 (Wk9)									
	Finalized Testing Plan									
	Timecard Wk 9									
	Hardware Status (100% build)									
	Draft of Poster									
	Peer Eval 3									

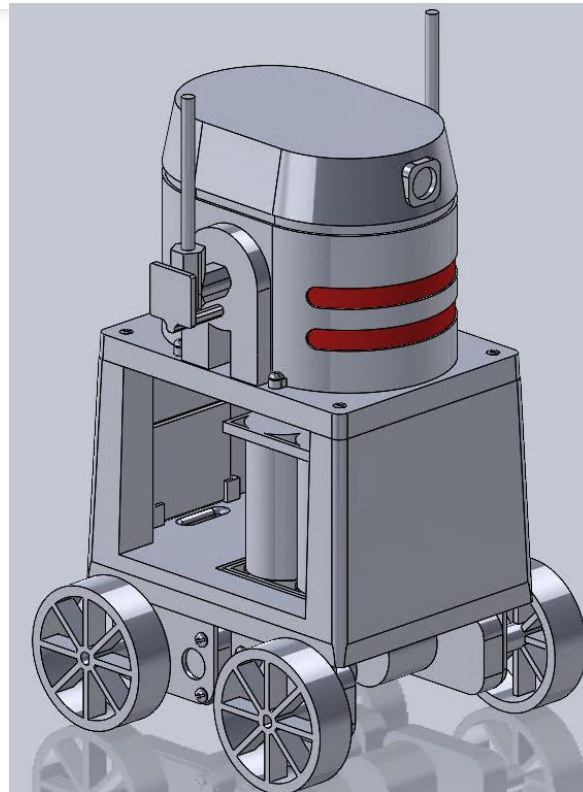
* No orders allowed 02.11 - 02.26
2 weeks of delay in printing

* Misprints and tolerances
Down units for final 5

Design Efforts - Robot 1 (Inverted Pendulum)



February 2022



February 2026

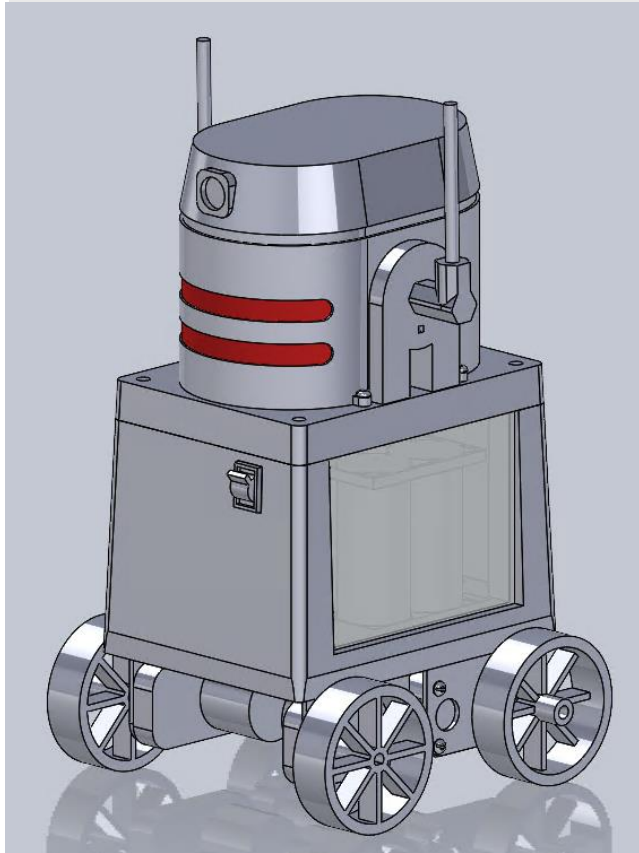
- Frame Completely Overhauled, Almost all electrical components now mounted on single level
- Switched from Arduino to Raspberry-Pi control system
- Battery system custom built.
- Switched to Magnetic Potentiometer
- Pendulum arm moved up, rebuilt to accommodate magnetic potentiometer
- Overall more aesthetically pleasing

Design Efforts - Robot 1 (Inverted Pendulum)

