Nintendon't

SPR 2025 ME 318

Conceptualization

“Make something that is practical, fun, and engaging.”

List of Ideas

- Handheld Device (Game Boy Emulator)
- Computer Peripherals
  - Mouse, Keyboard
- Figurines
  - Hollow Knight, Doomguy, Kirby, Mario Galaxy, Mario + Bowser
- Loaded Dice
- Marble Track
- Planetarium
- Transformer
- Wind Up Toy / Walking Bot
- Golden Snitch
- Shadow Projection Light Puzzle

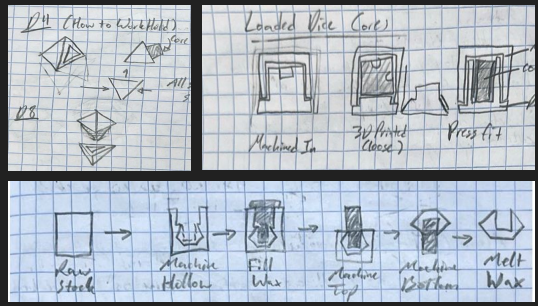
Decision Matrix

Main Focus: Motivation / Fun, Machinability, Design Intensity

	Weights	Handheld	Computer Peripheral	Figurine	Loaded Dice	Marble Track	Light Puzzle	Transformer	Planetarium	Walking Bot	Snitch
Inspiration / Motivation	0.3	10	0	7	8	4	7	6	5	4	5
Part Count (Low)	0.2	4	8	8	8	5	5	3	2	3	2
Work Holdability	0.5	7	7	2	4	4	4	5	2	8	2
Budget*	0.3	3	4	6	7	7	4	6	2	4	6
Interfaces	0.4	9	5	5	6	6	8	8	7	8	5
Machine Time (Low)	0.4	8	4	3	6	5	5	6	2	6	2
CAD Intensity (Low)	0.3	4	5	2	8	4	4	5	1	3	3
Fun	0.4	10	0	8	8	4	6	8	5	3	4
Variability / Design Freedom	0.2	6	2	9	5	7	8	5	2	4	1
Feasibility in 4 Weeks	0.6	6	8	3	9	5	6	5	1	2	2
Score		25	16.6	17.1	24.9	17.9	20.3	21	10.4	16.7	11.4
Rank		1	8	6	2	5	4	3	10	7	9

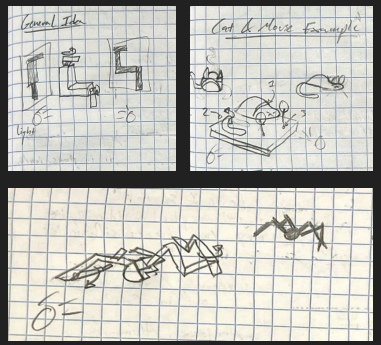
Loaded Dice

Focus on function and machinability



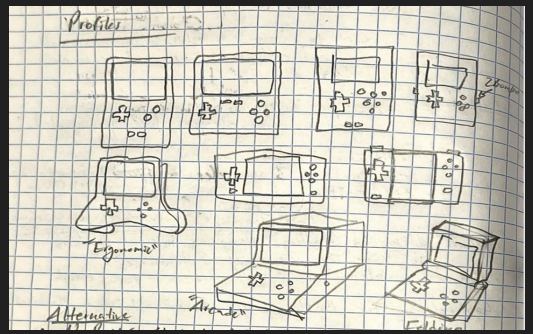
Shadow Projection Sculpture

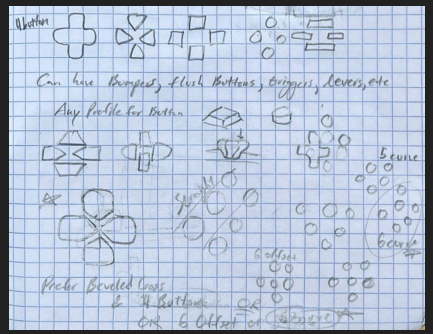
Focused on understanding projections

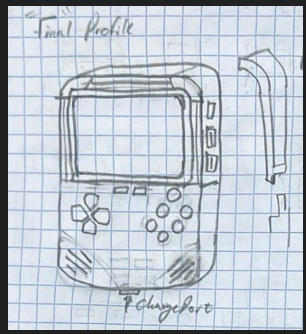


Game Boy

Study focused on form factor and interaction, testing various button layouts and designs.





