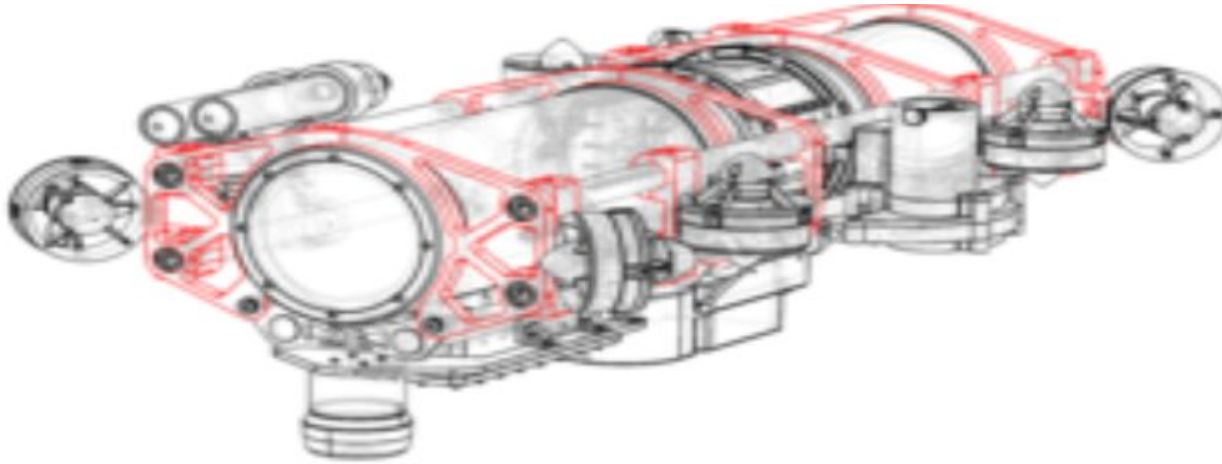# Carnegie Mellon TAUV (Tartan Autonomous Underwater Vehicle)

KINGFISHER

Project Description

Name: Acoustics Enclosure

Purpose and Specifications:

An enclosure is needed to hold hardware used to detect objects and aid the sub in navigation.
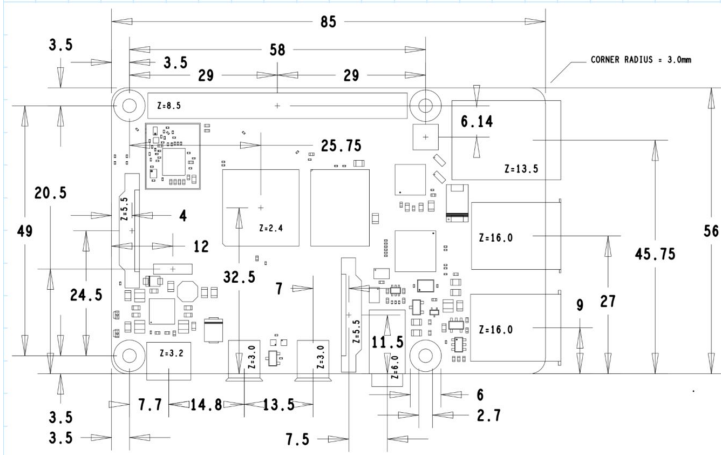
The enclosure should be 4 inches in diameter and hold:

- 2x ADALM Boards
- 1x Raspberry Pi
- 1x Power Board
- 4x Pre-Amps
- 4x XLR's

Side Note:
- The enclosure should be made with easy access to hardware (For quick adjustments for competition runs)

