Salico

Project Updates

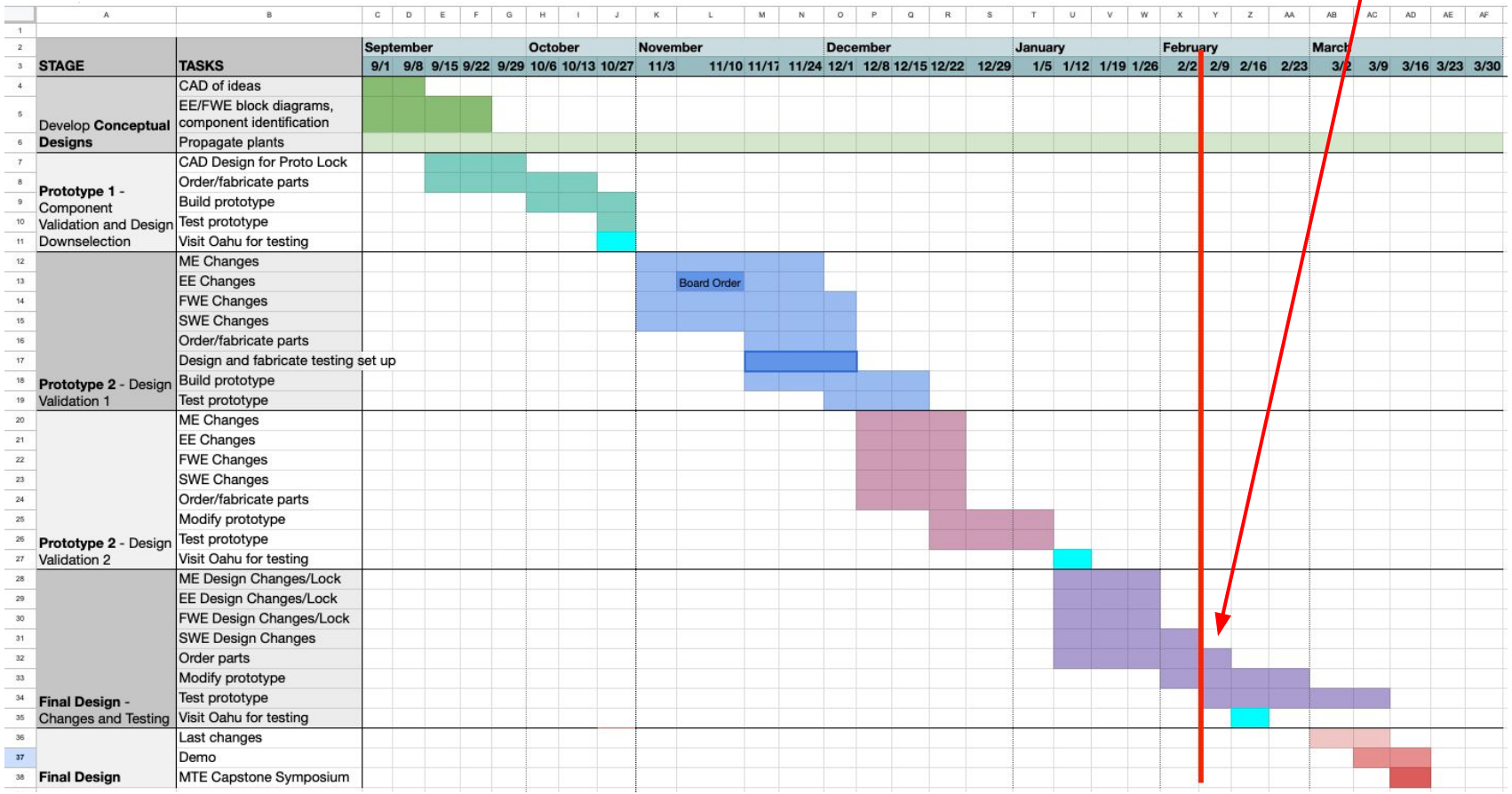
02.05.2025

Agenda

- **Schedule**
- **Prototype 2**
  - Design
  - Build
  - Testing (01/11-01/13)
- **Current Design**
  - Overview
  - Mechanical
  - Electrical
  - Firmware
  - Software
- **Upcoming Plans**
  - Last round of testing (02/13-02/17)
  - Final Design
  - Symposium, final meetings
  - After
- **Other**
  - Funding
  - Thank you

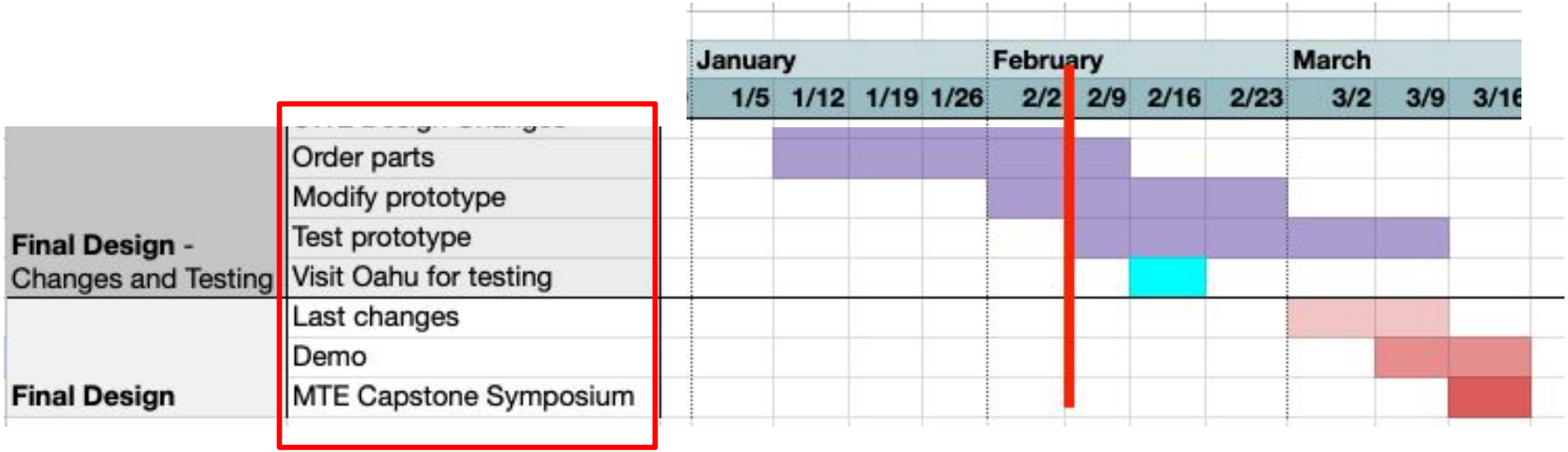
Schedule

We are here



STAGE	TASKS	September 9/1	9/8	9/15	9/22	9/29	October 10/6	10/13	10/27	November 11/3	11/10	11/17	11/24	December 12/1	12/8	12/15	12/22	12/29	January 1/5	1/12	1/19	1/26	February 2/2	2/9	2/16	2/23	March 3/2	3/9	3/16	3/23	3/30
Develop **Conceptual Designs**	CAD of ideas																														
	EE/FWE block diagrams, component identification																														
	Propagate plants																														
Prototype 1 - Component Validation and Design Downselection	CAD Design for Proto Lock																														
	Order/fabricate parts																														
	Build prototype																														
	Test prototype																														
	Visit Oahu for testing																														
Prototype 2 - Design Validation 1	ME Changes																														
	EE Changes																														
	FWE Changes																														
	SWE Changes																														
	Order/fabricate parts																														
	Design and fabricate testing set up																														
	Build prototype																														
	Test prototype																														
Prototype 2 - Design Validation 2	ME Changes																														
	EE Changes																														
	FWE Changes																														
	SWE Changes																														
	Order/fabricate parts																														
	Modify prototype																														
	Test prototype																														
	Visit Oahu for testing																														
Final Design - Changes and Testing	ME Design Changes/Lock																														
	EE Design Changes/Lock																														
	FWE Design Changes/Lock																														
	SWE Design Changes																														
	Order parts																														
	Modify prototype																														
	Test prototype																														
	Visit Oahu for testing																														
Final Design	Last changes																														
	Demo																														
	MTE Capstone Symposium																														