Design mistakes revealed in testing

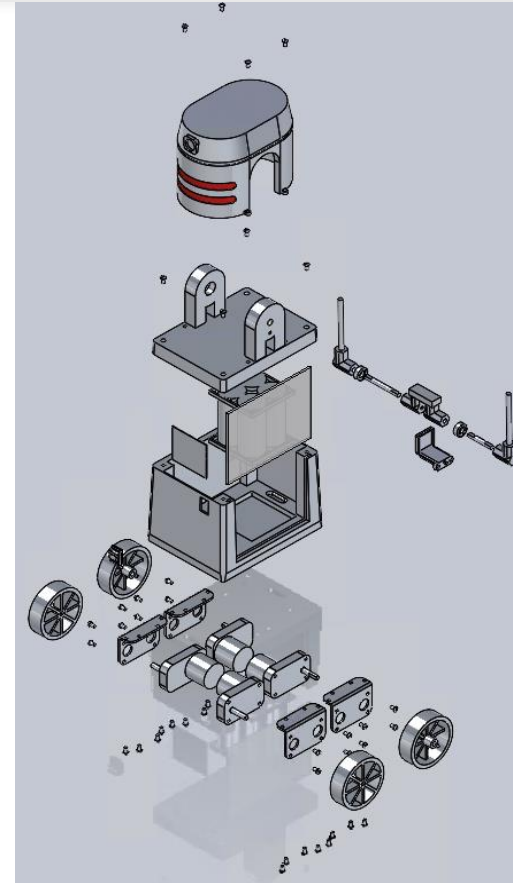
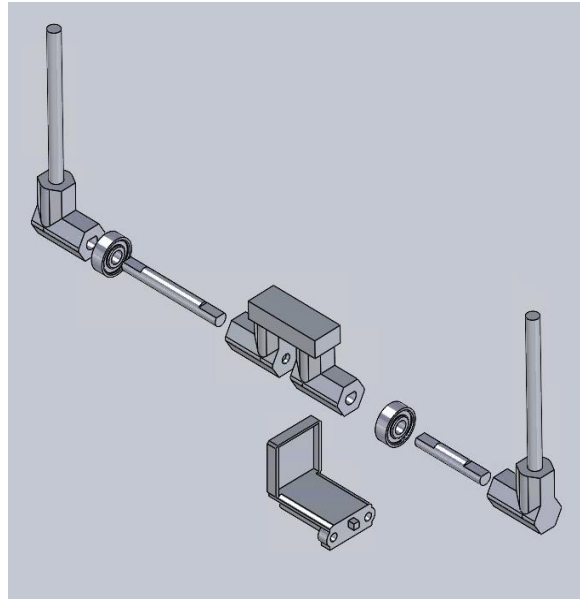
- 1) Aluminum Rods not exactly 6mm
- 2) Wires exposed, risk of catching on things

Robot 1 Updated CAD



RTV - Colin

4/21/2026



- Both Bottom and Top frames modified with looser tolerances, added hole for power switch and slot for acrylic window
- Magnetic Potentiometer mount reinforced & moved to inside of shell
- Pendulum Arm separated into 4 pieces, printed center bracket to mount magnet and keep arms at same angle
- Fillets added to Bracket arms and aluminum rods