- Enclosure should not clash with vehicle design (Too long, Extravagant geometries, etc.)
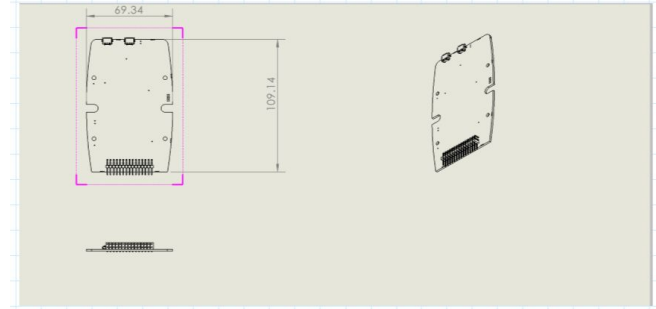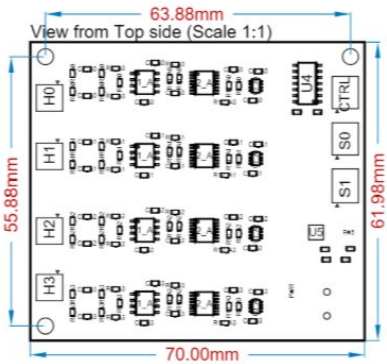
Hardware Specs.

Raspberry Pi

Length = 56mm

Width = 85mm

Adalm

Length = 109.14

Width = 69.34

Notes:
1. Mounting holes are M3 slip fit

Frontend Board

Length = 61.98 mm   distance b/w holes$_L$ = 55.88mm

Width = 70.00 mm   distance b/w holes$_w$ = 63.88 mm

Hardware Specs.

Specifications:

Default board setup: 26dB gain, differential output, P48 phantom-powered

Equivalent Input Noise:	-120dBV	10nF input shunt, A-weighted 20Hz – 22KHz, 1KΩ output load
Total Broadband Output Noise:	-88dBV	10nF input shunt, Unweighted 10Hz – 90KHz, 1KΩ output load
Bandwidth:	14Hz - 90KHz	+0/-0.5dB, 1KΩ output load
	4Hz - 270KHz	+0/-3dB, 1KΩ output load
THD+N:	<0.01%	@1KHz, -60 to -20 dBV input,1KΩ output load
Max output:	>8dBV RMS	@1KHz, 1KΩ output load, 1% THD
Current consumption:	8.5 mA	48V Phantom Power (from mic preamp)
	3.4 mA	24V Phantom Power (from mic preamp)
Gain:	26dB	Differential: pins 2 & 3 (Standard—can be factory-modified)
Z out:	17 Ω	Each phase to ground
Z in:	10 MΩ	(Standard—can be factory-modified to filter low frequencies)
Physical:	Ø19.7mm x 66.8mm, 42g. (Built on Switchcraft AAA3MZ connector)	

Hydrophone Pre-amp

GDQLCNXB XLR Female Jack 3 Pin Panel Mount Jacks, XLR Female Socket Connector 4Pcs,Silver Metal Housing.
Visit the GDQLCNXB Store
★★★★★ 3 ratings

$8.29

Get **Fast, Free Shipping** with Amazon Prime
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Get $100 off instantly: Pay $0.00 upon approval for the Amazon Store Card.

Product details

Brand	GDQLCNXB
Connector Type	XLR
Cable Type	XLR

- Product Name :XLR Female Jack 3 Pin - Chassis Panel Mount Jacks D Series Size.
- Packing : 4 Pcs XLR Panel Mount Socket
- Total Size : 31 x 26 x 21mm / 1.2" x 1.1" x 0.83"(L*W*H);Main Material : Plastic, metal,Silver Metal Housing.
- Heavy Duty Metal Design.Rivet or Screw in Design ,Patch Bay and Snake Cable Applications,Rack Mount and Rack Panel Ready.
- Rivet or Screw in Design,Separate ground contact to mating connector shell and front panel, Full GDQLCNXB Audio Guarantee.