Schedule

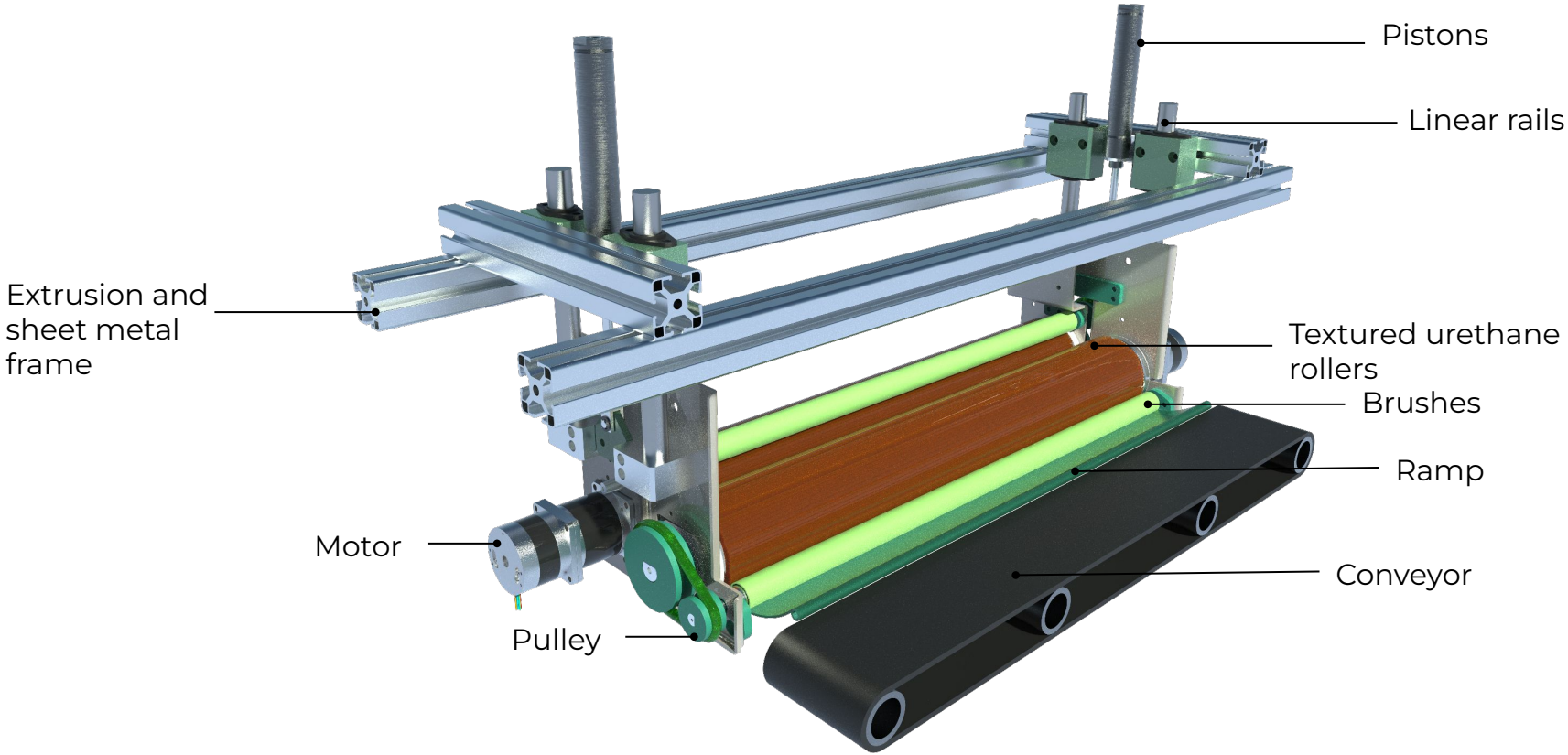


Currently modifying our prototype

After our trip, we will only have time for finishing touches and our symposium

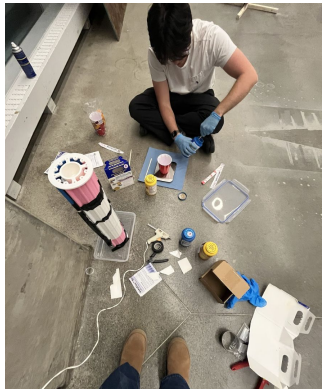
Prototype 2

Prototype 2 Design



Building Prototype 2

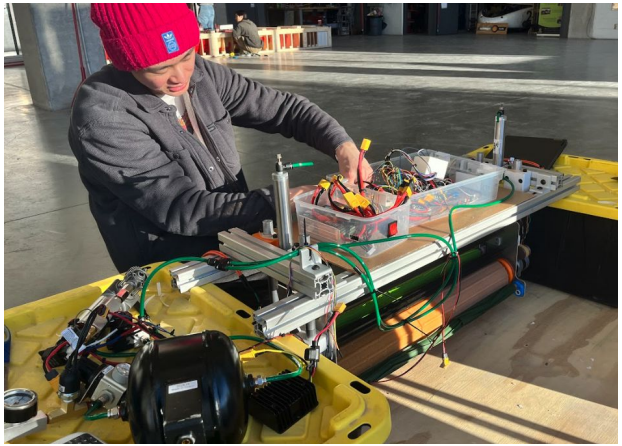
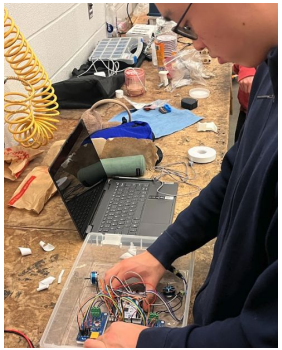
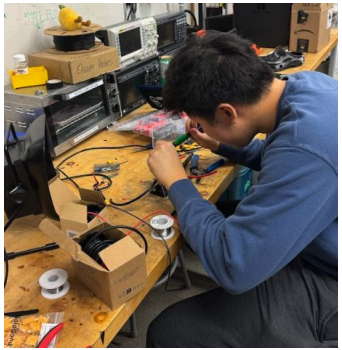
Casting the 2 ft long rollers...



Assembling the frame



Adding motors and pneumatics

Oahu Trip 2: Test Setup

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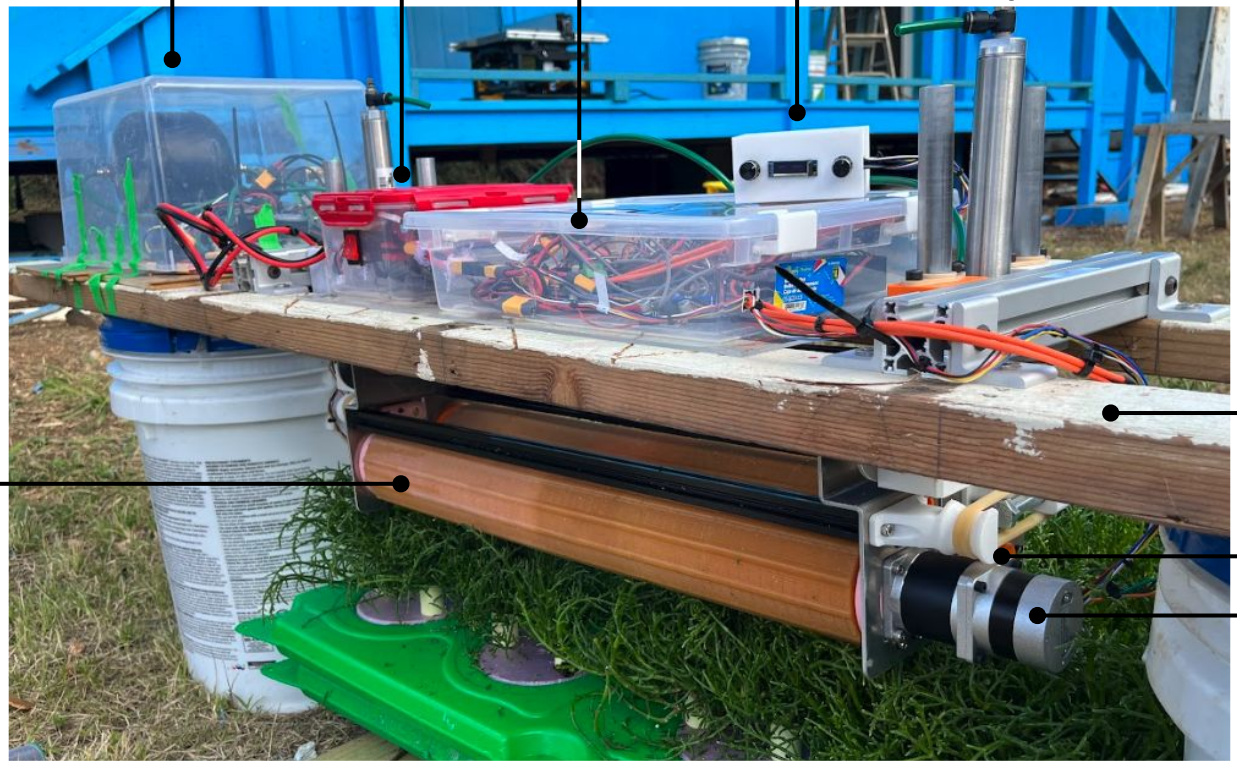
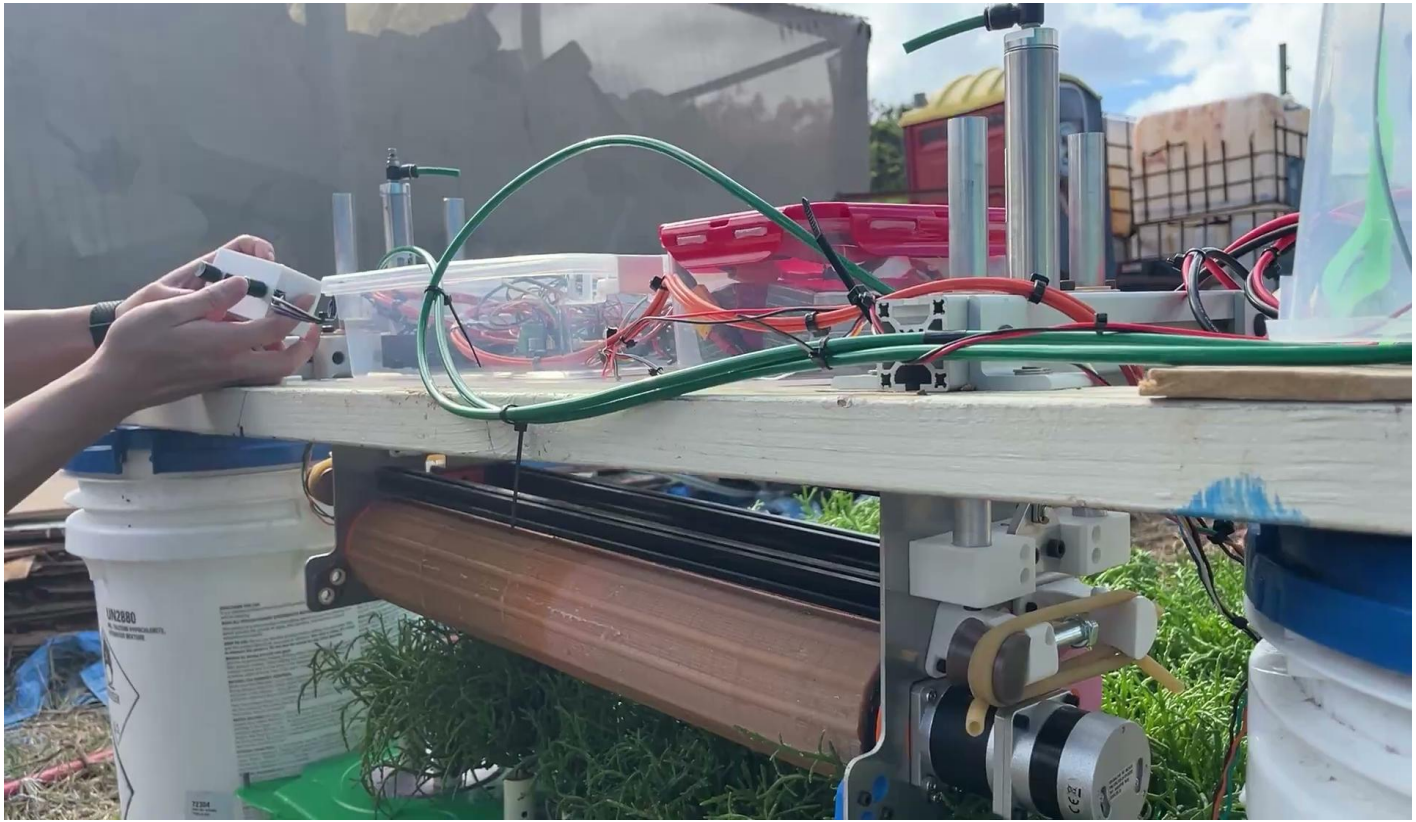