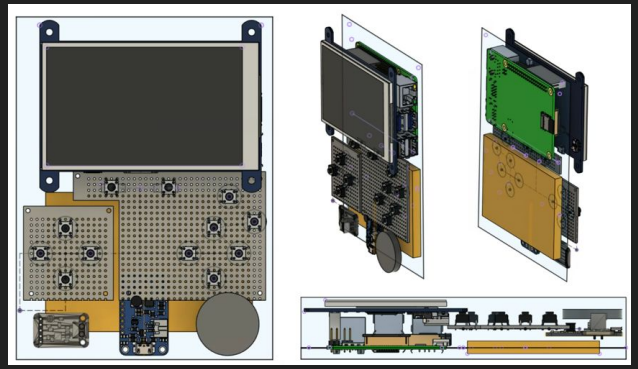


Prototyping

Creating the Draft CAD revealed that the electrical component references were not square or parallel with edge alignment. This resulted in the models being partially rebuilt from scratch for assembly and joint alignment.

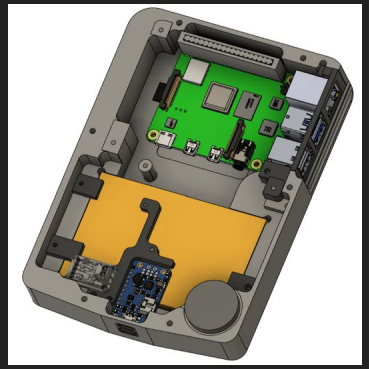
Proto-CAD

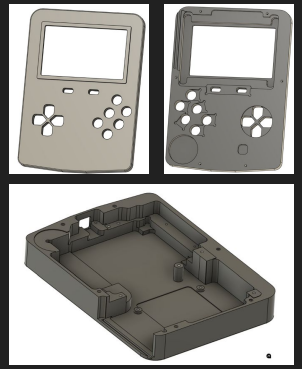
Rough size and position of electronics to gauge stock size



Draft CAD

Final component positions and draft machined parts.





Foam Form Prototype

Minimal Viable Size that is ergonomic and within stock size

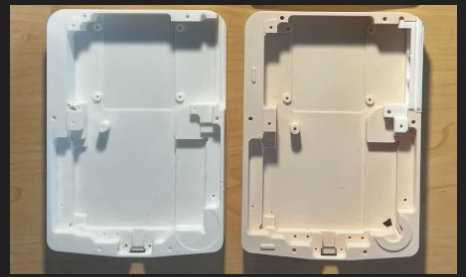
Sizes Tested:
- 6” , 6.5”, 7”

Chosen Length: 6.5”

3D- Printed Prototypes

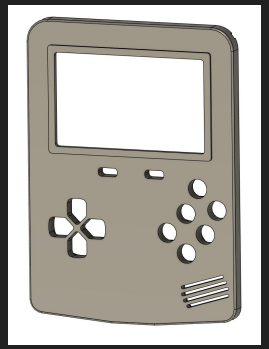
V1: Many minor clearance issues

V2: Everything ready for Machining



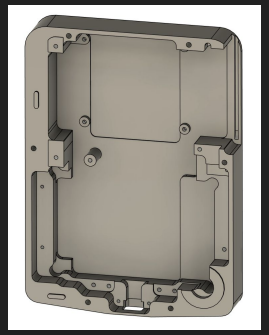
Final Model

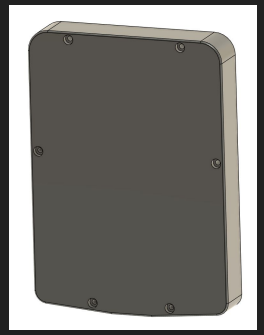
Top Panel



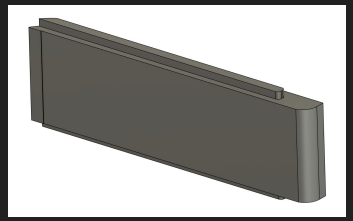
Full Model

Bottom Housing





Port Slot Cover

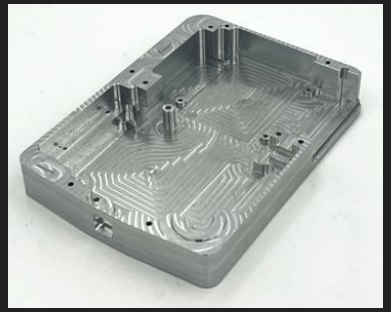


- 14 Sliding fits
- 2 press fits
- 1 zero tolerance fit

Stock Setup

- 1 Set of Soft Jaws
- Bottom Housing: (4.875 x 6.665 x 1.08)
- Top Panel : (7.49 x 5.054 x 0.502)
- Port Slot Cover: (1.081 x 0.994 x 3.259)
- 13 Tools
- 8hr 40m Machine Time
- 11 CAM Setups