Roll over image to zoom in

Drafted Design - Body
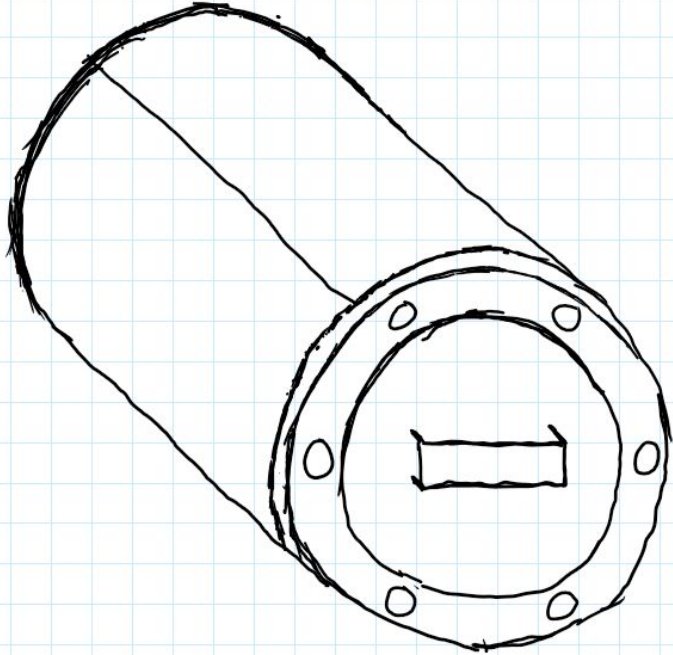
- Simple cylindrical tube design with a removable faceplate for easy access to hardware.

- O-rings are fixed to both ends of the tube to prevent water from seeping in

Note/Concern: The removable faceplate has to be sealed in a way that allows it to be easily removed while preventing water intrusion.
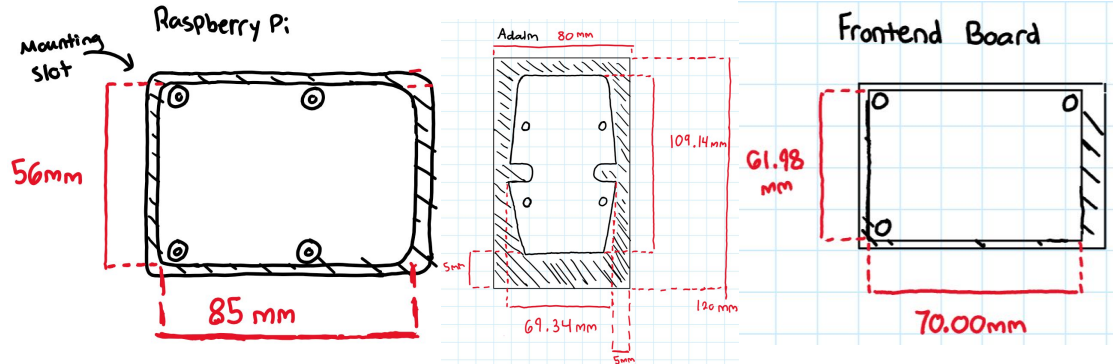
Drafted Design - Hardware Rack
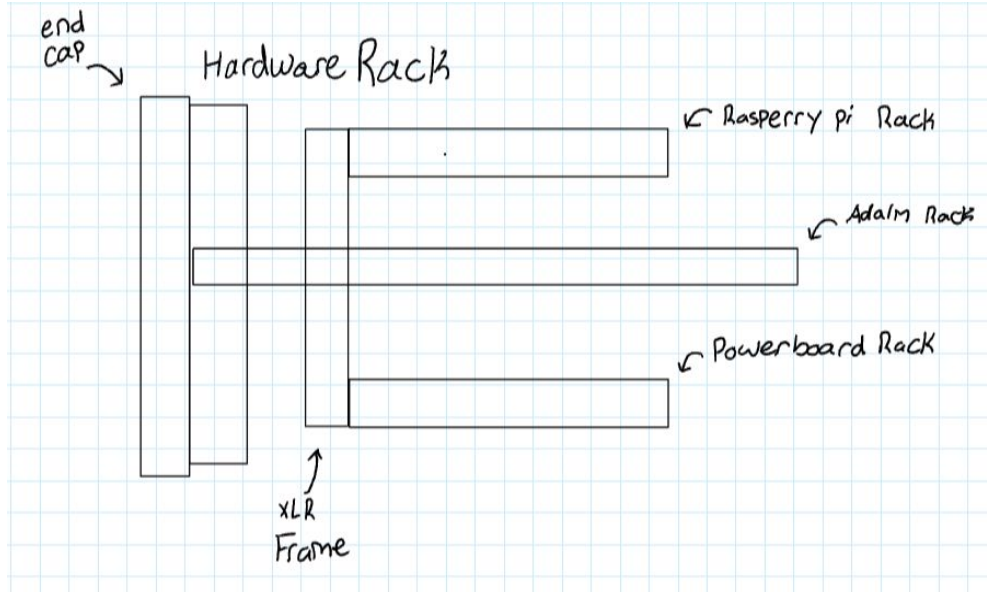
- The distance between the Raspberry Pi and ADALM should be at least 20mm due to the height of the board and its components.