Oahu Trip 2: Test Videos

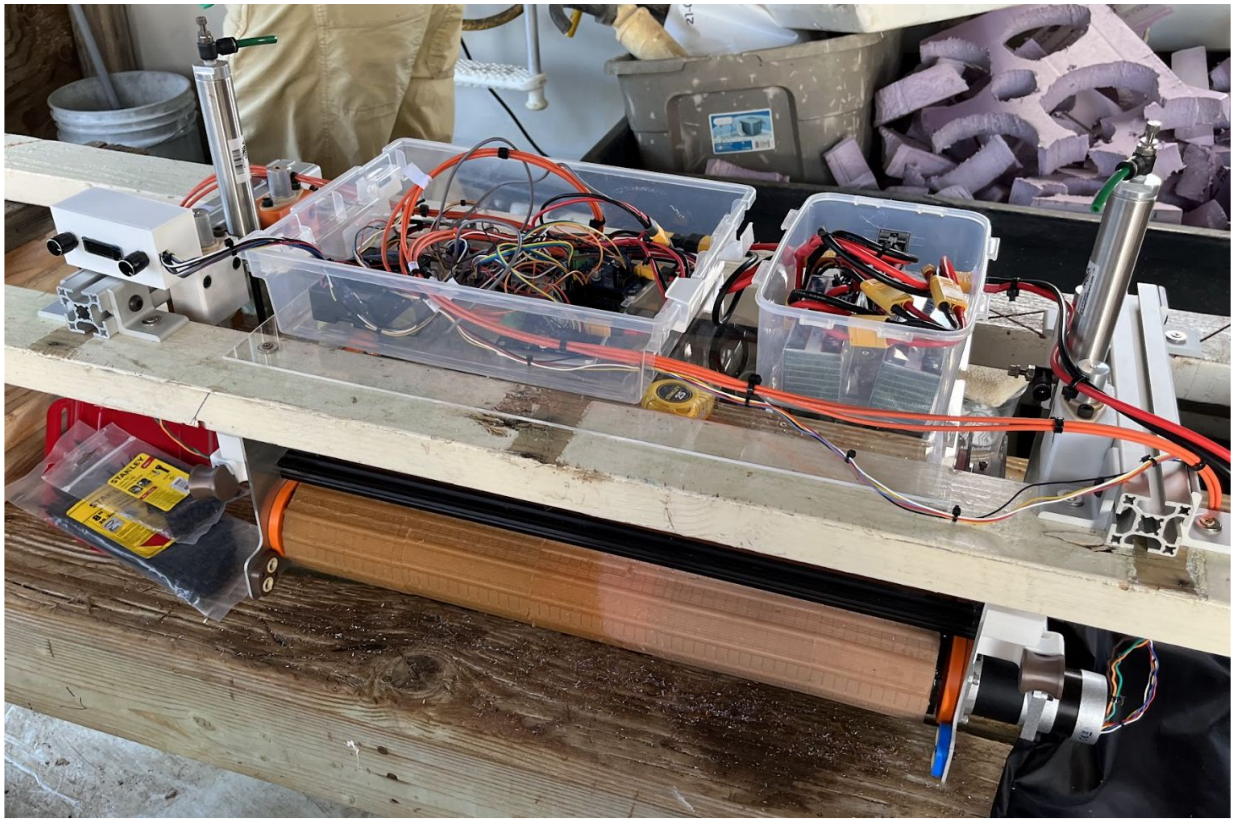


Some motor stalling
-> increasing current limit fixed this

Rollers not rigid
-> seeing uneven picking

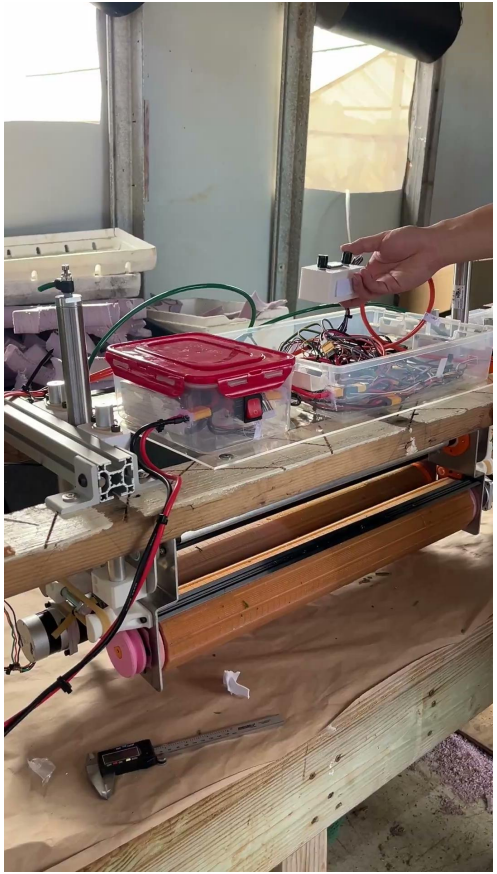
Not picking enough tips
-> could be too many or too large plants being tested. Maybe we can design tusks?

Oahu Trip 2: Test Setup



Tupperware for ebox, batteries, and pneumatics were fine this time, but we need to think of **designing a rain shield and enclosure**.

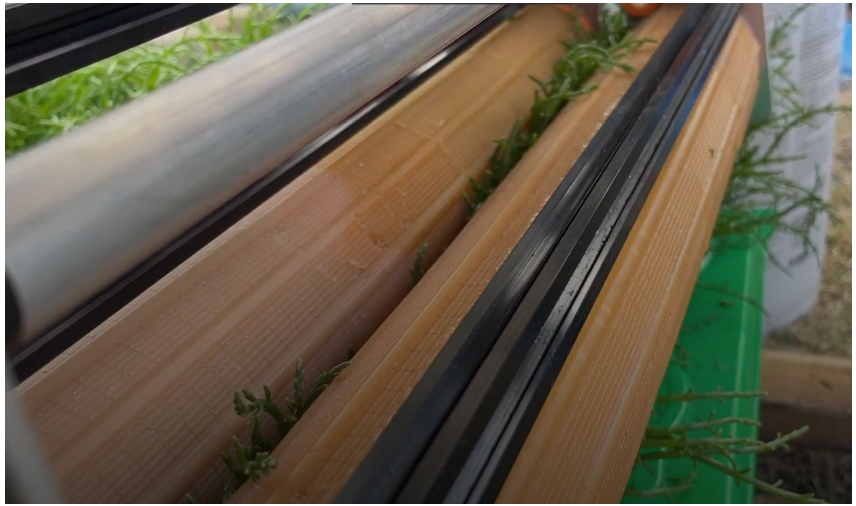
Oahu Trip 2: Test Videos



Pistons were uneven (adjusting the valves were not precise)

Rollers were ok but not as effective **when wet** (better than last time)

We may not be getting enough of the plant (tusks?)



Oahu Trip 2: Pontoon and Cargo Investigation

Pontoons are promising to use for entire mechanism to sit on

Cargo sits pretty high on top of the plants...

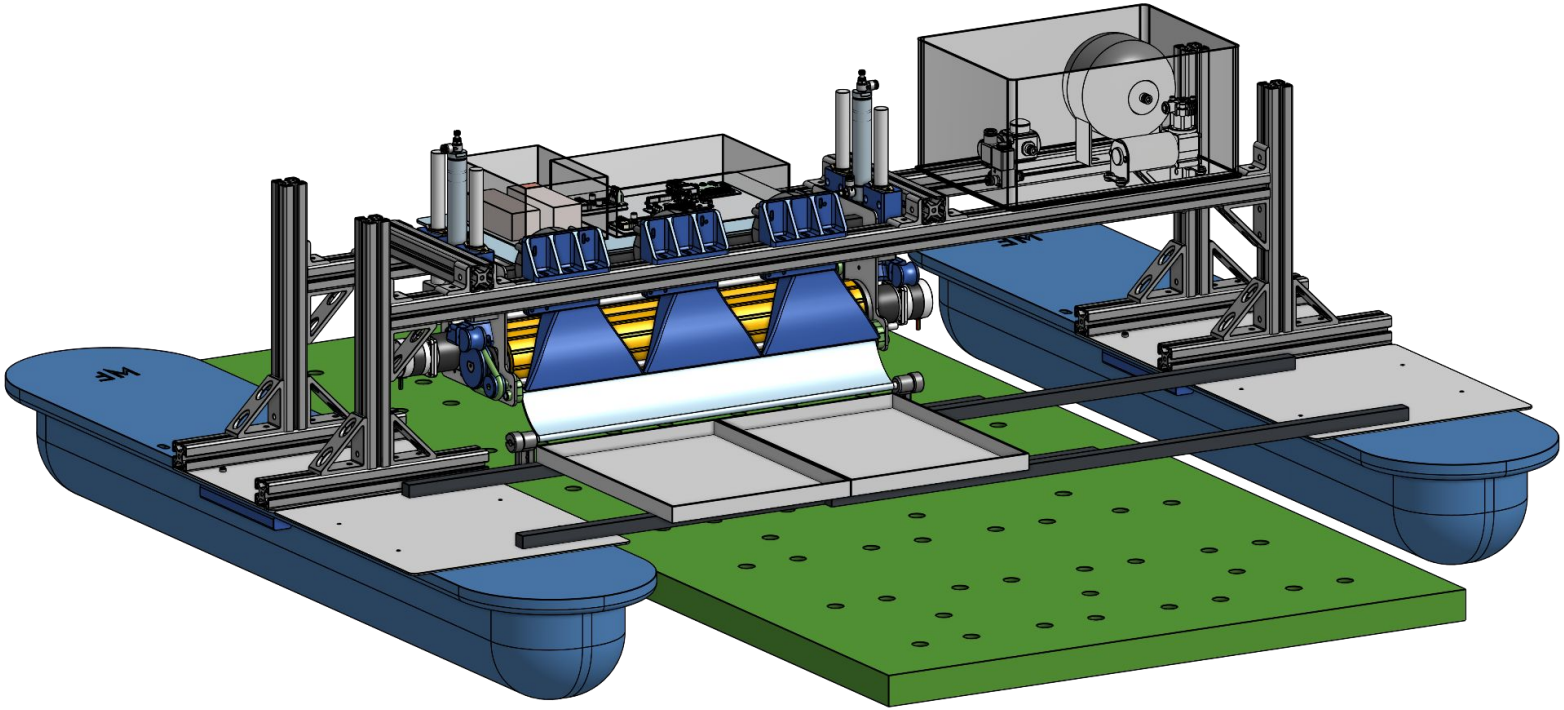
Oahu Trip 2: Main Notes

Pinching Force
1 surgical tubing spring per end of the roller was working decently
2 caused the plant medium to be uprooted
Motor
Motor would stall at the point before the medium was uprooted
Found good speed for motor
Pistons
Slightly out of sync and hard to tune
Rain
Realized that it can rain and that all electronics, batteries, etc. need to be shielded
Parts broken
Some 3D printed pieces broke during shipping -> they are now CNC
Frame
Extrusions we brought were not long enough, found 7ft long planks to replace
Plant ideal pick height
Measured freshly picked plants compared to ripe plants
Rollers
New textured grip seems to be working better when wet
Soft urethane gets dirty very easily
Must be reversed on way up, cannot be free spinning

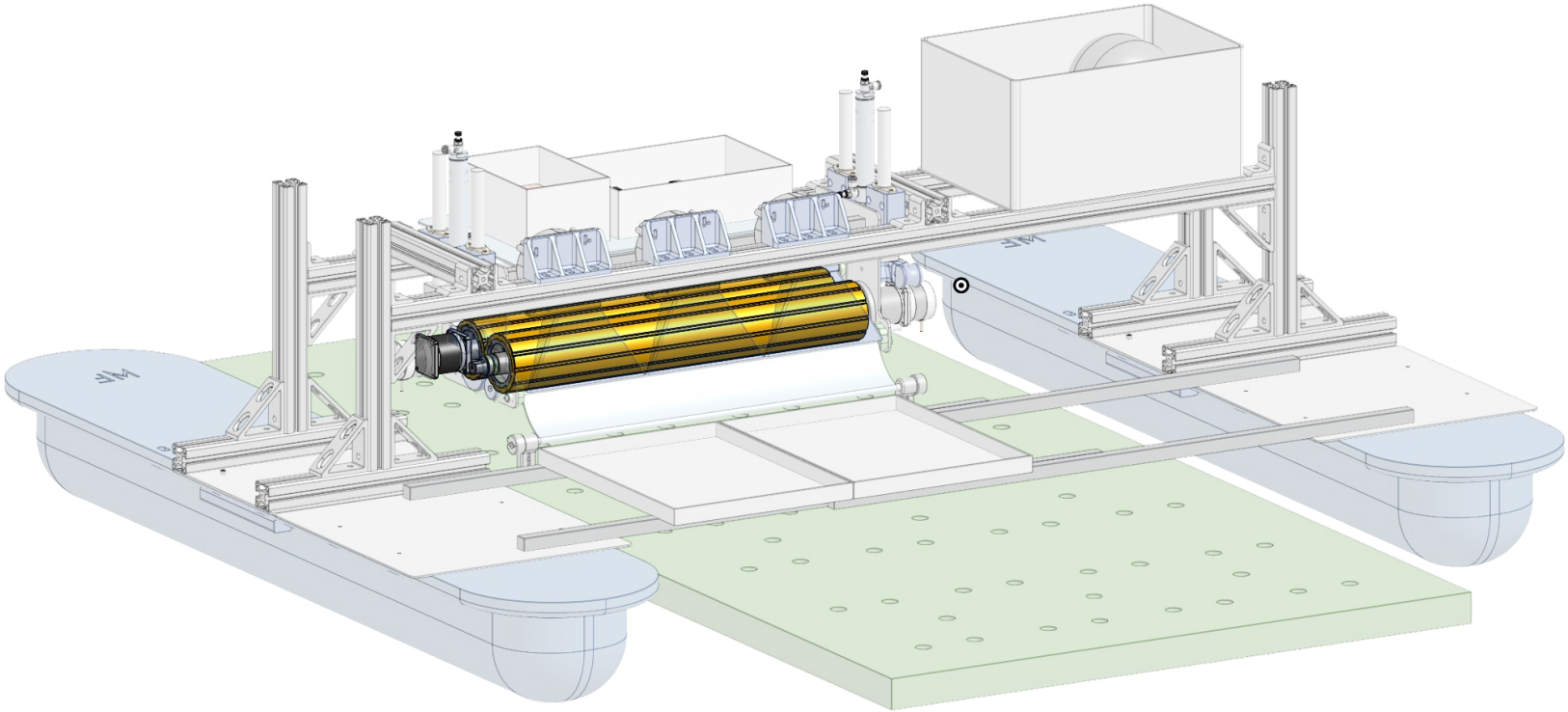
Pontoons
Took measurements, will be useful to have mechanism sit on them
Electrical
Jumper wires were very unreliable
Some board components were falling off (capacitor)
Heat
Solenoid bottom super hot
Converter warm
Motors warm (fixed side is warmer)
Rasp pi got hot
Buttons and Screen
Screen keeps blacking out
Button will double click sometimes
Logging
Was not logging information when not connected to wifi