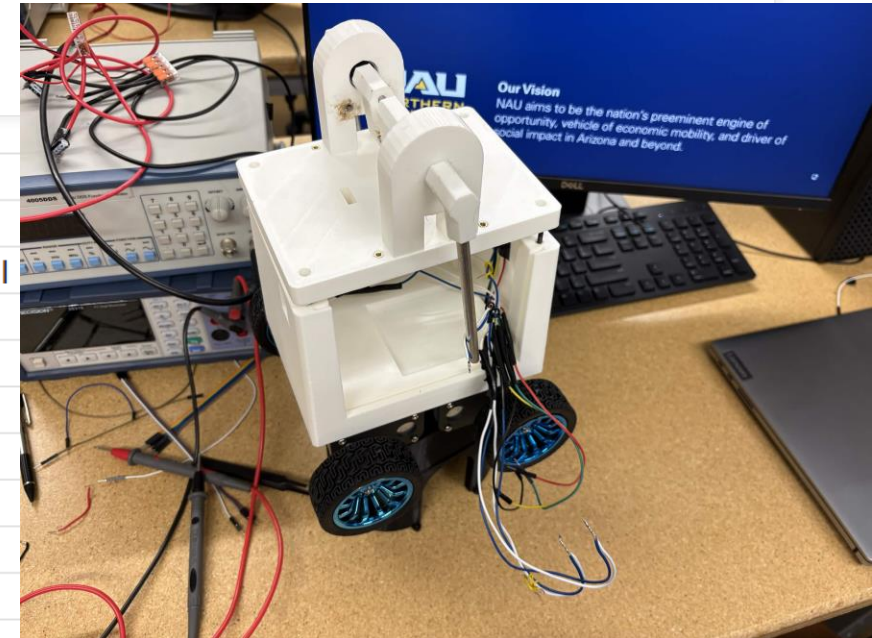
Purchasing Plan - Robot 1

5 Unit BOM		Purchased	In Stock	Cost			
Mech	4 motors	100%	100%	49.95			
	4 wheels	100%	100%	-			
	2 bearings	100%	100%	8.49			
	5 Al rods	100%	100%	11.99			
	3kg filament	100%	100%	22.99			<u>Total Budget</u>
	100 screws	100%	100%	21.99	Spent		\$5,000
	100 M3 long	100%	100%	9.49	Remaining		\$925.68
	100 M3 short	100%	100%	9.99			\$4,074
Electrical	1 PicoPi	100%	100%	12.99			
	1 protoboard	100%	100%	5.99			
	1 buck converter	100%	100%	8.69			
	2 motor drivers	100%	100%	25.98			
	# wire	100%	100%	9.99			
	4 batteries	100%	100%	159.95			
	1 chargers	100%	100%	72.95			
	1 mag. encoders	100%	100%	44.95			
	1 BMS	100%	100%	44.95			
1 power cords	100%	100%	49.95				
UI	1 Touchscreen	100%	100%	104.95			
	% total	100%	% total	100%			

- 1) Project Scope has been severely dialed back
- 2) Now only producing 1 of each robot, if approved by Shaefer, might get the go-ahead for more

