Renewable Energy Lab Weather Station

67% Build Update

By:

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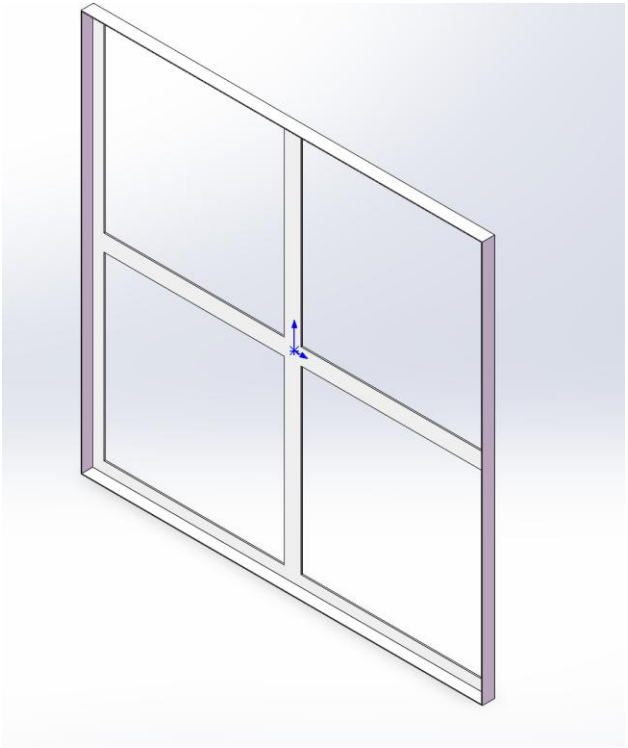