Current Design

Current Design - Overview



Mechanical - Rollers & Motors



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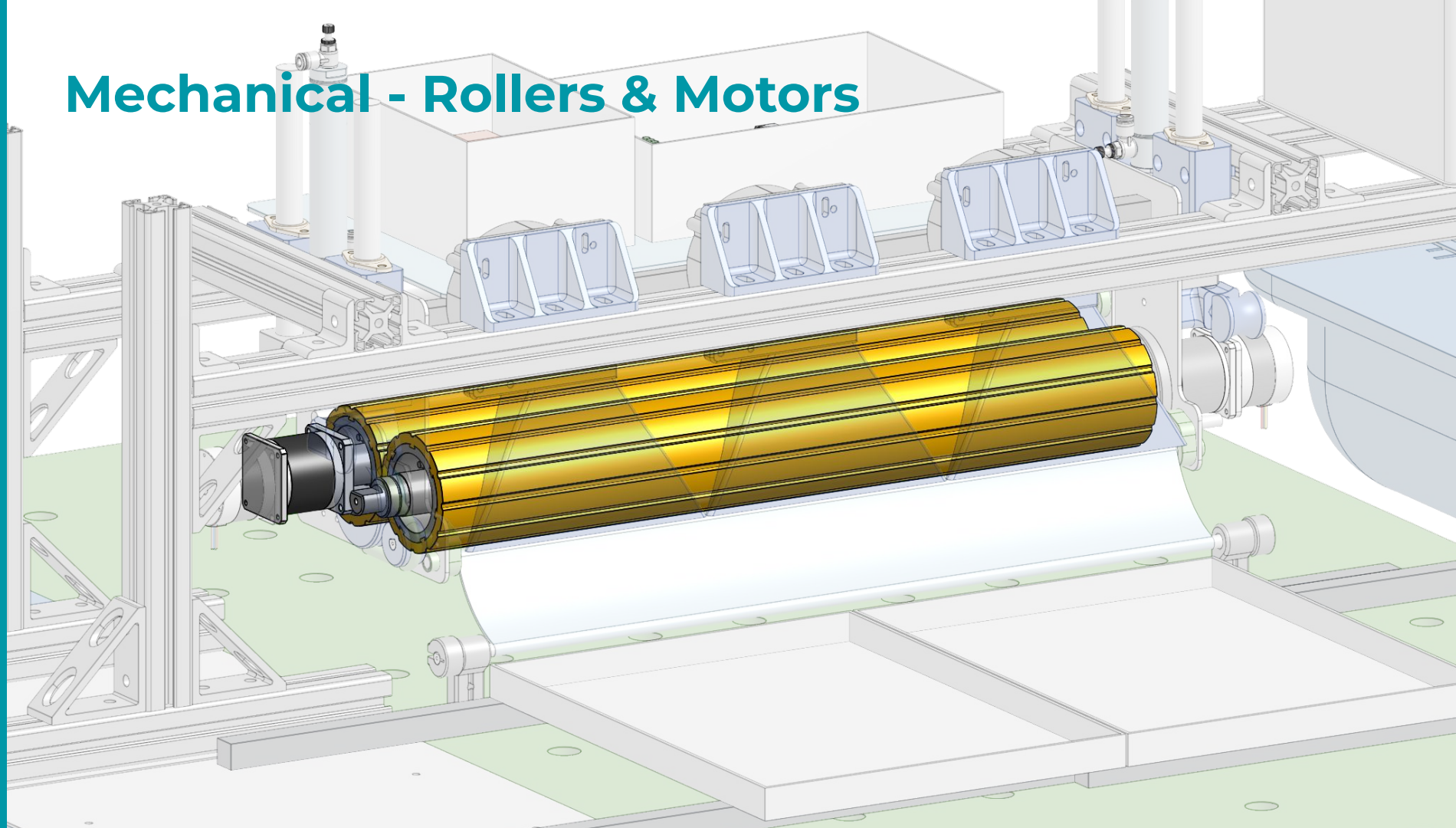
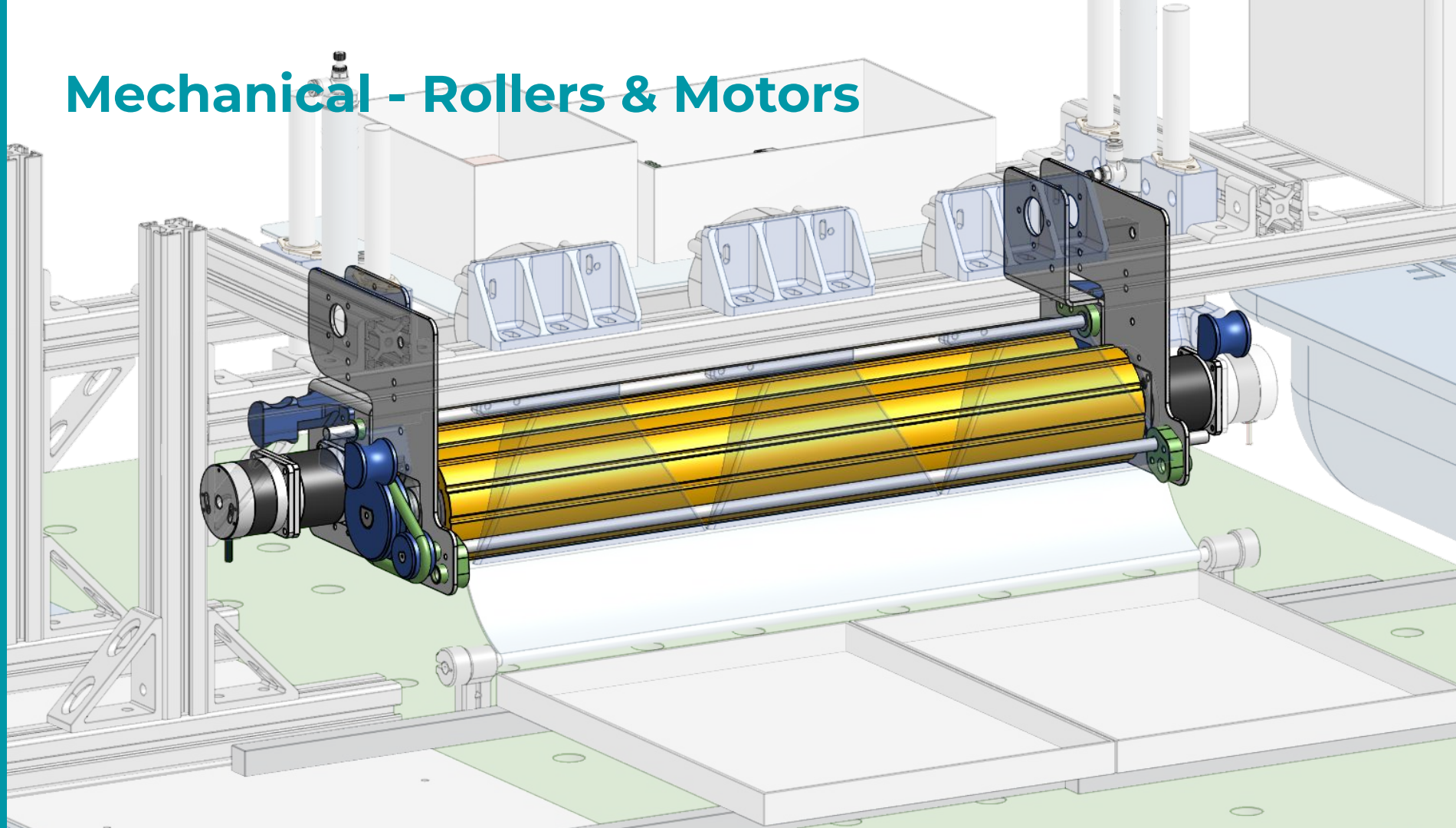
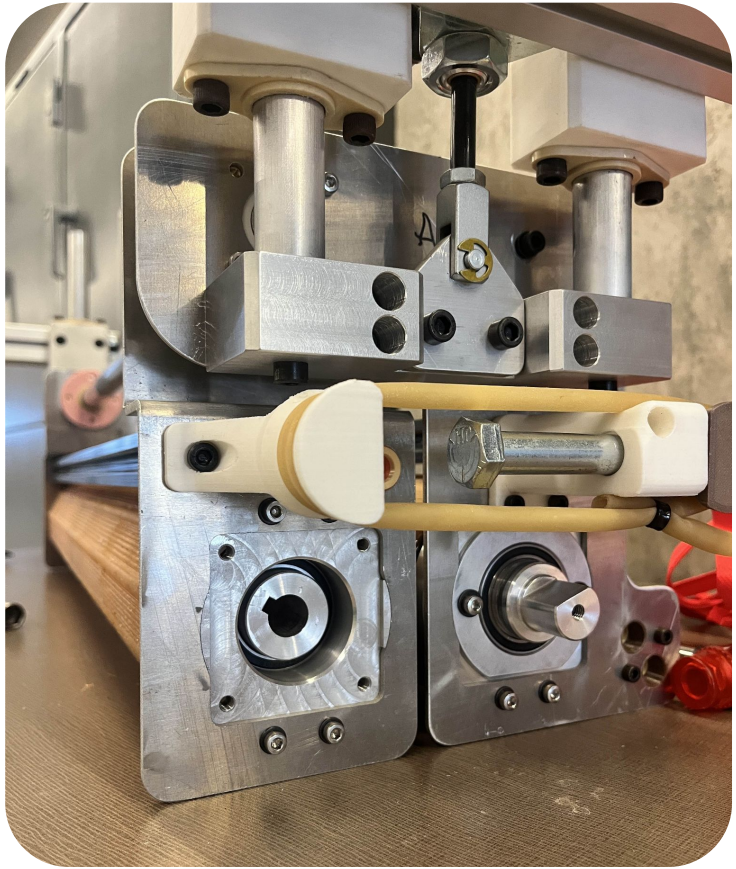