Final Assembly



Final Result and Reflection

This project was the first time I had to majorly consider form factor and internal structures to house electronics compactly. I believe that the digital proto-draft to foam testing to CAD to prototype workflow was a good decision. However, I should have spent more time optimizing electronics in terms of form factor and capabilities (compromising on performance for a smaller volume). Overall, I am proud of this project and know it was a success!

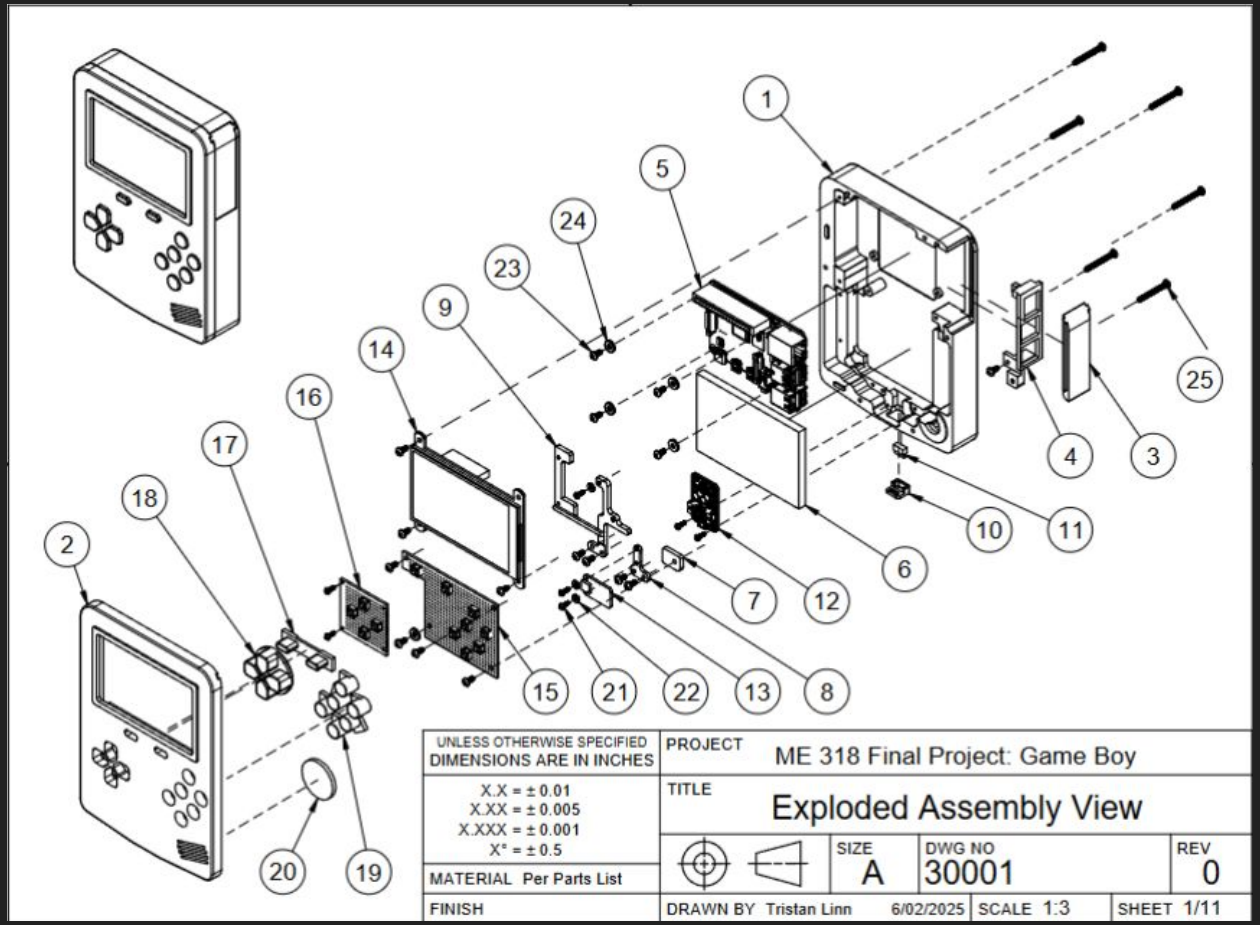
<u>Takeaways:</u>

- Be open-minded to alternatives for non-critical design features to reduce complexity or lessen design challenges down the pipeline.
- Continue to be thorough in design validation in the prototyping phase and do a full assembly test before final production of product.