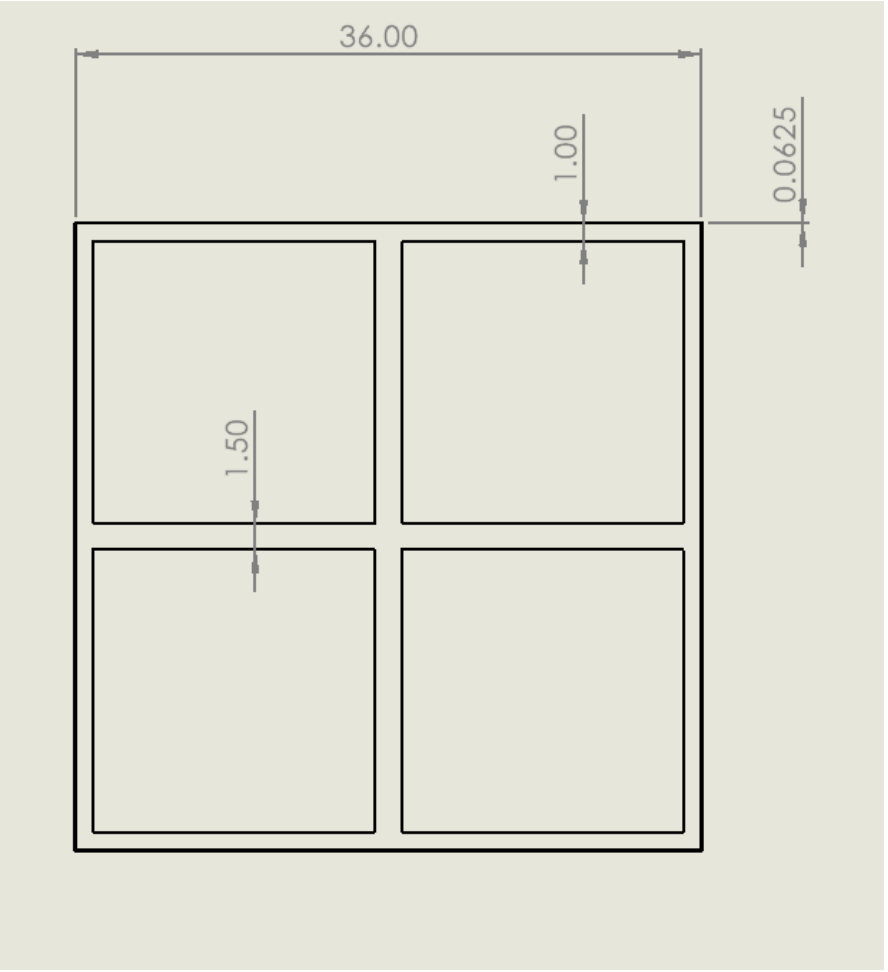
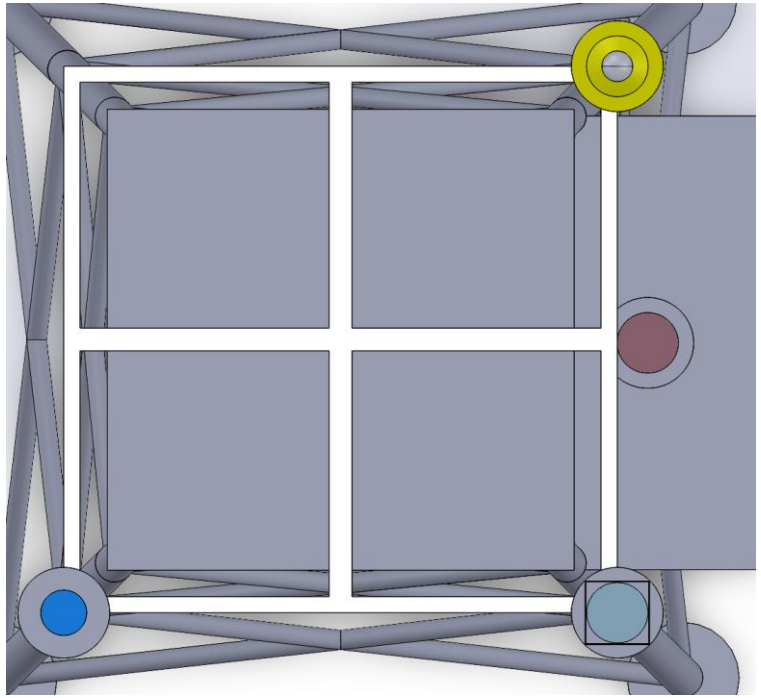
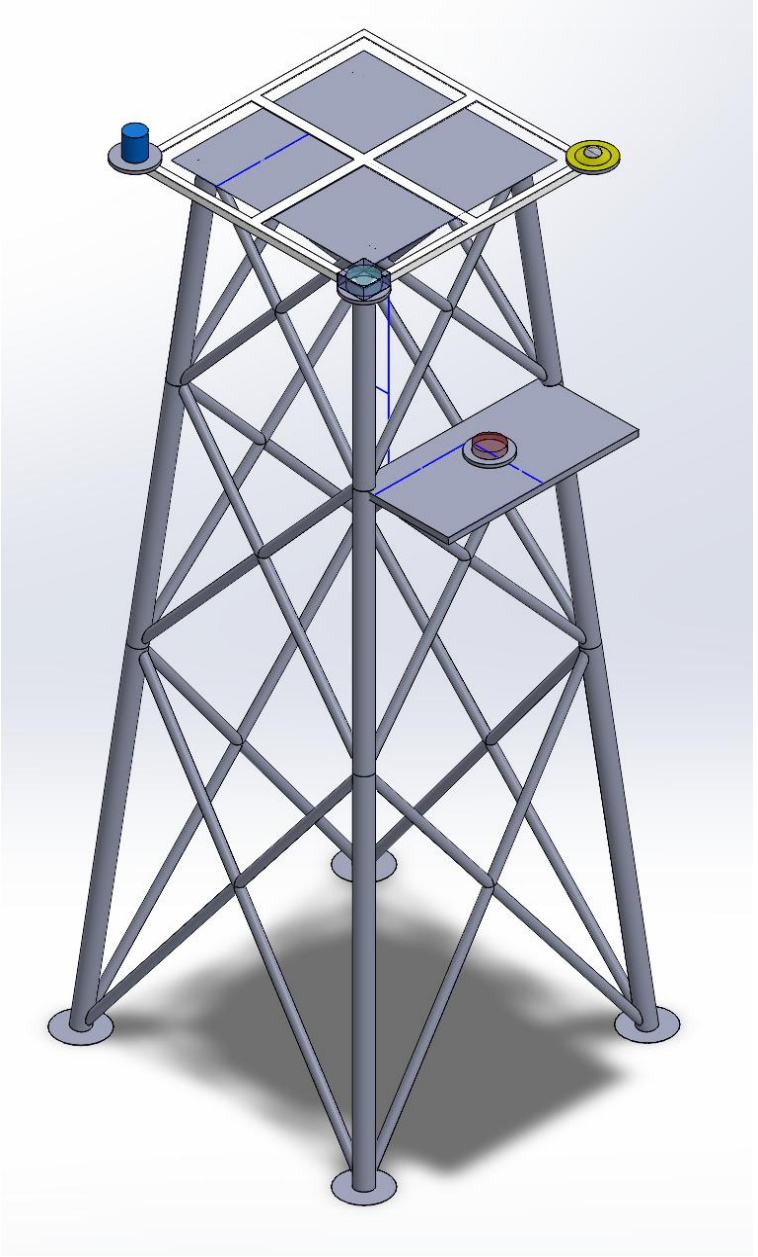
CAD – Aluminum Crossbar