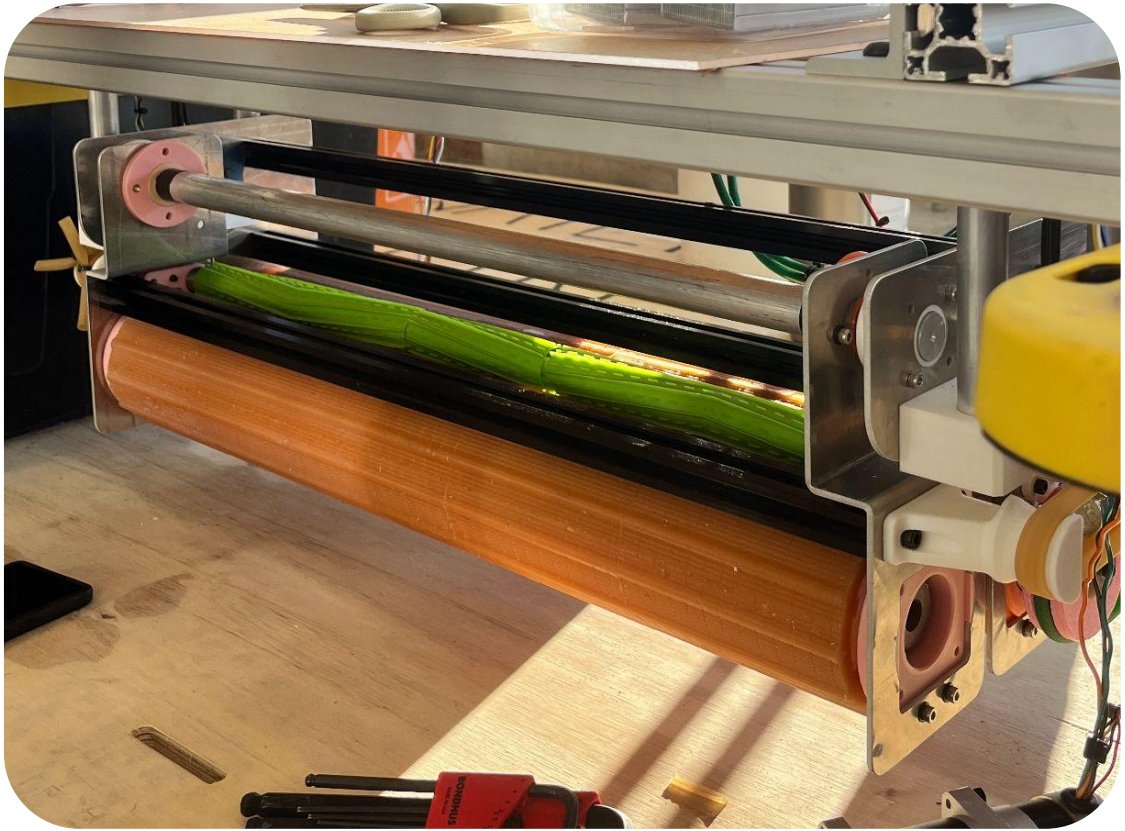
Mechanical - Rollers & Motors



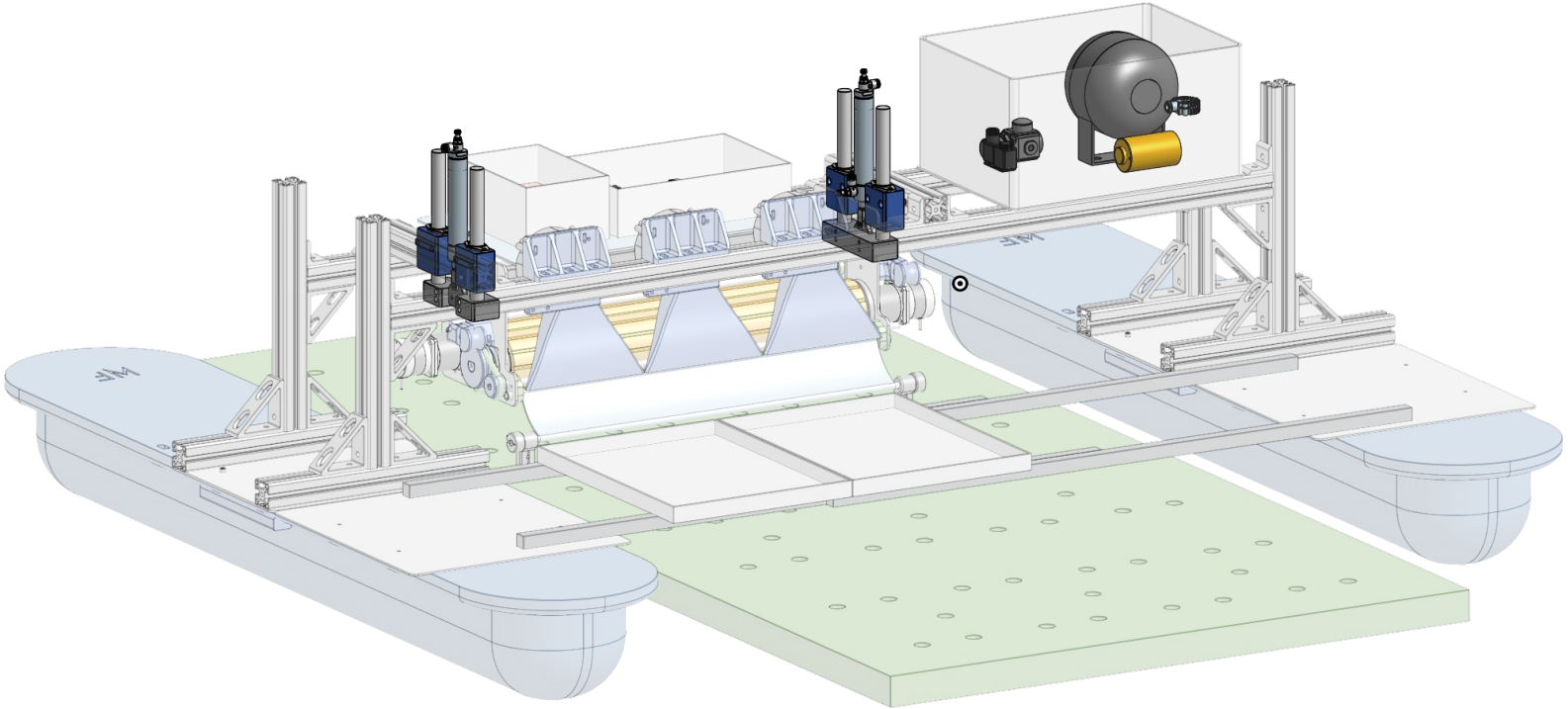
Mechanical - Rollers & Motors (CNC Parts)



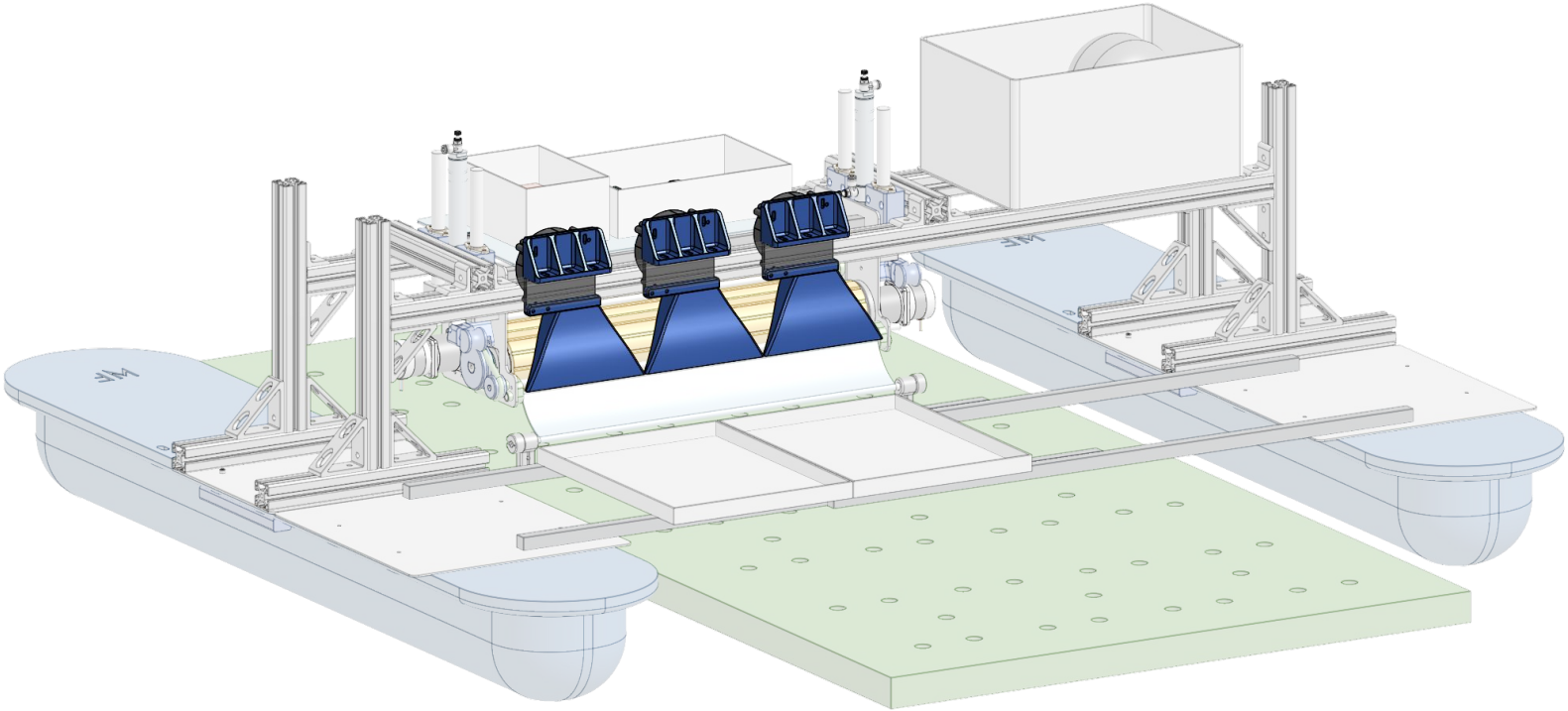
Mechanical - Rollers & Motors (Urethane Rollers)



Mechanical - Pneumatics



Mechanical - Fans



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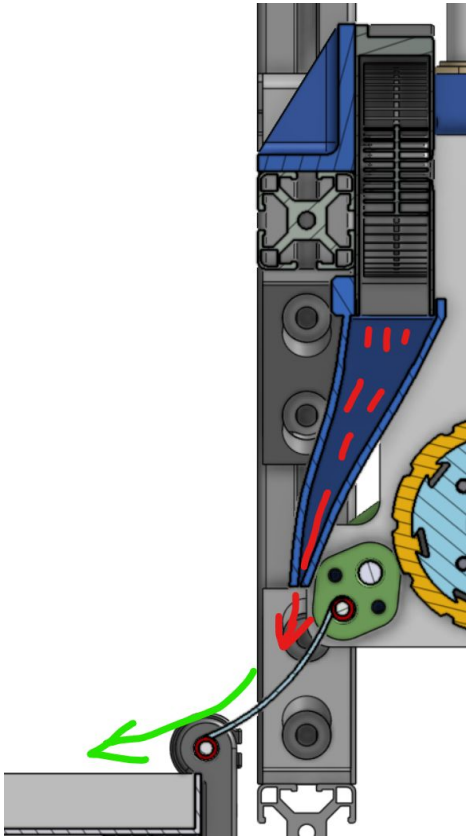