<u>Areas of Improvement:</u>

- Lightweighting / Optimization for form factor and nominal stock
- Finishing past machine lines / Clear Coating to prevent scratches

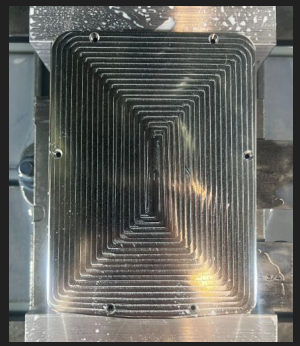
Appendix - Exploded View



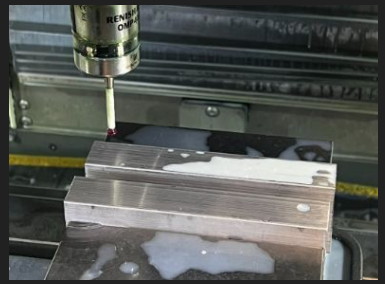
Appendix - Work Holding 1-4 (Bottom Case)

Bottom Case

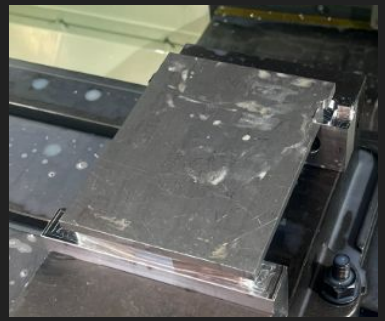
Backside



Soft Jaws



Port I/O

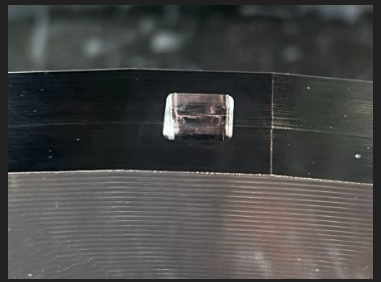


Port Panel Slot

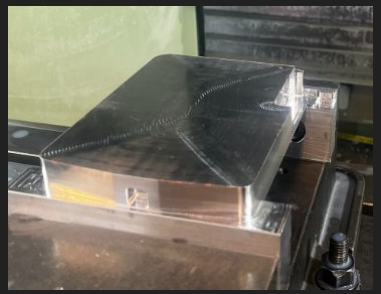
Appendix - Work Holding 5-8 (Bottom Case and Top Panel)

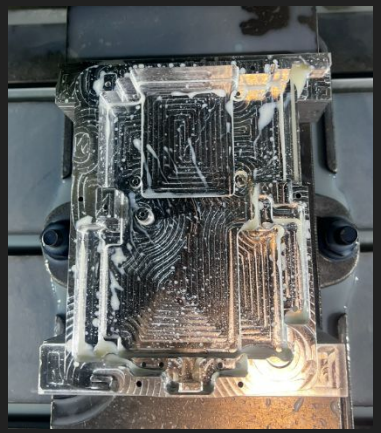
Bottom Case

Charge Port



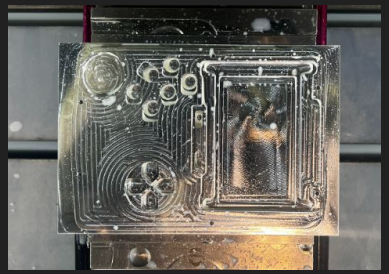
Internals





Top Panel

Back Side

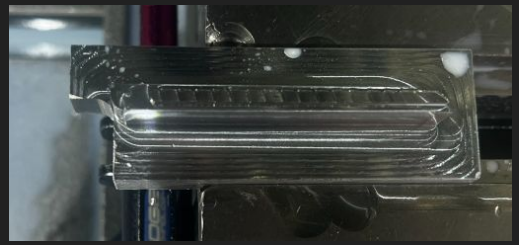


Front Side

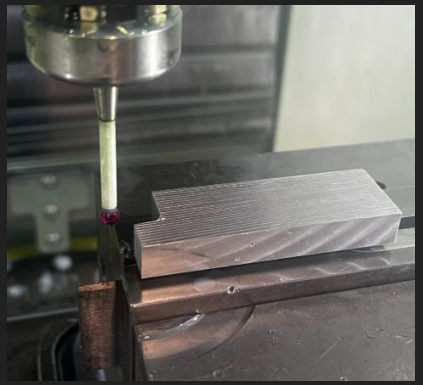
Appendix - Work Holding 9-11 (Port Cover)