- The XLR's will be screwed into the same plate that each rack extrudes from, minimizing the length of tube needed
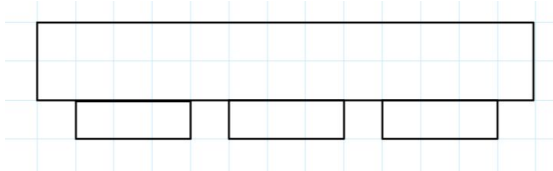
Potential Design Issues:
- The racks are only supported at the XLR Frame which could lead to sagging and deformation of the part.
- The issue stated also applies to the connection of the rack to the end-cap, which is held by a single beam

Drafted Design - Mounting Slots

Raspberry Pi
Mounting slot
56mm
85 mm

Adam 80 mm
109.14mm
69.34mm
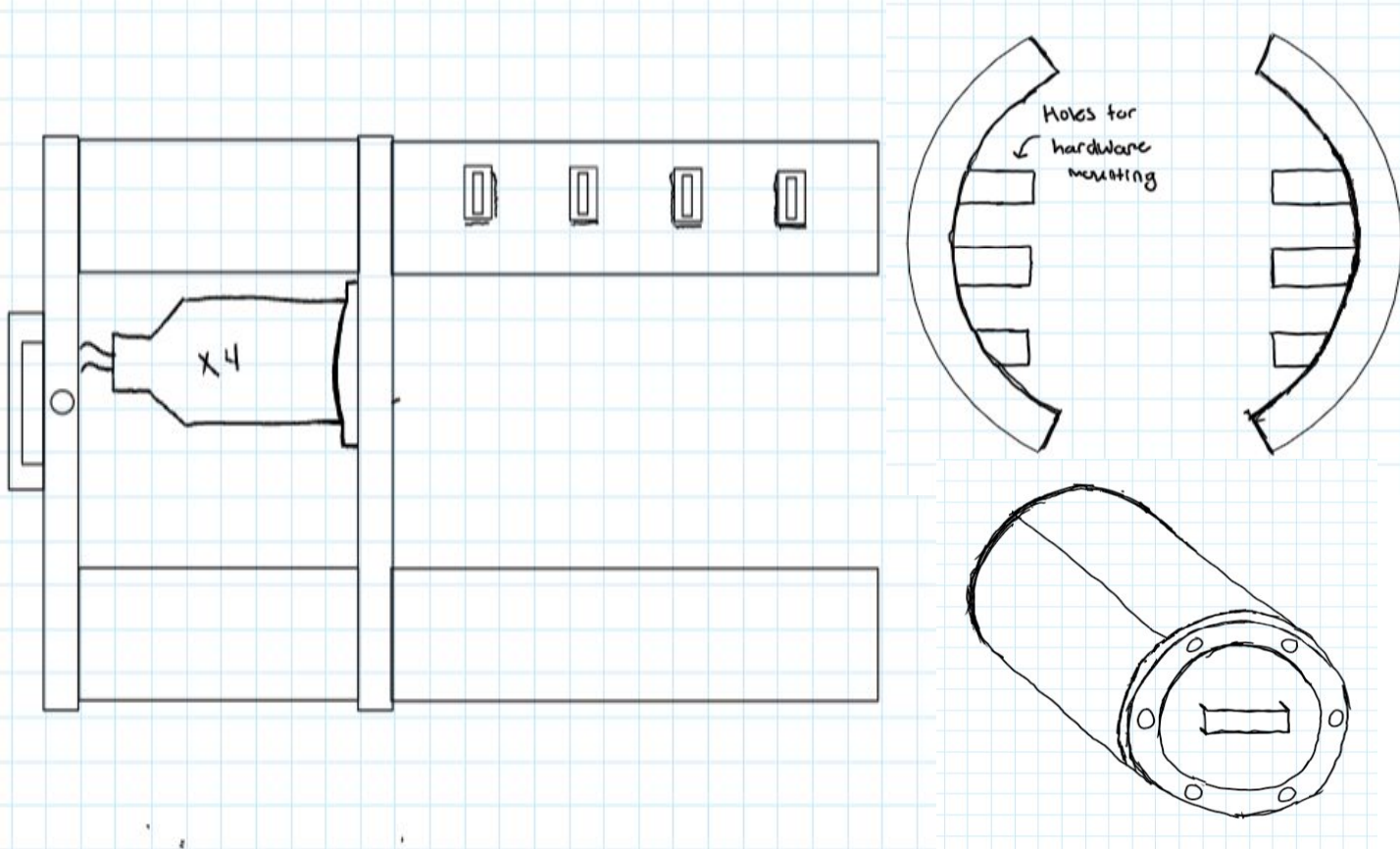120 mm
5mm
5mm