Manufacturing Plan - Robot 1

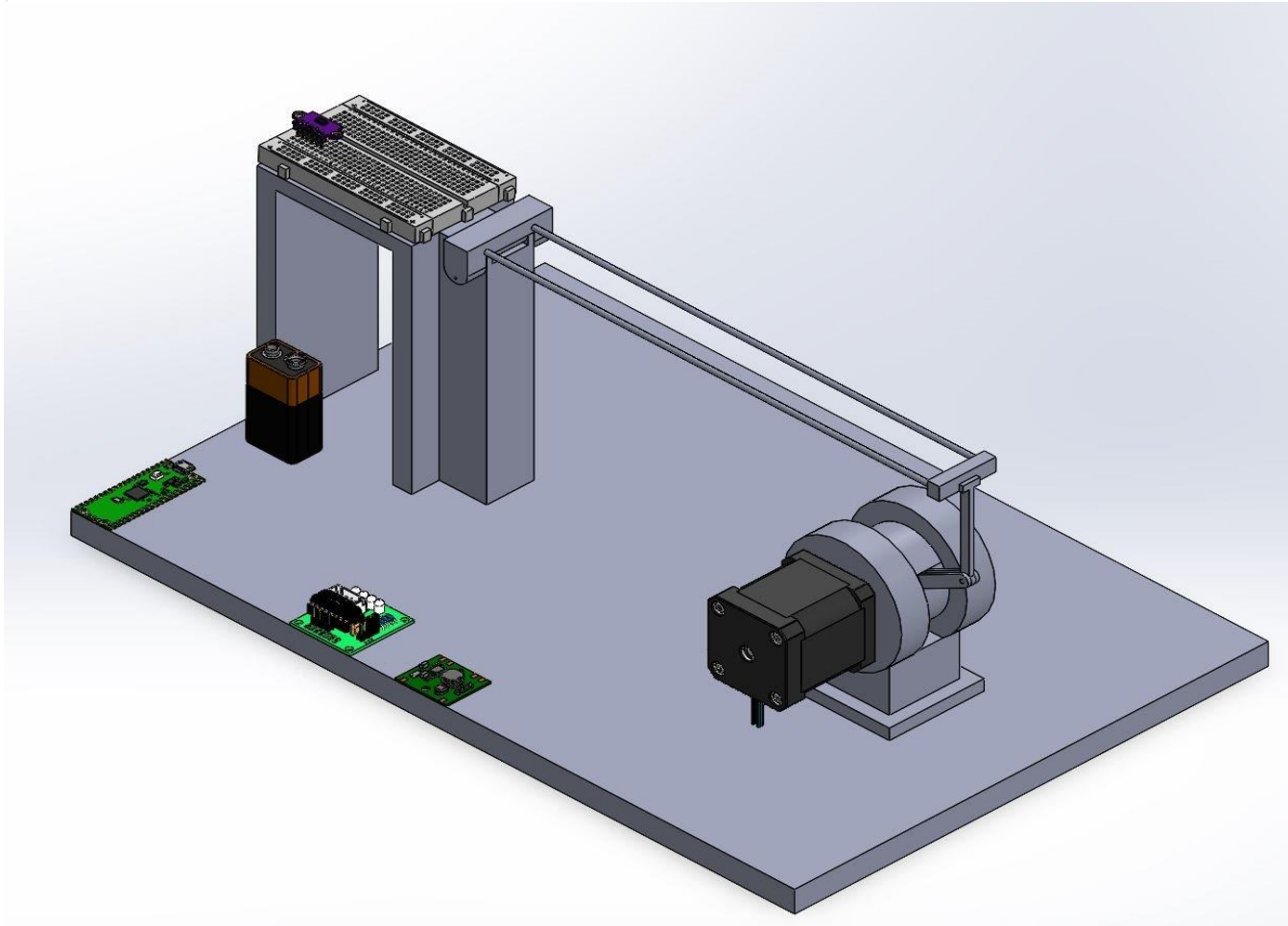
		Status	Unit Time	1 Units Time	TOTAL:	100%
Parts Printed						
Frame	top/bottom	100%	9 hrs/each	352 hrs	Note: 10 hrs of print from IDEALab for TPU shell	
	arm bracket	100%	3 hrs/per 12	8 hrs		
	mag. holder	100%	2 hrs/per 8	9 hrs		
	shells	100%				
Parts Machined						
		Status			TOTAL:	100%
Pendulum		100%	1hr/each	7 hrs	(moved from bending to cutting)	
Units Assembled						
		Status			TOTAL:	100%
Robot 1		100%	1.5 hrs/each	9 hrs	Note: Only includes mechanical assembly and circuit mounting, NOT circuit soldering (~3 hrs each)	
Soldering						
		Status			If electrical included, total assembly time for 5 units is ~22.5 hrs	
circuit	protoboard	100%	4 hrs/each	13.5 hrs		





Robot 2 Design Efforts (Sep. 2025-March 2026)