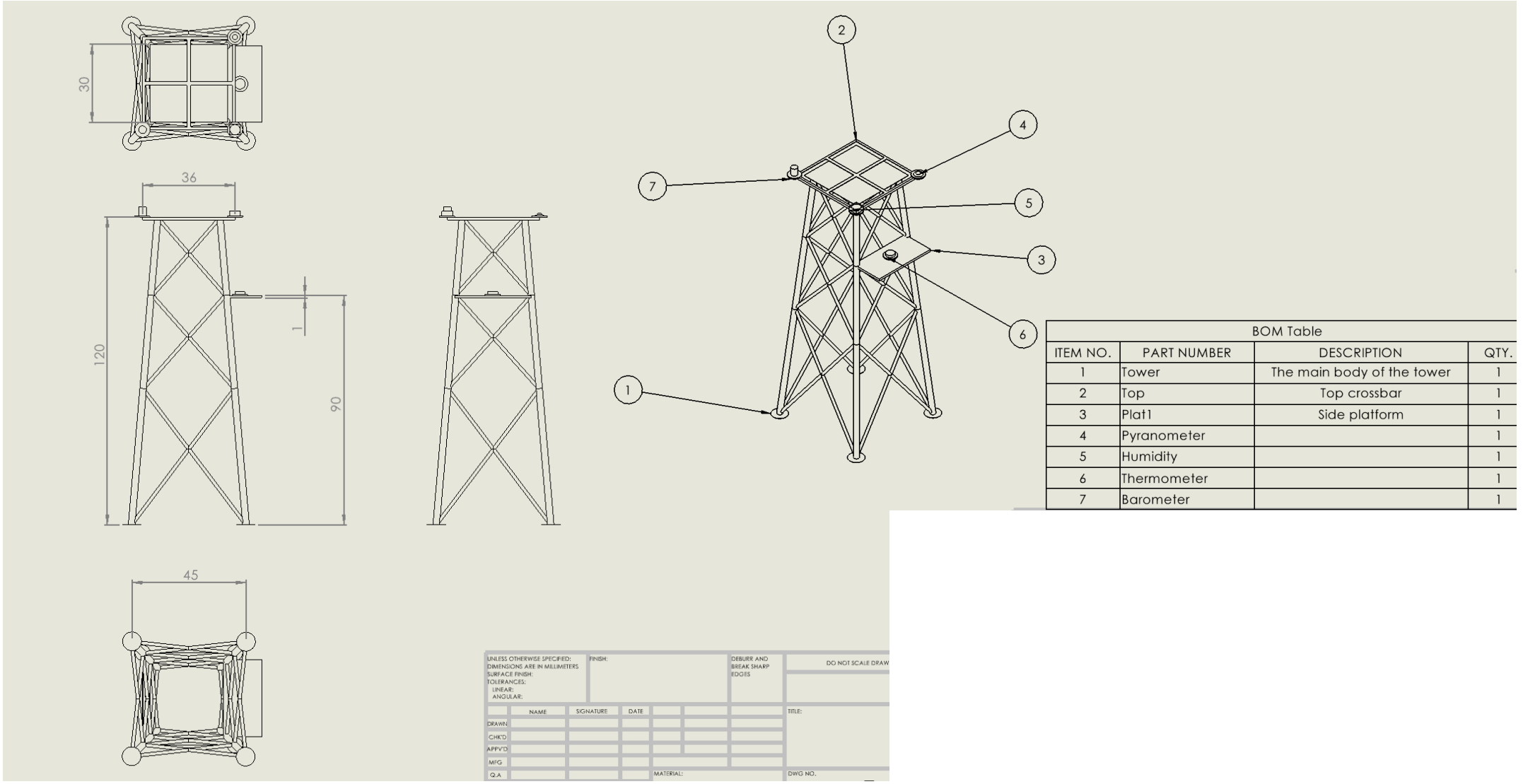


CAD – Weather Tower





Design Description

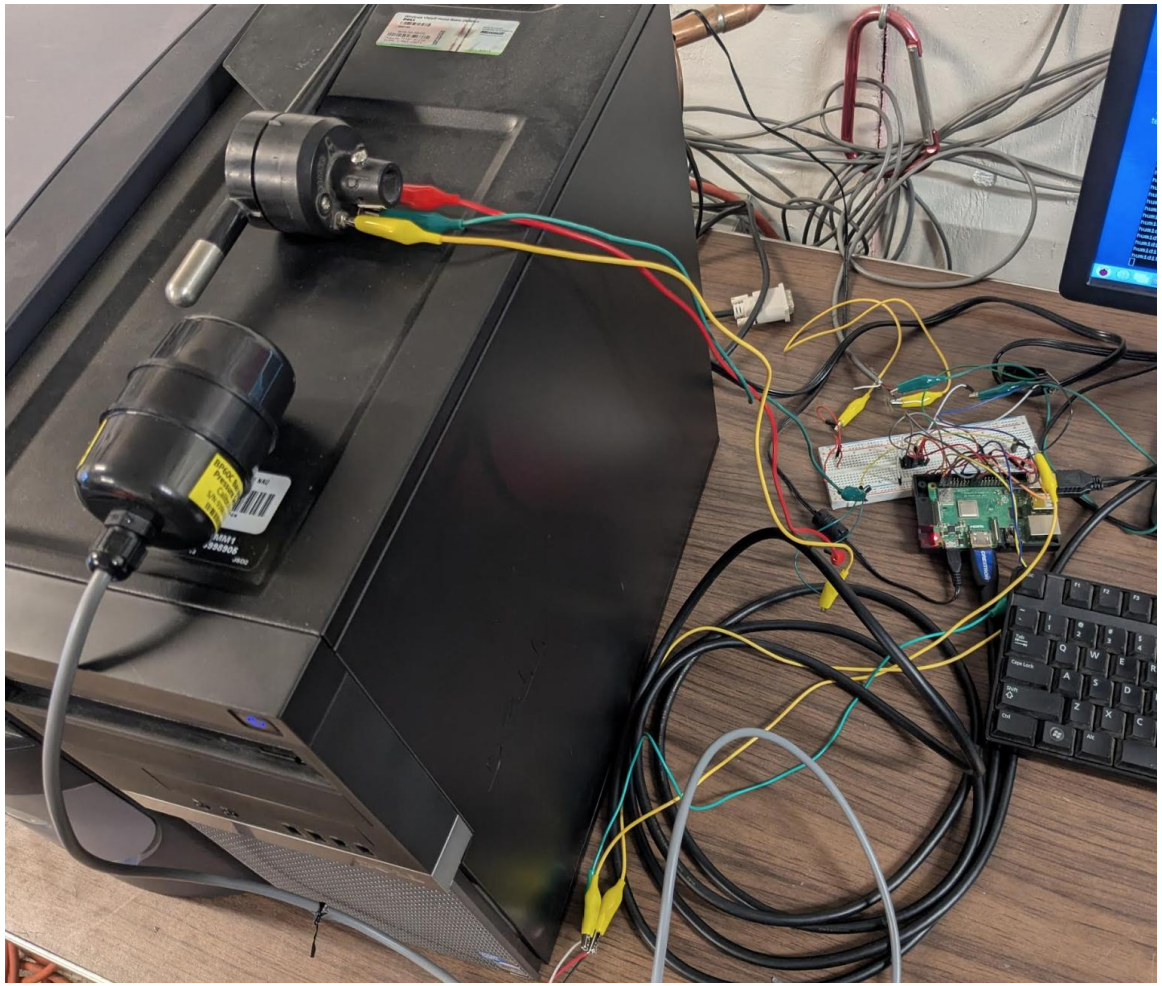


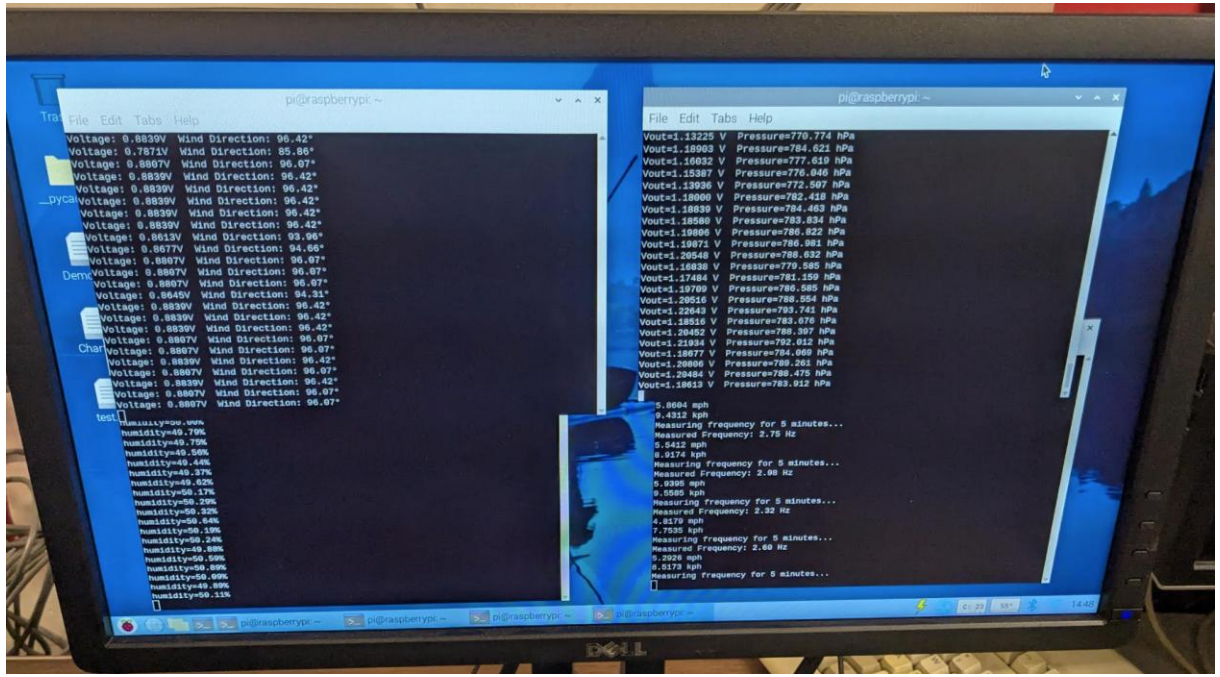
BOM Table			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Tower	The main body of the tower	1
2	Top	Top crossbar	1
3	Plat1	Side platform	1
4	Pyranometer		1
5	Humidity		1
6	Thermometer		1
7	Barometer		1

