

Kyle Vernyi

Aerospace Engineer



vernyikyle4@gmail.com
234.804.1972

Lift Measurement System



LiDAR installation



Embedded computation nodes

Results

Volume measurement of <1% error, >99% accuracy at 20Hz sampling rate.
AIAA SciTech 2023 Conference paper.

Skills

C++, Poisson surface reconstruction, Monte Carlo integration, FAA software requirements, embedded Linux, UDP networking.

Requirement
Develop system to measure lift of a gas cell.



Manufacturing LIDAR sleeves

Methodology
Use a 3D LiDAR sensor to sample cell geometry and perform numerical integration.

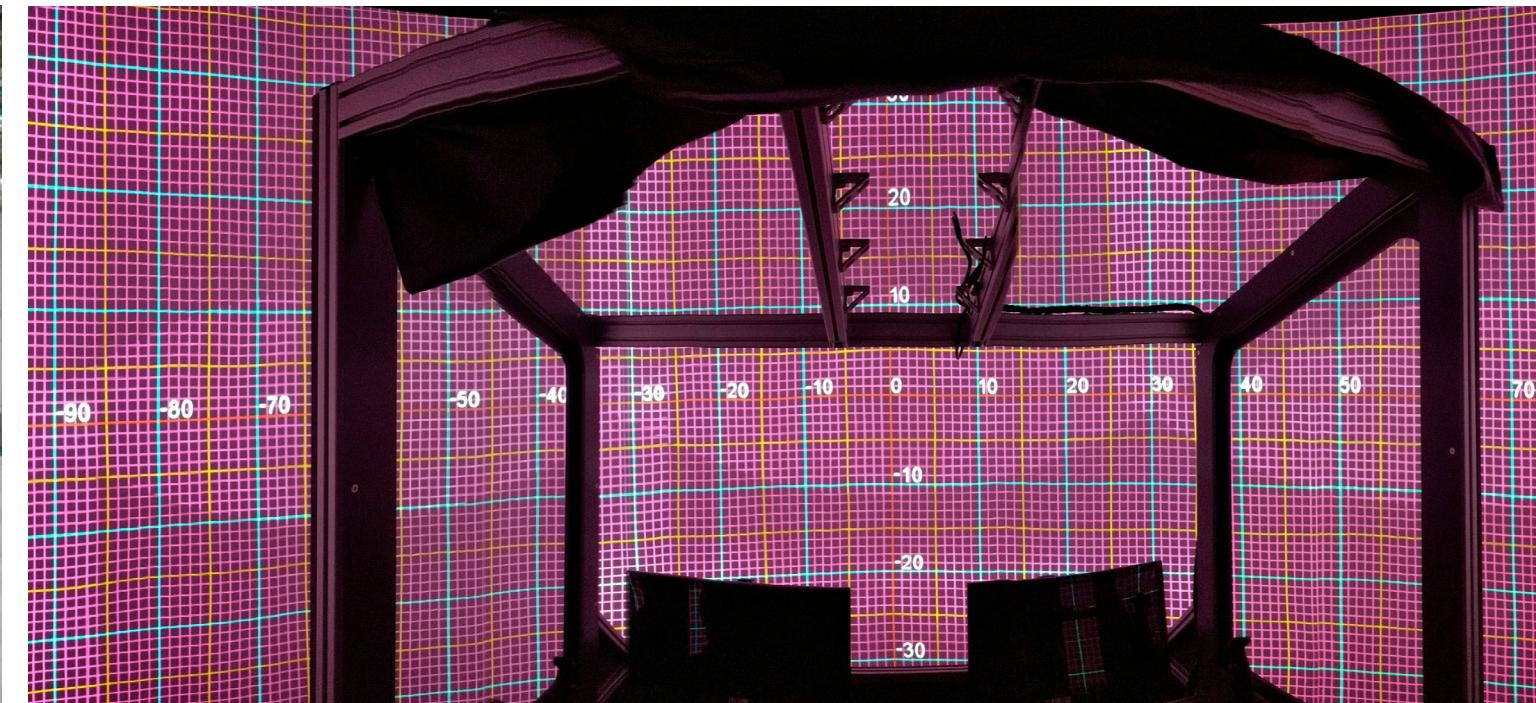


Gas cell

Airship Simulator



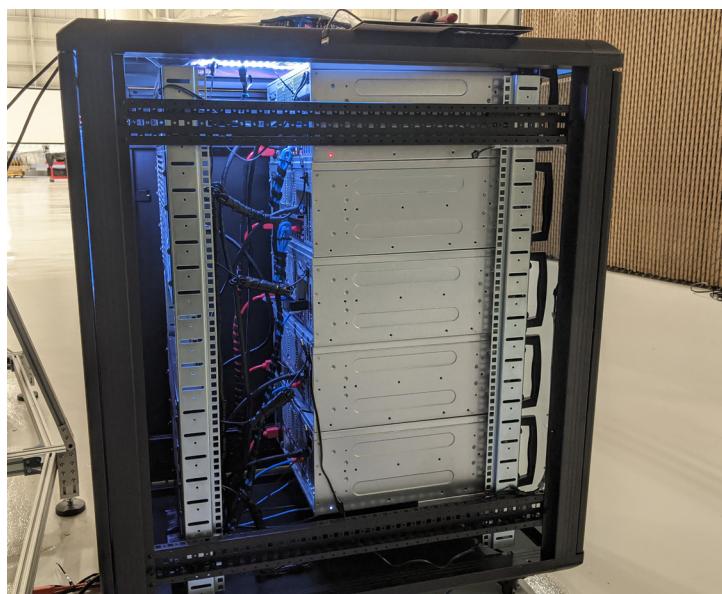
Simulator Vo2.00 - 10ft tall, 315 degree surround



Meshing all ten projectors into one image



Simulator Vo1.00



Simulation PCs

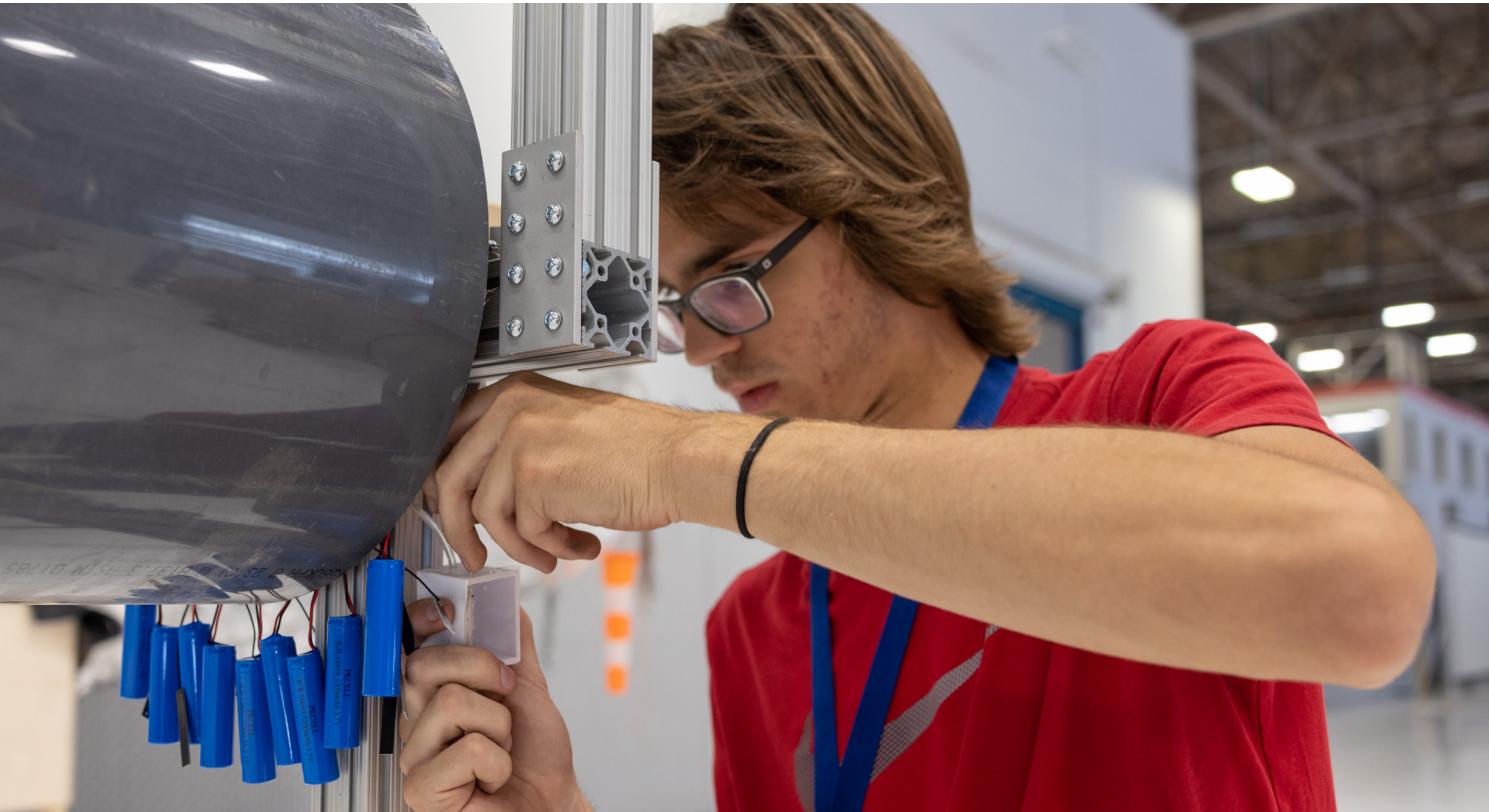
Requirement

Construct an immersive airship simulator for testing of GNC plant and controller.