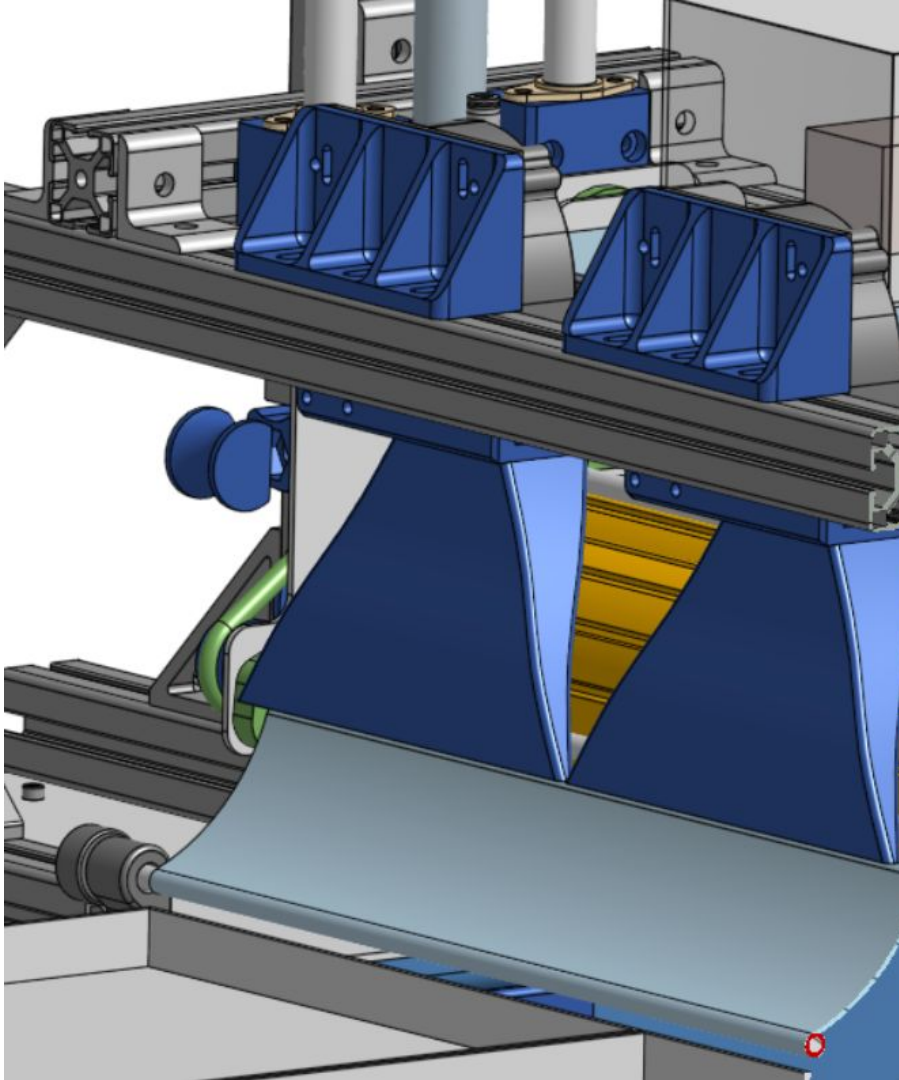

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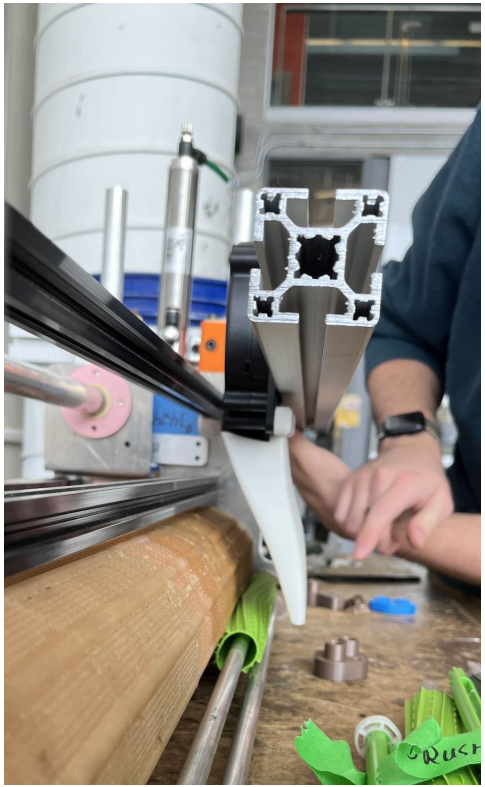
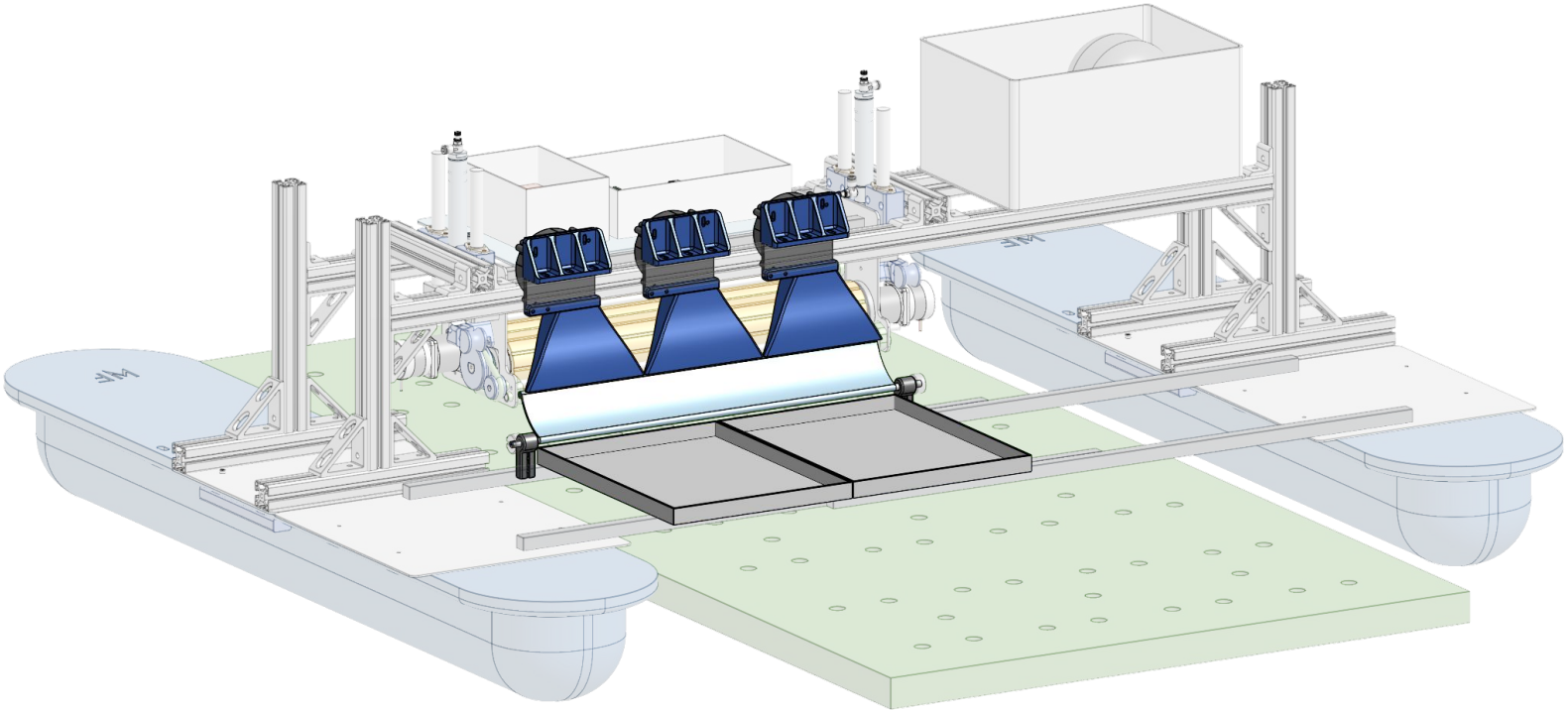
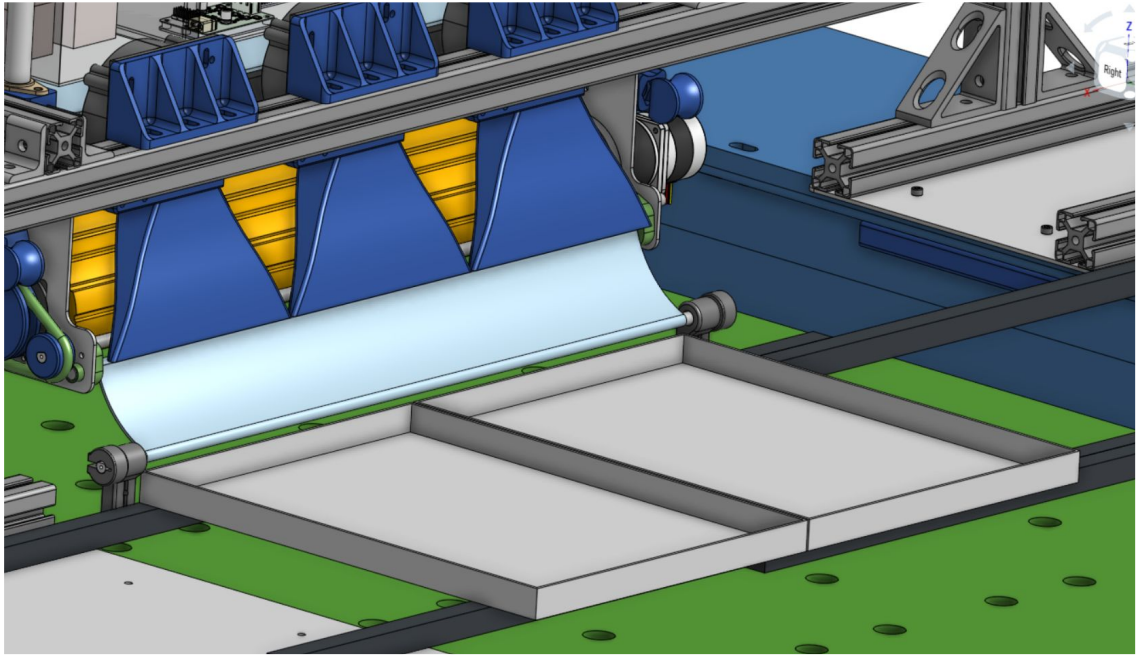