Port Cover

Top Side



Bottom Side

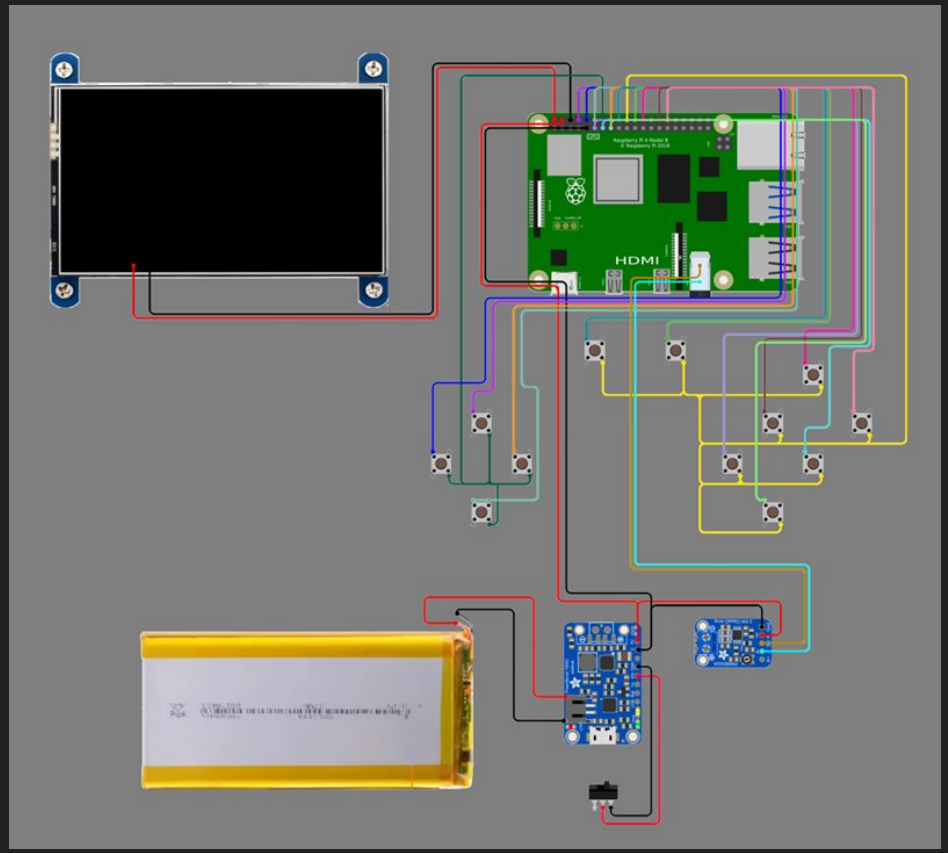


Engraving

Appendix - Circuit Diagram and Electronic Components

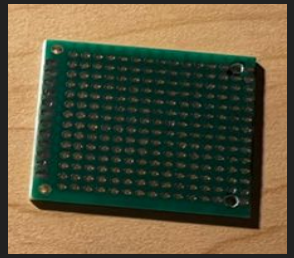
Electronic Components:

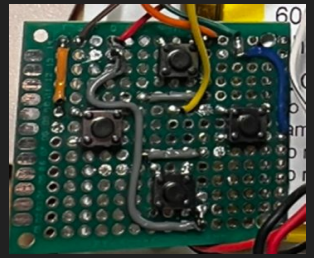
- Raspberry Pi 4 Model B
- WaveShare 4inch LCD
- 12 - 6mm Tactile Buttons
- 3.7V 4200mAh Battery
- 5v2A Step Booster
- Sound Amplifier
- Speaker
- 50V 0.5A SPDT 3mm Slide Switch