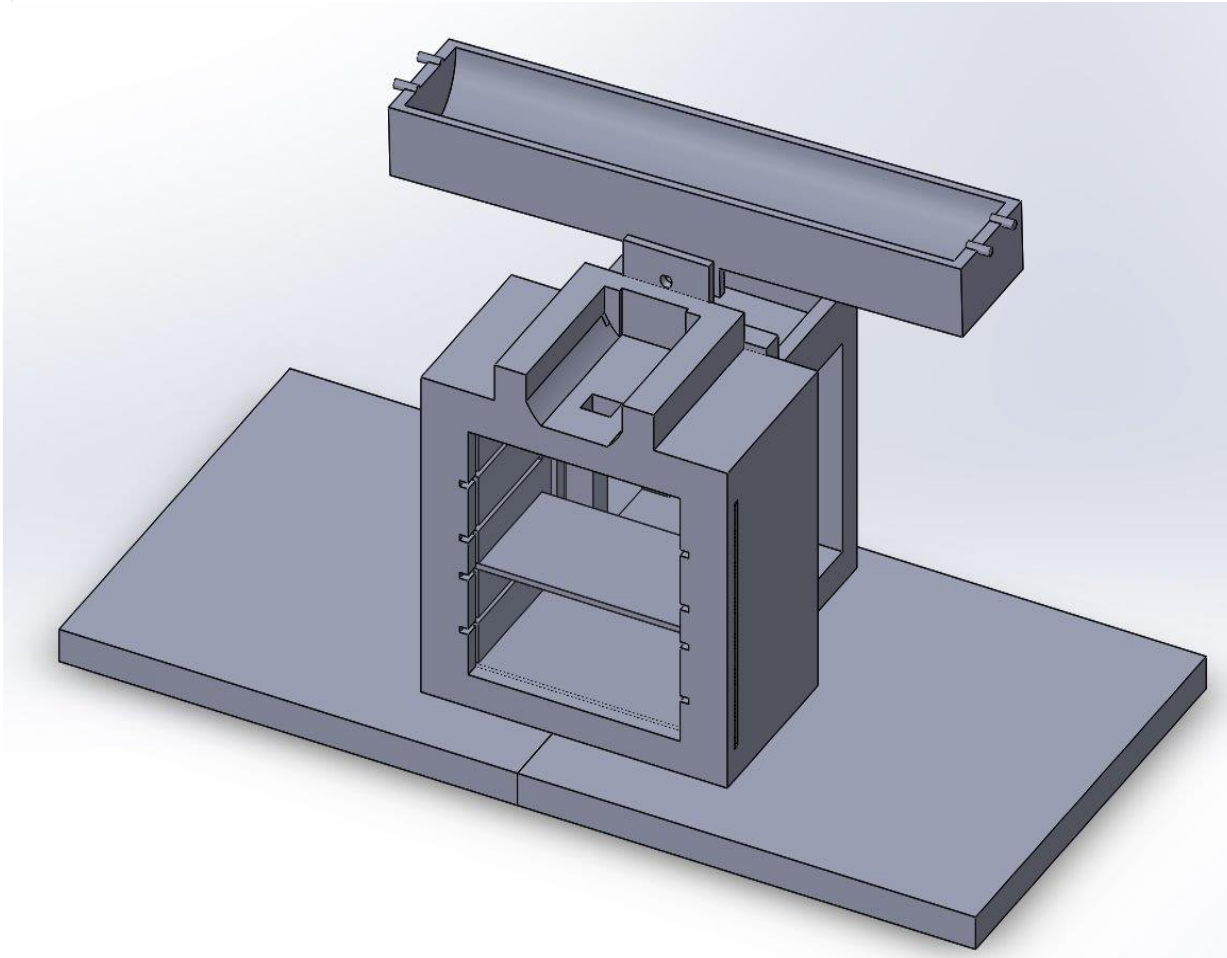
Design Efforts - Robot 2 (V1-V2)



September 2025 - December 2025

- Create a physical prototype
- Studying the physics of beam
- Analyzing stresses and motion of the components