Weather Tower Status

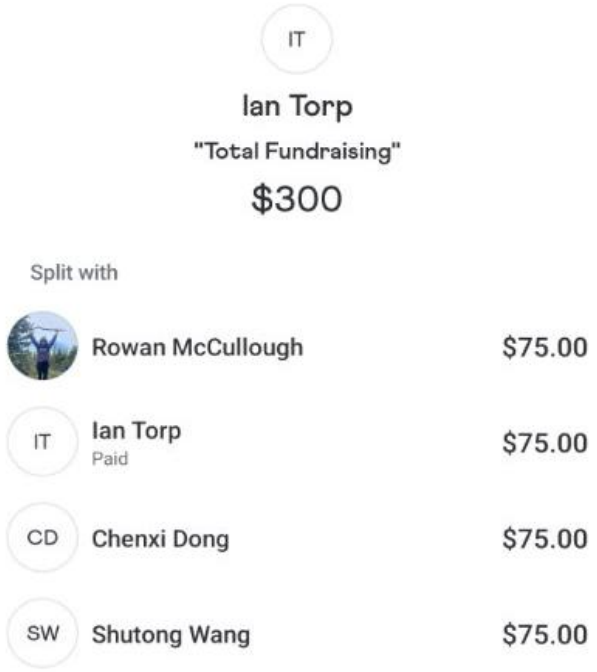
- Crossbar assembled and mounted

Current Sensor Connections





Budget



$250.41 Remaining

Client Funding Support: $500

Item	Total Cost:	Remaining Budget
Crossbar Aluminum	67.38	432.62
Hardware	14.19	418.43
Monitor	37.42	381.01
EKO Converter Cable	104.2	276.81
Replacement Raspberry PI	85.42	191.39
	Remaining Budget:	$191.39