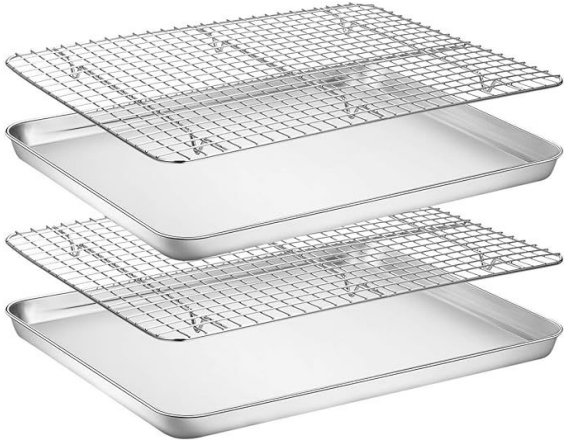
Mechanical - Cargo



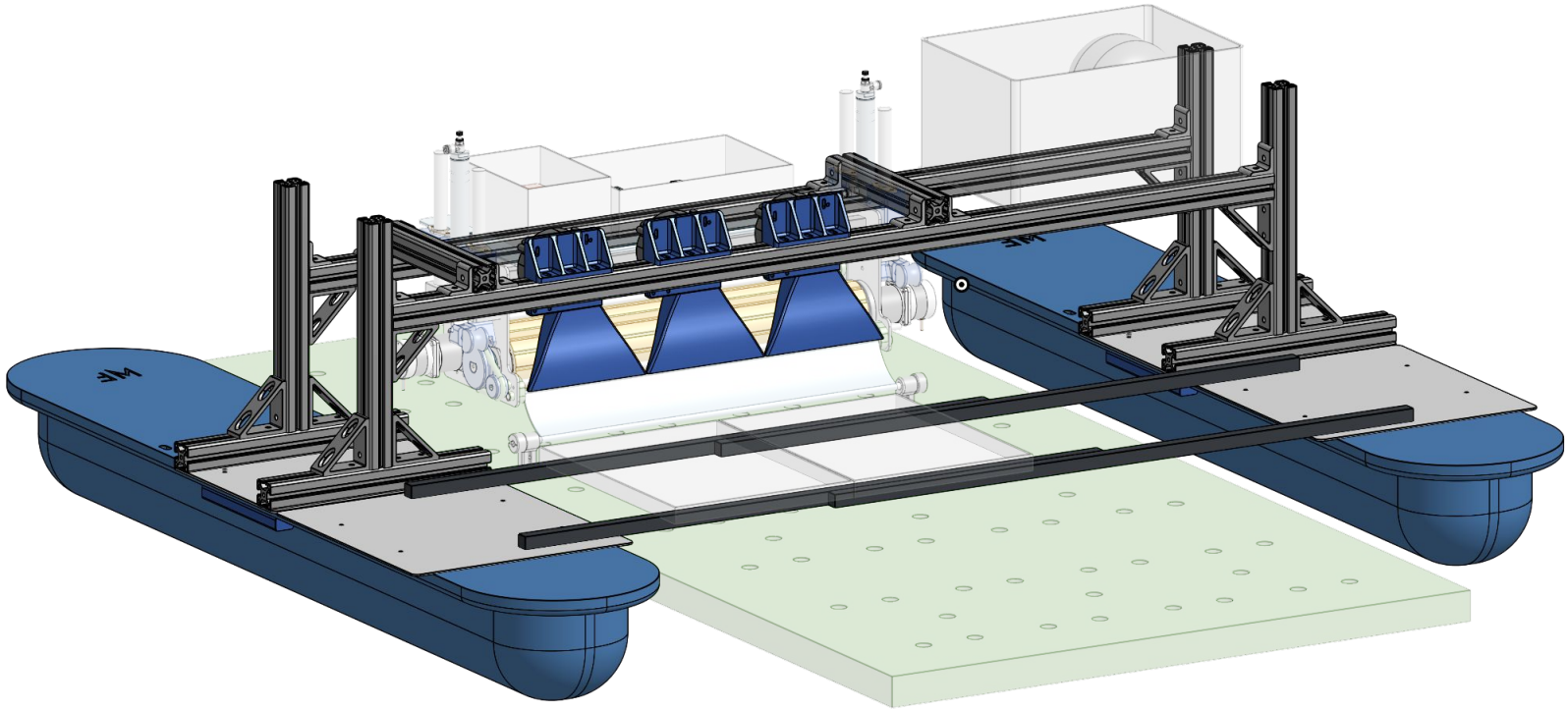
Mechanical - Cargo

Testing uncovered, but intending to have a cover for shade





Mechanical - Frame



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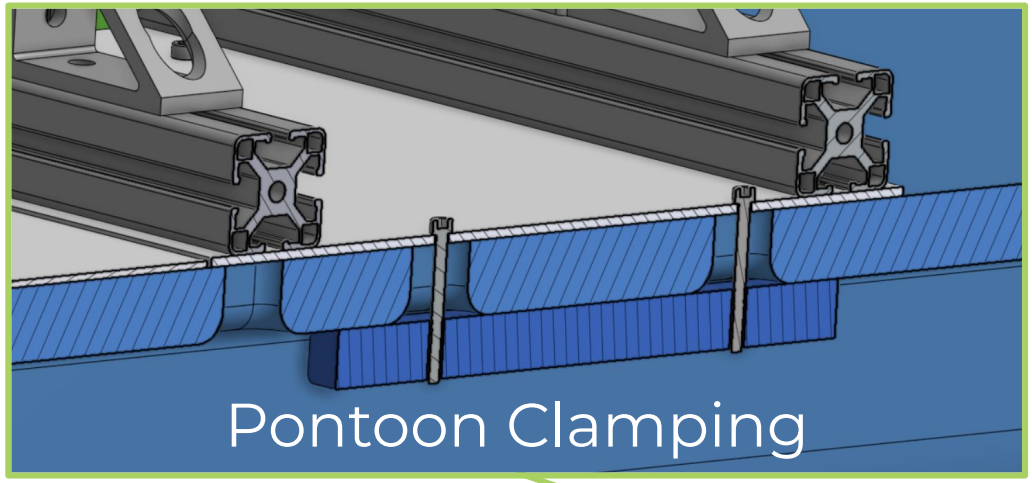
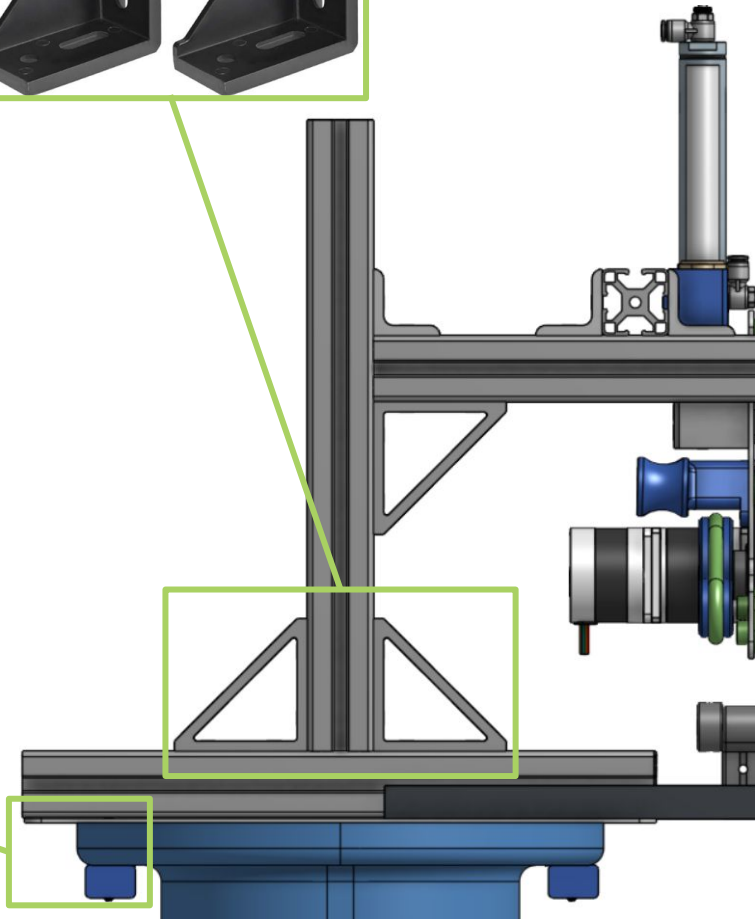
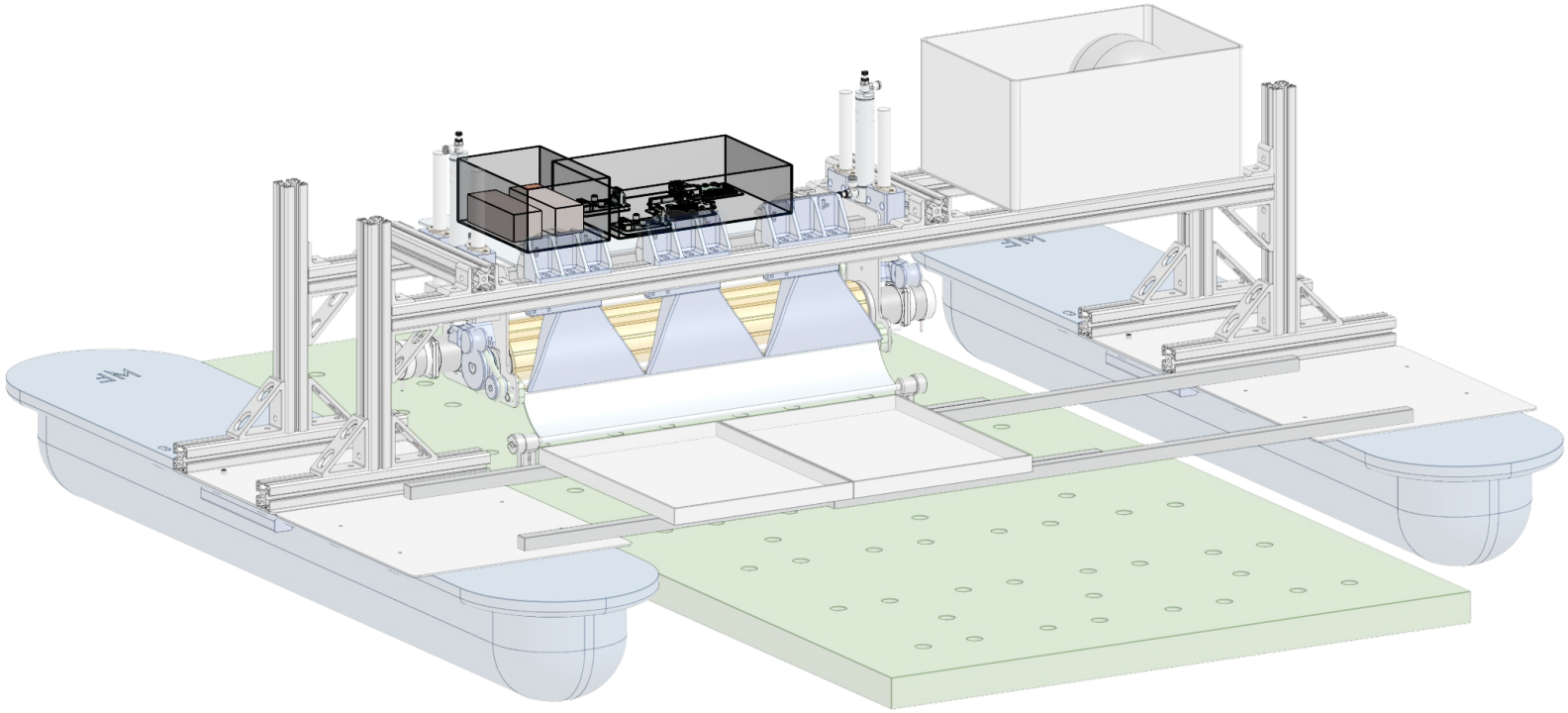
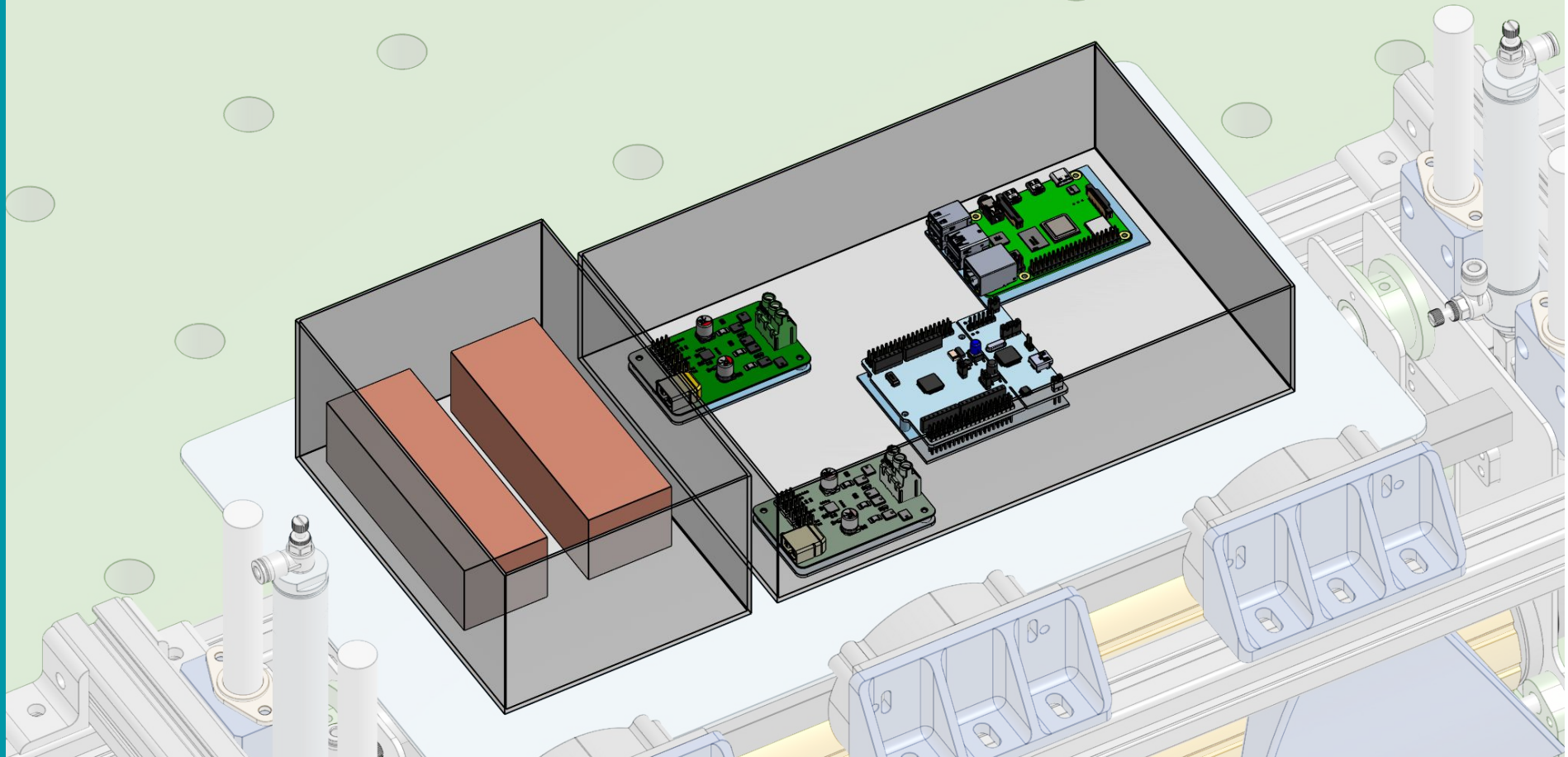