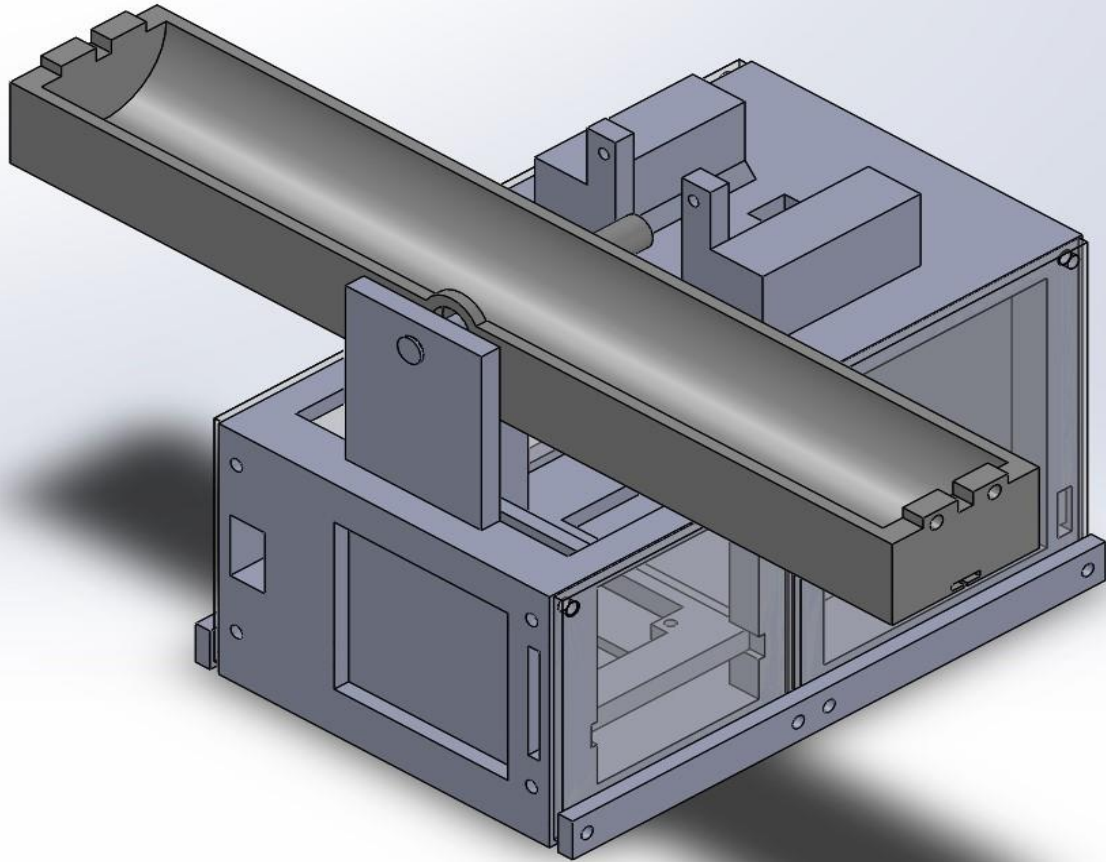
Design Efforts - Robot 2 (V3)



January 2026 - February 2026

- Less parts = Less material
- Stability
- Reduction size (14"x 7.5")
- Spacious for Electrical components
- Multiple functionality with each individual part
- Flows efficiently

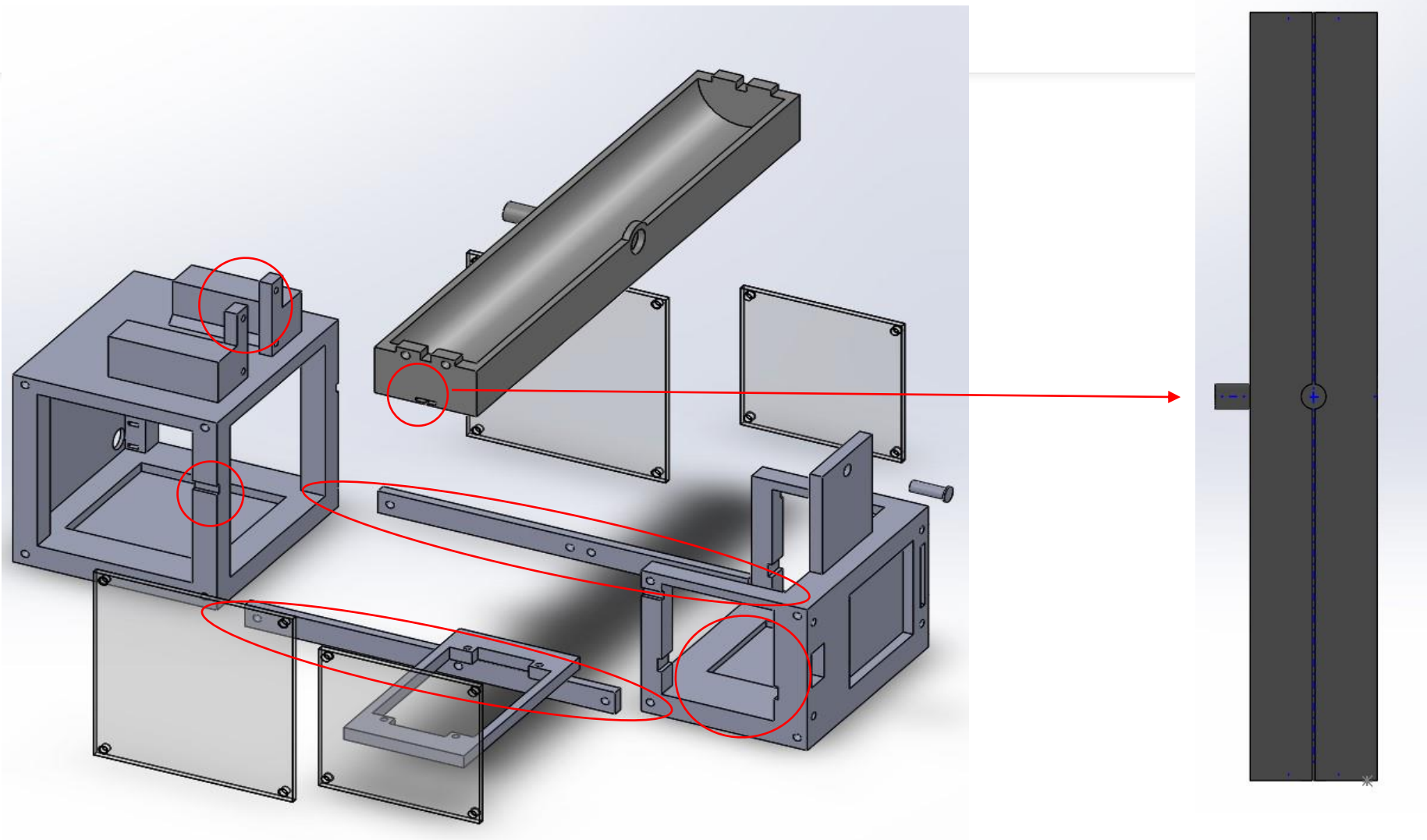
Design Efforts - Robot 2 (V4)