Total Spending Budget: $800
Total Remaining: $441.8

Bill Of Materials

Material	Quantity	Cost	Part Status	Make/Buy	Primary vender	Manufacturer	Lead Time	Link to Product
Onn MicroSD card 32gig	1	6.96	Arrived	Buy	Walmart	Onn	Same Day	https://www.wal
MCP3008 Analog to Digital Converter	2	15.3	Arrived	Buy	Amazon	Bridgold	Two Day	https://www.am
BME280 Sensor	2	14.1	Arrived	Buy	Amazon	Qoroos	Next Day	https://www.am
Model MS60 Pyranometer	1	3100	In house	Preowned	NRG	EKO	N/A	https://eko-instr
T60C Temperature NRG Sensor	1		In house	Preowned	NRG	NRG	N/A	https://www.nrg
Wind Vane NRG #200P	1		In house	Preowned	NRG	NRG	N/A	https://www.car
NRG #40C Anemometer	1		In house	Preowned	NRG	NRG	N/A	https://www.nrg
NRG BP60 Barometric Pressure Sensor	1		In house	Preowned	NRG	NRG	N/A	https://www.nrg
Raspberry Pi 3 model B+	1	35	In house	Preowned	Mouser	Raspberry Pi	N/A	https://www.mo
Wire/cabling	1	22c/ft	In house	Preowned	Home Depot	Syston	N/A	https://www.hor
1/2 emc tubing	7	N/A	In house	Preowned	N/A	N/A	N/A	N/A
3/4 emc tubing	18	N/A	In house	Preowned	N/A	N/A	N/A	N/A
36/1/(1/16) Angle Gage Aluminum	4	34.32	Arrived	Buy	Home Depot	Everbilt	Same Day	https://www.hor
1.5/36/(1/8) Flat Bar Aluminum	2	27.28	Arrived	Buy	Home Depot	Everbilt	Same Day	https://www.hor
2' Boom Mount	1	N/A	In house	Preowned	N/A	N/A	N/A	N/A
Voltage Amplifier (AD620)	1	13.23	Arrived	Buy	Amazon	Midzooparts	6-10 Day	https://www.am
Mounting Hardware	4	14.19	Arrived	Buy	Home Depot	Everbilt	Same Day	https://www.hor
EKO Converter Cable	1	104.2	Arrived	Replace	EKO	EKO	4-6 Day	https://eko-instr
Monitor	1	37.42	Arrived	Buy	NAU Surplus	Dell	Same Day	N/A
Backup Raspberry PI 4B	1	85.42	Shipping	Buy	ADA Fruit	Sony	4-6 Day	https://www.ada
	Total Cost:	3487.42	100% ordered					
			95% Arrived					

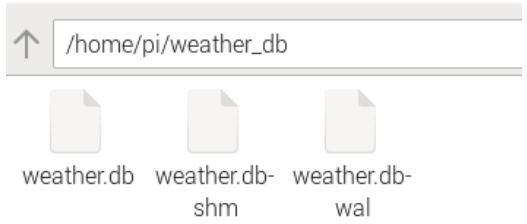
Manufacturing Plan

- Sensors still need to be mounted on crossbar/tower and permanently wired through conduit tubing into RE Lab.

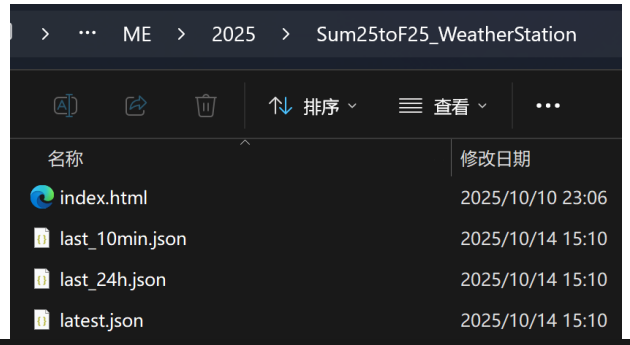
Manufacturing Items	Status	Completion Date
Crossbar Aluminum	Assembled	7-Oct
Crossbar Hardware	Assembled	12-Oct
Sensor Mounting Hardware	Owned	N/A
EMC Electrical Conduit	Owned	N/A
Long-Term Wiring	Owned	N/A
EKO Converter Cable	Purchased	N/A