Mechanical - Battery and Electronic Enclosures



Electrical, Firmware, Software



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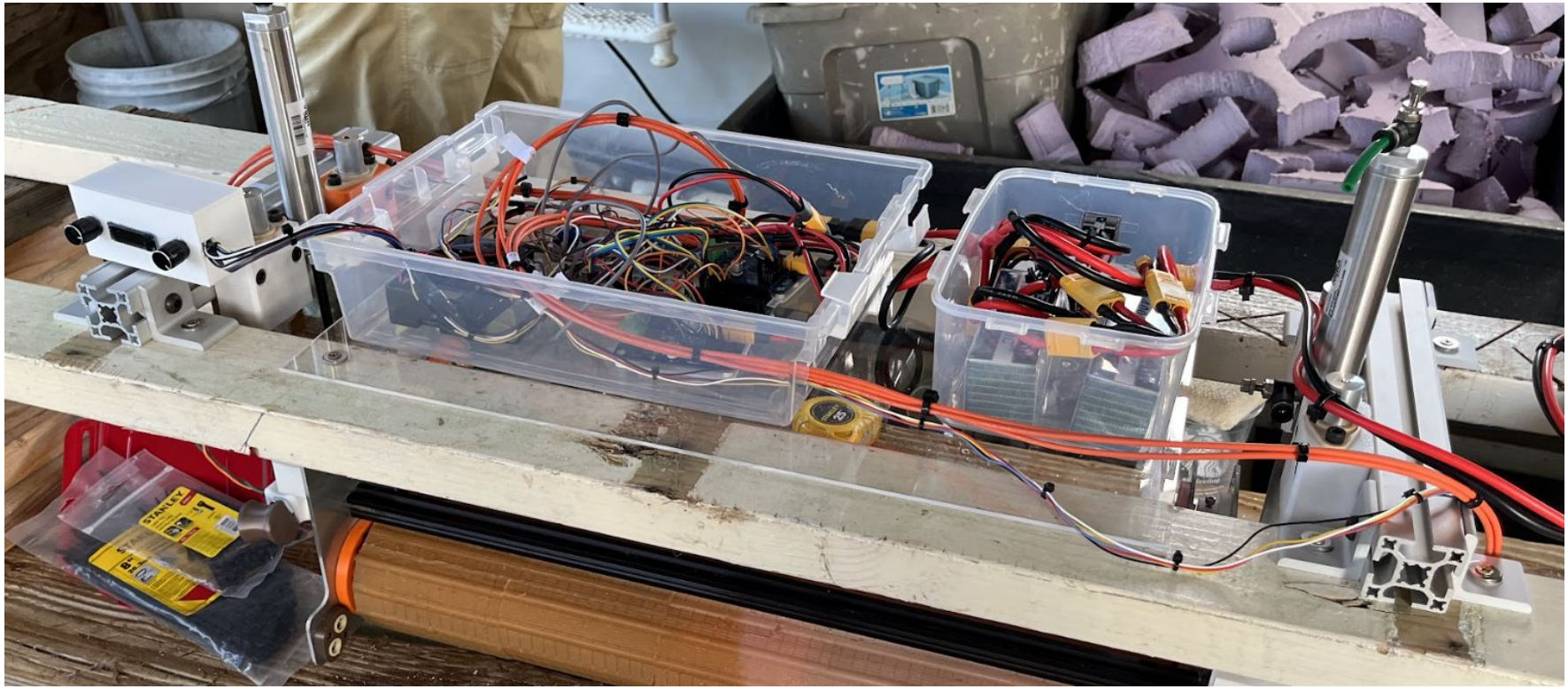
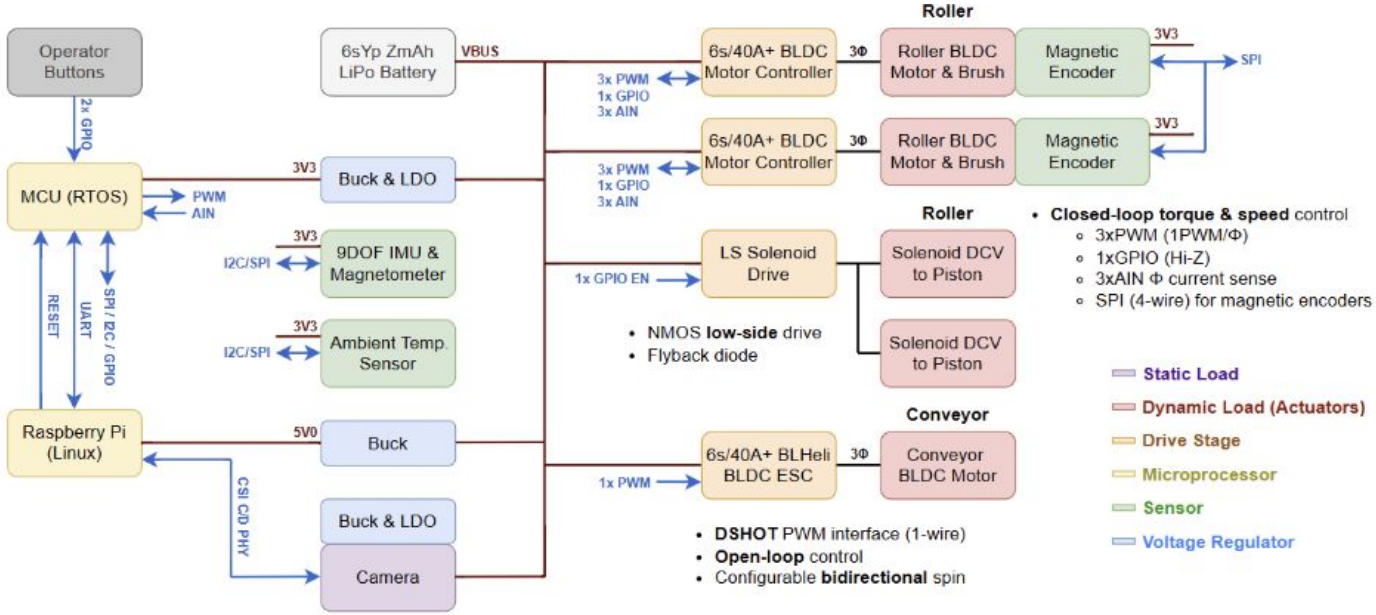


Electrical



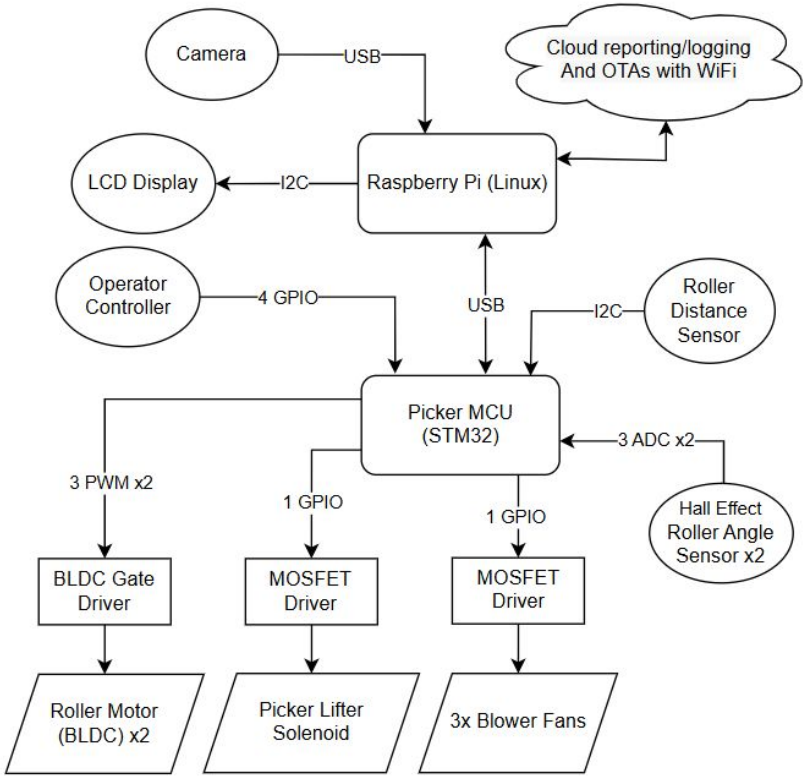
For upcoming trip:

- Hall effect sensing integrated
- Improved harnessing reliability (protoboard shield and soldered connections)
- Low-side driver for fan control

Future Targets:

- Custom Salico controller module (Target: Capstone Symposium)

Firmware



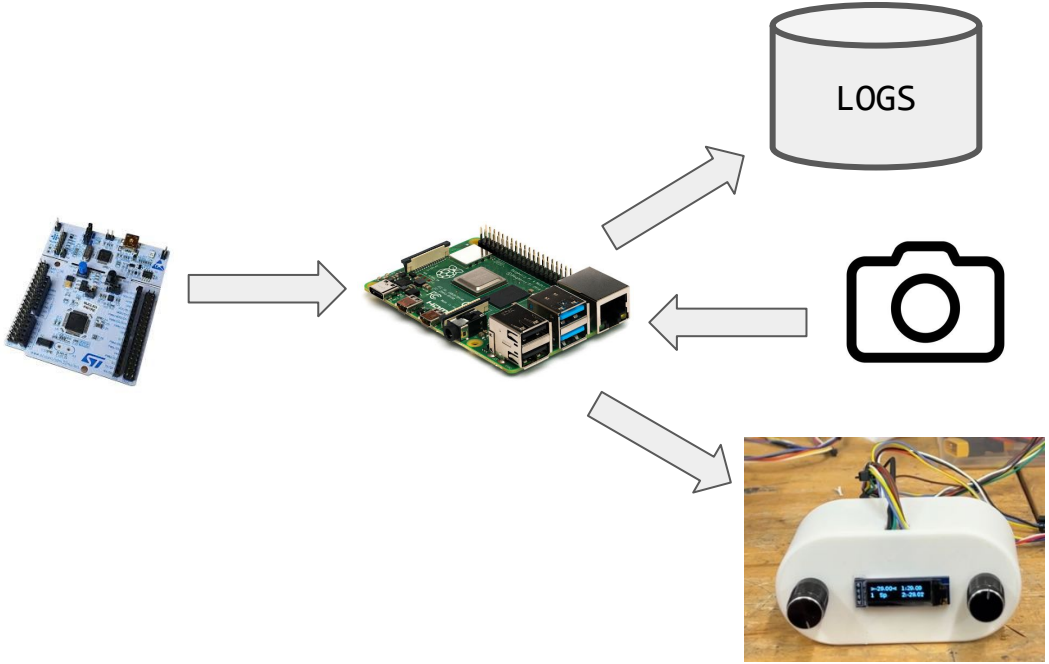
For upcoming trip:

- Validate closed-loop control and torque limiting
- Detailed roller speed control based on the extension of the pistons for better control
- Fan controller (timer)
- Improve robustness of operation

Future targets:

- Integrate more monitors for battery and motors
- Improve user interface (Controller screen layout)

Software



Upcoming Plans

Upcoming trip: what we will be doing

- **Build** full robot
- **Accurate test environment**
  - Rigid rollers
  - Younger and fewer plants
  - Full mechanism on the water
- **Full path of the plant**
  - Observe full path of plant from harvest to cargo
- **Tuning**
  - Pneumatics
  - Motor
  - Pinch force
  - Height & other dimensions
- **Media**
  - Take **lots** of photos and videos

Final design: plans for after our trip and symposium

- **General:** fix anything from testing
- **Usability**: make the harvester easier to use without tech support
    - Make guide for how to use and troubleshoot
- **Safety:** improve battery situation (battery management system, fuse, etc.)
- **Weather Proofing:** add sun and rain protection to the cargo, rollers, pneumatics, electronics
- **Simplifying:** simplify wiring, simplify electrical boards, custom enclosures for pneumatics and electronics
- **Finishing Touches:** engravings, poster, videos, symposium set up, finish updating our website
- **Funding:** keep trying to apply to funding to pay ourselves back
- **Last few meetings:** Joyce will follow up

Plans for after that

- **Shipping:** Packing up and shipping after the design symposium
- **Assembly:** Creating instructions and remotely supporting the assembly
- **Support:** Technical support and troubleshooting to get everything running
- **Improvements:** We will send our full report, CAD, & BOM to Olakai including a list of improvements that can be made
    - Very fast 7 month design sprint
    - We want to provide you with a first version of the design, but we know it is not perfect - the list of recommendations will give a direction for future R&D