February 2026 - March 2026

- Maximizing *internal* volume for wiring
- Increasing *central hub* vertically for clearance for components
- Minimized *backbone* with brackets
- *Cut out* for zip ties to hold hubs together
- Vertical extrusion for the *stepper motor* to reduce motion
- *Beam* cut-out underneath for easy wiring access

Robot 2 Updated CAD



Robot 2 Updated CAD

RTV - Florence

ITEM NO.	MANUFACTURED PART NUMBER	DESCRIPTION	QTY.
1	Center_HubV2	Mechanical	1
2	Motor_HolderV4	Structural	1
3	New_Beam	Mechanical	1
7	Shelve For ProtoboardV2	Structural	1
8	Shaft Plug	Mechanical	1
20	Center Hub Glass	Structural	2
21	Motor Holder Glass	Structural	2
22	Left_Railroad	Structural	1
23	Right_Railroad	Structural	1

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN MILLIMETERS		DRAWN	Florence F. 3/25/2024
TOLERANCES: ± 0.2mm		CHECKED	
FRACTIONAL ±		ENG APPR.	
ANGULAR: MACH ± BEND ±		MFG APPR.	
TWO PLACE DECIMAL ±		Q.A.	
THREE PLACE DECIMAL ±		COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER:			
MATERIAL			
Acrylic and PLA			
FINISH			
	NEXT ASSY	USED ON	
	APPLICATION	DO NOT SCALE DRAWING	

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THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