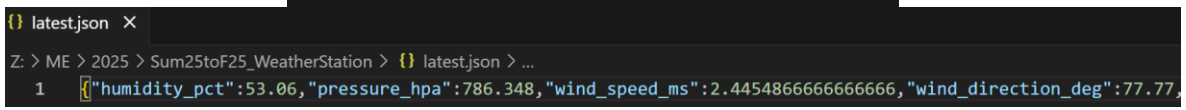
Database and transmission protocol

After the sensor starts running, it will automatically create a database file on the Raspberry Pi

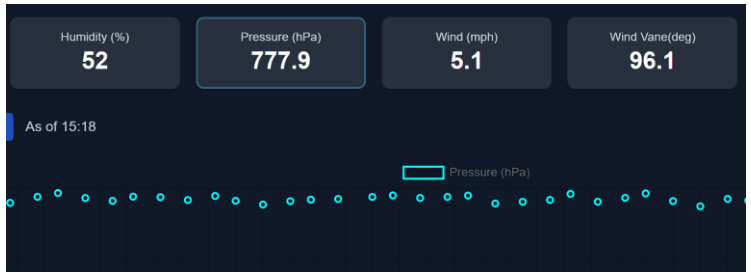


After the data is successfully written to the database, it will be exported as a .json file directly in the NAU website folder via the SMB protocol.



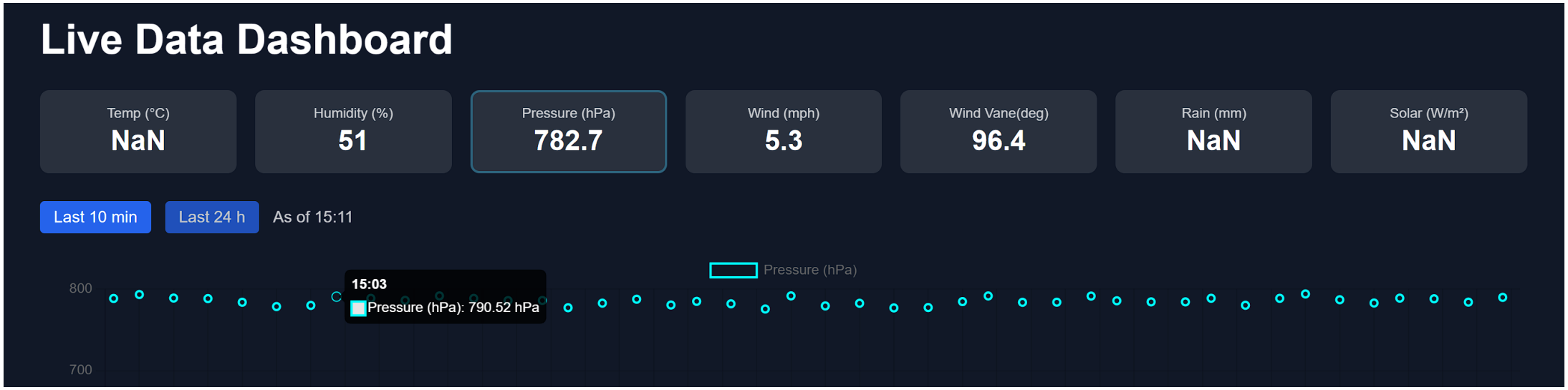


Finally, the front-end .html of the website will automatically read various sensor data in .json and display them on the web page.