Frontend Board
61.98 mm
70.00mm

- Each Mounting Slot has "teeth" that will fit into the hardware rack.

- Rectangular teeth prevent forward and backward sliding.

Potential Design Issues:
-   How will movement along the y axis be prevented? The hardware should be fully constrained.
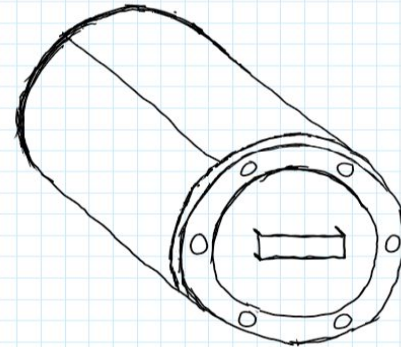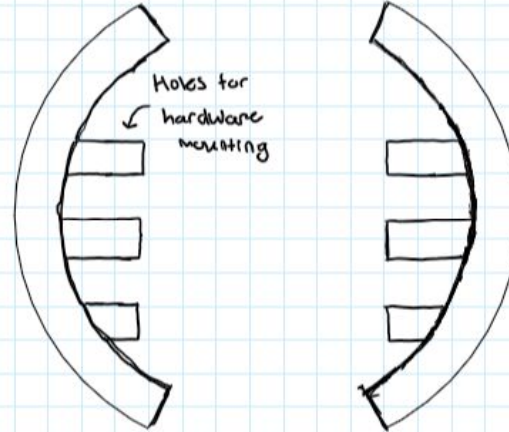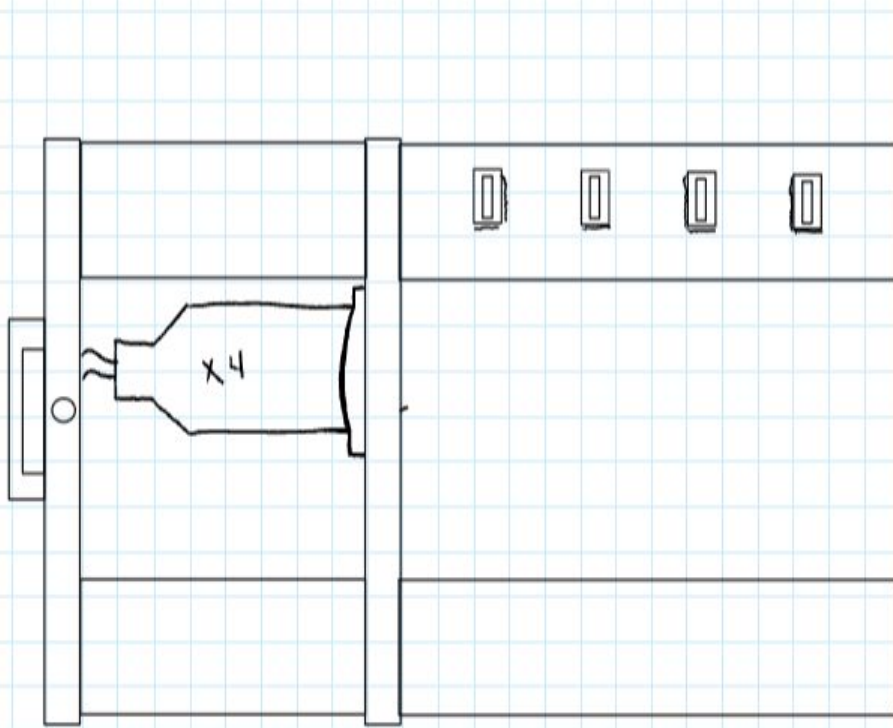
Final Sketch