TITLE:
Exploded View Robot 2
Version 4

SIZE **A** DWG. NO. Assembly_Robot2_V4 REV

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

Purchasing Plan - Robot 2

Category	Item Description	Total Qty Ordered	Price Per Unit	Total Price	Status
Electronics & Power	Nema 17 Stepper Motor	5 Units	\$14.99	\$74.95	RECEIVED
Electronics & Power	ToF Sensor (VL53L0X)	3 Packs (1 Unit + 2 Packs)	\$12.99	\$38.97	RECEIVED
Electronics & Power	LiFePO4 Batteries	4 Boxes	\$31.99	\$127.96	RECEIVED
Electronics & Power	LCD Screen (4-inch)	5 Units	\$20.99	\$104.95	RECEIVED
Electronics & Power	Voltage Step-Down	2 Packs	\$8.69	\$17.38	RECEIVED
Electronics & Power	BMS Board (14.8V)	3 Packs	\$8.99	\$26.97	RECEIVED
Electronics & Power	Microcontroller (RP2040/Pico)	3 Units	\$12.99	\$38.97	RECEIVED
Electronics & Power	LiFePO4 Battery Charger	4 Units	\$14.59	\$58.36	RECEIVED
Electronics & Power	Protoboard Set	2 Packs	\$13.59	\$27.18	RECEIVED
Electronics & Power	Stepper Motor Driver TMC2208	1 Unit	\$17.99	\$17.99	RECEIVED
Electronics & Power	Rocker Switch (On/Off)	4 Units	\$7.99	\$31.96	RECEIVED
Hardware & Fasteners	686 Ball Bearings (10-pack)	2 Packs	\$8.59	\$17.18	RECEIVED
Hardware & Fasteners	Longer M3 Threaded Inserts	2 Packs	\$9.99	\$19.98	RECEIVED
Hardware & Fasteners	Shorter M3 Threaded Inserts	1 Pack	\$9.99	\$9.99	RECEIVED
Hardware & Fasteners	M2 Threaded Inserts	1 Pack	\$9.99	\$9.99	RECEIVED
Hardware & Fasteners	M3 x 12mm Socket Screws	1 Pack (100pcs)	\$8.95	\$8.95	RECEIVED
Hardware & Fasteners	M3 x 8mm Socket Screws	1 Pack (100pcs)	\$8.95	\$8.95	RECEIVED
Hardware & Fasteners	M2 Screw Assortment Box	1 Box	\$14.99	\$14.99	RECEIVED
Hardware & Fasteners	M3 Zinc Hex Nuts (5-piece)	2 Packs	\$3.75	\$7.50	RECEIVED
Wiring & Materials	22 AWG Hookup Wire	1 Pack	\$15.29	\$15.29	RECEIVED
Wiring & Materials	Dupont Jumper Wire Set	1 Pack	\$6.98	\$6.98	RECEIVED
Wiring & Materials	Header Pins	1 Pack	\$7.39	\$7.39	RECEIVED
Wiring & Materials	Hyper PLA Filament (Black)	3 Rolls	\$17.99	\$53.97	ORDERED
Wiring & Materials	KAITELA Clear Acrylic Sheets 4'x6"	2 Packs	\$16.99	\$33.98	ORDERED

Requirement	Target	Current Progress	Raw Numbers	Status
Total Items Ordered	100%	100%	26 / 26 Items	<input checked="" type="checkbox"/> Goal Met
Total Items On-Hand	100%	100%	26 / 26 Items	<input checked="" type="checkbox"/> Goal Met

Raw Estimates:	1 Unit:	All 5:
	\$305.63	\$780.78

Manufacturing Plan - Robot 2

Part	Time [hours]	Manufacturing Method	Progress Percent
Center Hubs	5	3D Printed	100%
Backbones	3	3D Printed	100%
Protoboard Shelves	2	3D Printed	100%
Shaft Plugs	:06	3D Printed	100%
Motor Holders	6	3D Printed	100%
Beams	5	3D Printed	100%
Soldered Protoboards	5	Soldered	100%
Soldered Battery Packs	5	Soldered	100%
Acrylic Glass Covers (4x)	:30	Cut / Drilled	100%
Total	31		100.00%

File Part	Total PLA Filament (g)	Total Time (hrs:min)	Costs (\$USD)
Motor Holder	188.69 g	6:03	\$3.39
Center Hub	136.28 g	4:47	\$2.45
Protoboard Shelf	11.60 g	1:01	\$0.21
Inside Base Plate	38.90 g	2:11	\$0.70
Shelve for BMS	21.80 g	2:27	\$0.39
Shaft Plug	0.50 g	0:07	\$0.01
Beam	115.00 g	5:37	\$2.07
TOTAL PER ROBOT	512.97 g	22:13	\$9.23

— Physical Builds

— Robot 1 Demo

— Robot 2 Demo



Robot 2: Ball - on - Beam

Thank You