Website Dashboard

Weather Station

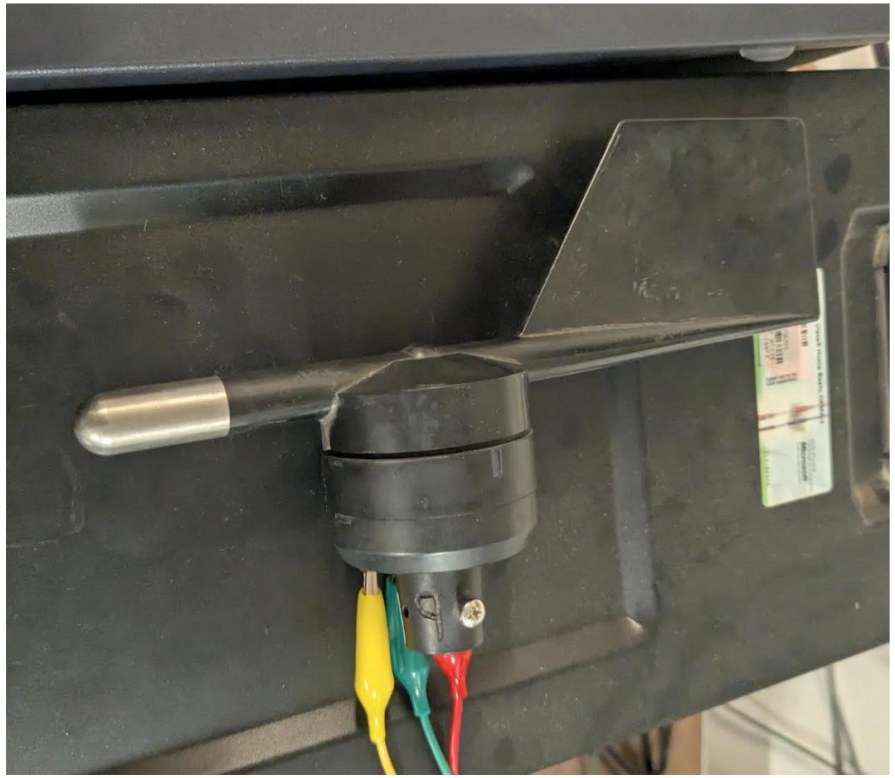


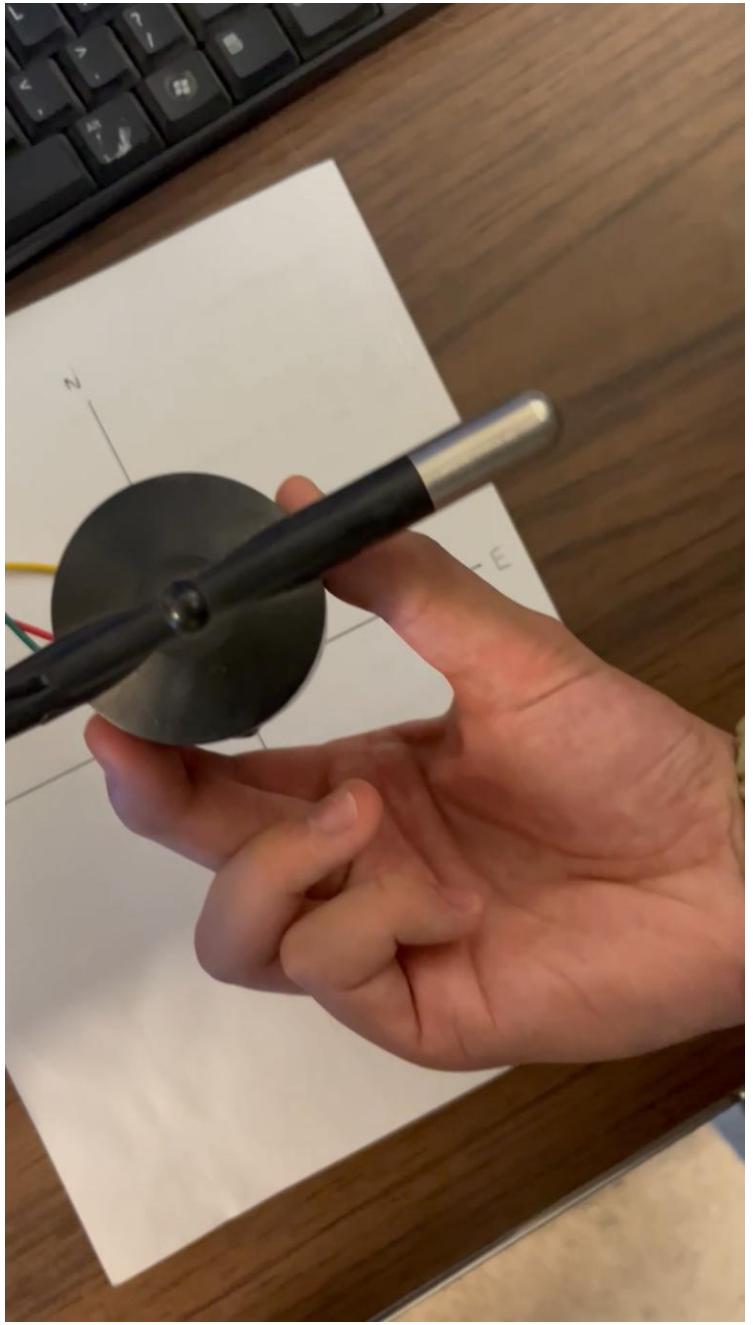
Anemometer

- Second Anemometer Attached
- 90ft
- Outputting Data to Website
- Pre-existing, used previously built code to connect.

Wind Vane

- Outputs Degree Angle
- 0° = N
- 90° = E
- 180° = S
- 270° = W





Barometric Pressure Sensor

- Output Voltage
- P=243.87*V+494.426 (instruction)
- Final data
- We ultimately obtained a barometric pressure of approximately 785 hPa.