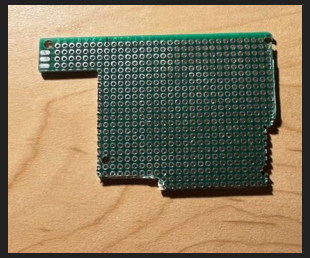
Appendix - Electrical Assembly

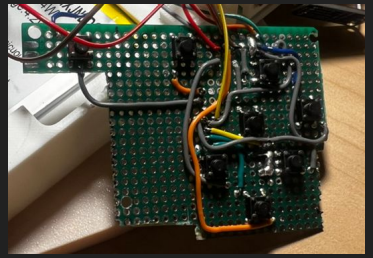
Left Gamepad



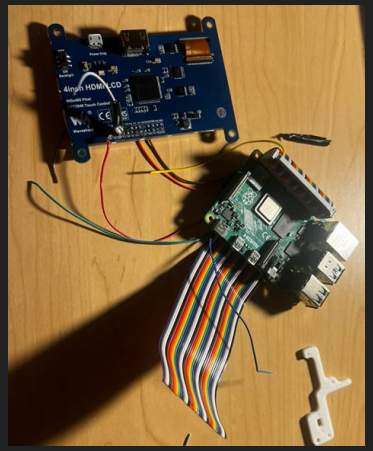


Right Gamepad

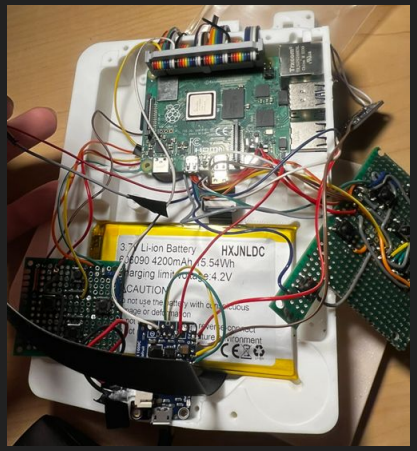




LCD to Pi

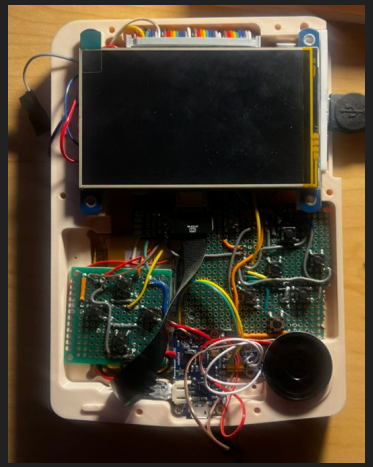


Gamepads to Pi



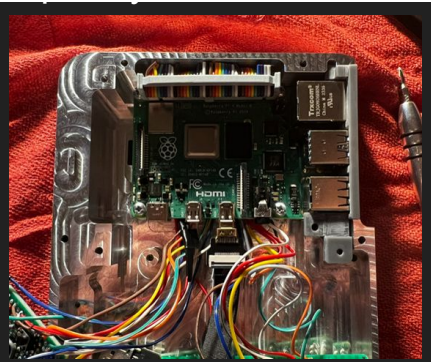
Step Booster + HDMI

Speaker and Install



Appendix - Final Assembly

Raspberry Pi and Port Cover



Battery, Mounts, Step Booster

LCD Screen, Game control Buttons, Sound Amplifier, Speaker

Top Panel and Buttons

Appendix - Budget

Part	Material	Actual Stock Size	Nominal Stock Size			"Purchased Stock Size"			QTY	Purchase Price	Nominal Price	Supplier	Salvage
			W	L	H	W	L	H					
Top Panel	Aluminum	7.49 x 5.054 x 0.50155	7.5	5	0.5	8	12	0.5	1	$24.99	$9.76	Amazon	Yes
Base Panel	Aluminum	4.875 x 6.665 x 1.08	4.875	6.75	1	8	8	1	1	$82.80	$42.57	McMaster	Yes
Mount Parts	Tough 2000	-	-	-	-	-	-	-	1	$5	$5	AMPS	No
4-40 x 1 Screw	Stainless								6	$0.04	$0.04	AMPS	No
4-40 x 0.25 Screw	Stainless								16	$0.02	$0.02	AMPS	No
2-56 x 0.25 Screw	Stainless								7	$0.07	$0.07	AMPS	No
Cover	Aluminum	1x3x1	1	3	1	1	3	1	1	82.8	$9.76	Same Stock as Base Panel	Yes
3D Prints	Gray Resin	49.67 mL							1	$0.14/mL	$6.95		
										Total	$75.10		