Holes for hardware mounting

x4

Solution to XLR Frame & Hardware Rack Integrity:

The frame has supporting beams connecting to the removable faceplate, providing a robust structure for the hardware rack.
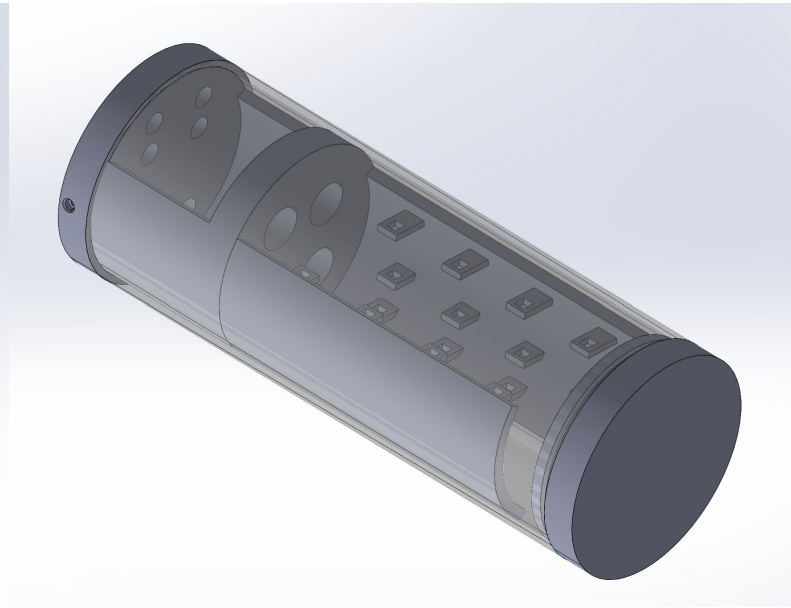
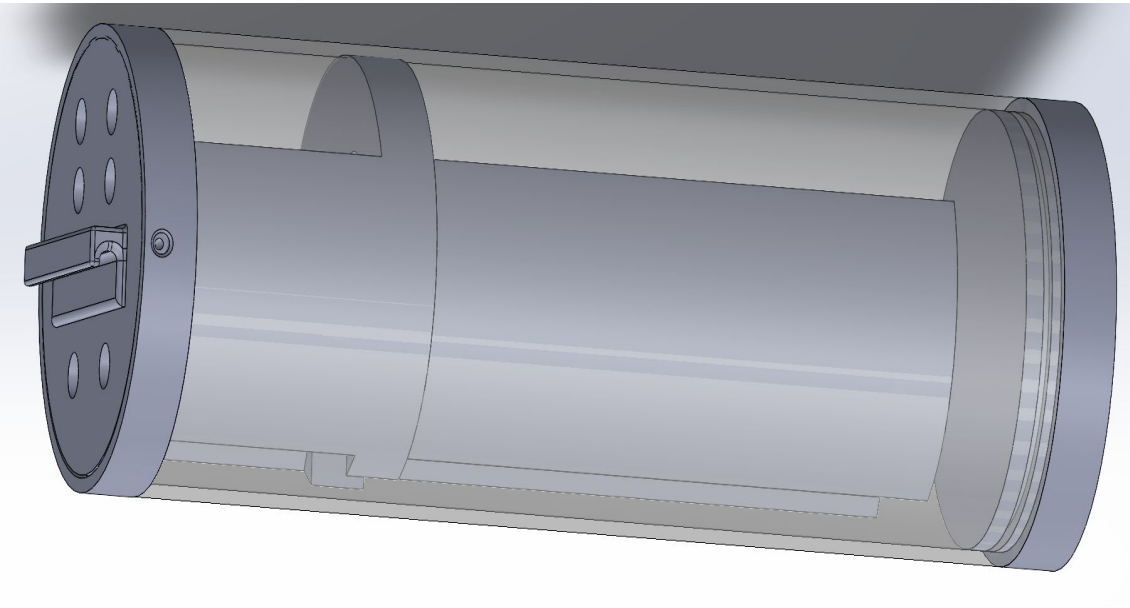# Final Sketch