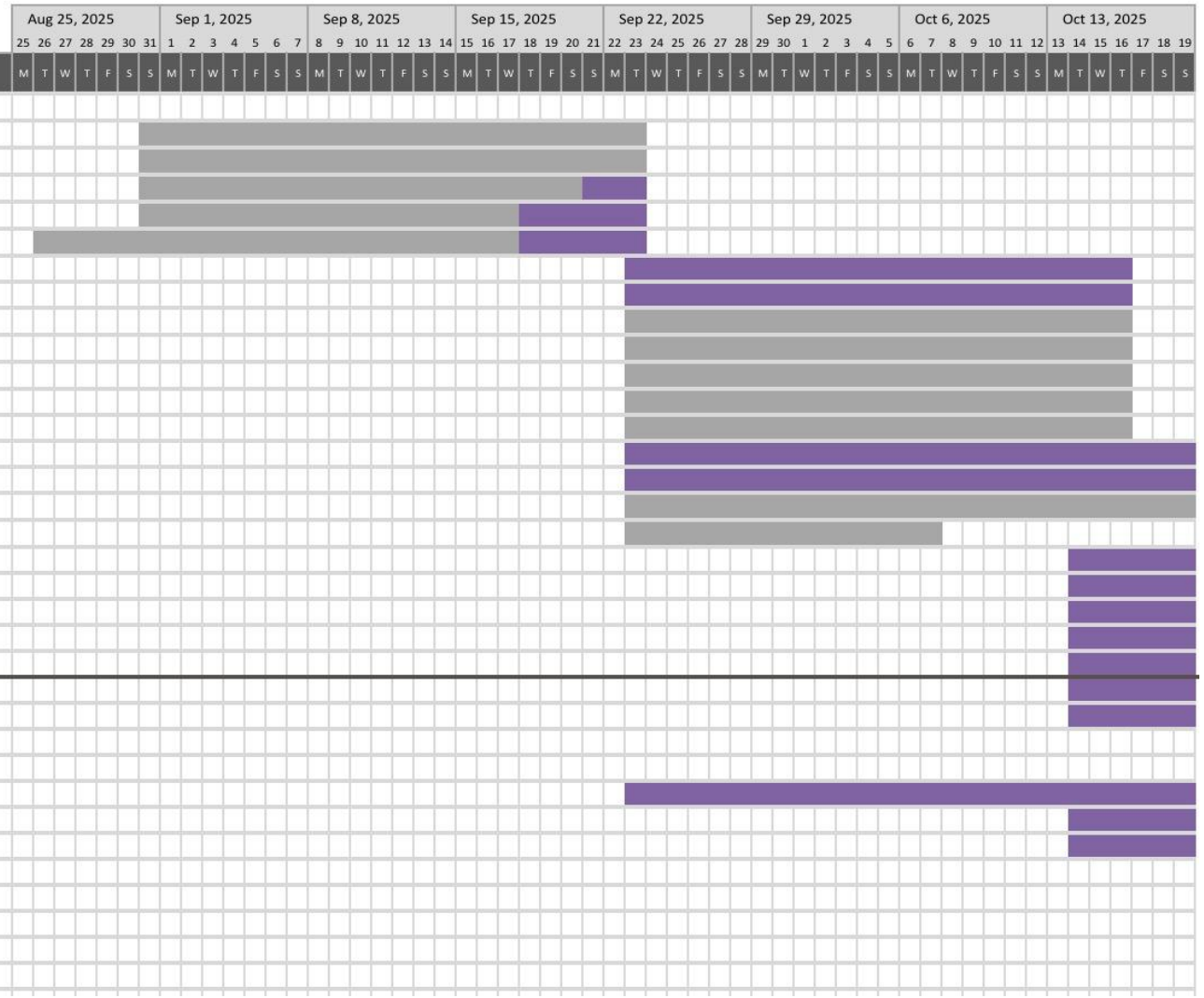
Gantt Chart

Weather Station

NAU Capstone

Project Start:	Tue, 8/26/2025
Today:	10/14/2025
Display Week:	1

TASK	ASSIGNED TO	PROGRESS	START	END
Hardware Status 33%				
Sensor connection and code	Ian	100%	8/31/25	9/23/25
Gantt Chart	Shutong	100%	8/31/25	9/23/25
Material purchase, order and assembly	Ian&Rowan	88%	8/31/25	9/23/25
Website Updates	Chenxi&Shutong	75%	8/31/25	9/23/25
Modification and improvement of CAD part	Chenxi	80%	8/26/25	9/23/25
Testing (Anemometer)	Rowan	0%	9/23/25	10/16/25
Testing (BME280)	Rowan	0%	9/23/25	10/16/25
Hardware Status 67%	Everyone	100%	9/23/25	10/16/25
Programming (Wind Vane)	Ian	100%	9/23/25	10/16/25
Physical Connection (Wind Vane)	Ian	100%	9/23/25	10/16/25
Programming (Pressure Sensor)	Chenxi & Shutong	100%	9/23/25	10/16/25
Physical Connection (Pressure Sensor)	Chenxi & Shutong	100%	9/23/25	10/16/25
Testing (Pyranometer)	Rowan	0%	9/23/25	11/6/25
Testing (Wind Vane)	Rowan	0%	9/23/25	11/6/25
CAD	Chenxi	60%	9/23/25	11/18/25
Website Check #1	Chenxi&Shutong	100%	9/23/25	10/7/25
Programming (Thermometer)	Chenxi	0%	10/14/25	11/6/25
Connection (Thermometer)	Chenxi	0%	10/14/25	11/6/25
Programming (Pyranometer)	Ian	0%	10/14/25	11/6/25
Connection (Pyranometer)	Ian	0%	10/14/25	11/6/25
Mounting	Rowan	0%	10/14/25	11/6/25
Testing (Thermometer)	Rowan	0%	10/14/25	11/6/25
Testing (Pressure Sensor)	Rowan	0%	10/14/25	11/6/25
Future				
Efest Registration	Ian	0%	10/21/25	10/21/25
Finalized Testing plan	Rowan	0%	9/23/25	10/31/25
Hardware Status 100%	Everyone	0%	10/14/25	11/4/25
Final CAD	Chenxi	0%	10/14/25	11/6/25
Product Demo/Final Testing	Rowan	0%	11/6/25	11/18/25
Final Report	Everyone	0%	11/6/25	11/28/25
Client Handoff	Everyone	0%	11/20/25	11/28/25
Final Website check	Everyone	0%	11/20/25	11/28/25
Efest	Everyone	0%	12/5/25	12/5/25



Thank You & Questions?