Holes for
hardware
mounting

Solution to constraining the mounting slots:

The mounting slots will be press fit, so they will not fall out during operation.

Alternatively, along the end-cap on the far end of the enclosure, there are bars that will be fixed to the end-cap. These bars slide along the top edge of the hardware racks, blocking any upward motion.
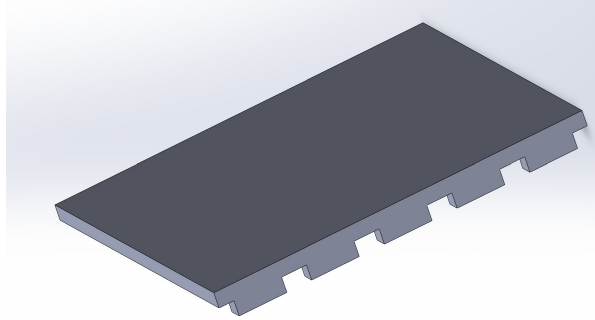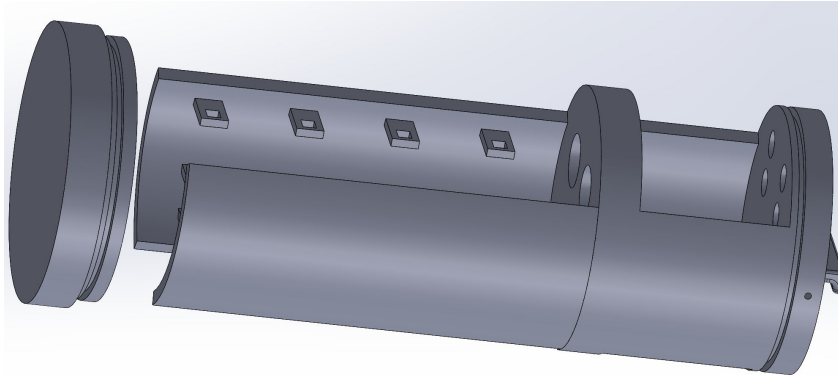
Solidworks Design

Additional Sketches and CAD

- Hardware mount concept

- Full assembly without Tube
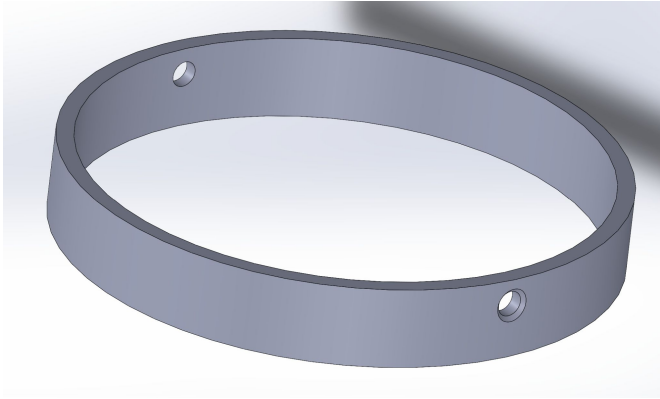
- Tube ring design.
- This is fixed to the tube using epoxy and allows screws to drive through into the hardware plate.