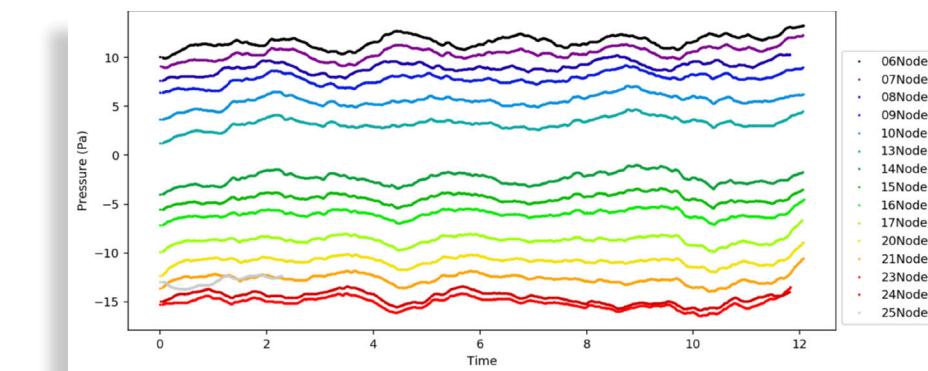
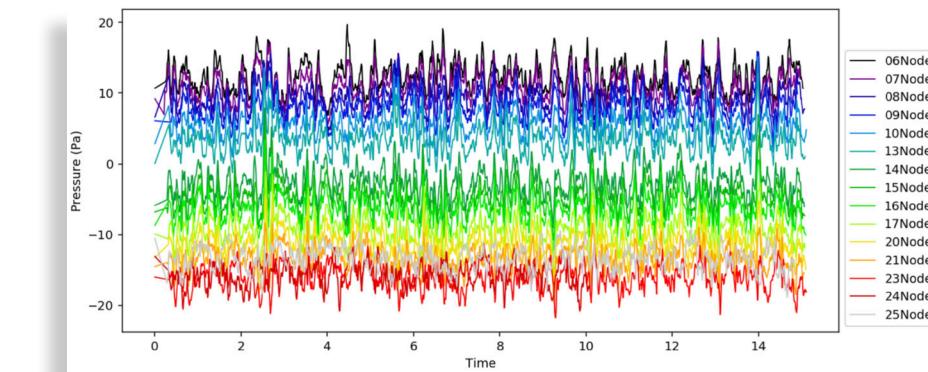
Skills

Computer networking, Teensy, C++, Python, computer hardware, flight testing, GNC, projector warping, pilot training.

Airship Gust Testing



Pressure sensor setup for scaled test



Results

Successfully correlated theoretical and experimental results of pressure distributions satisfying FAA requirements.

Skills

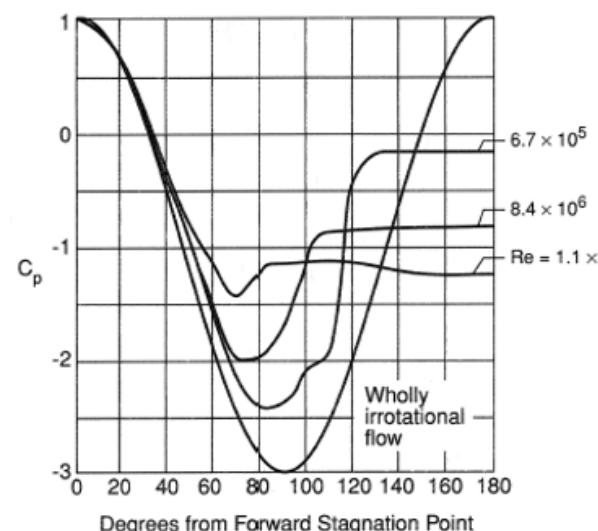
Fluid dynamics, Python, Google Cloud Platform, ParticleIO, Fourier analysis, digital signal processing.

Goal

Study the effect of strong wind gusts to determine if airship frame can withstand pressure loads.

Methodology

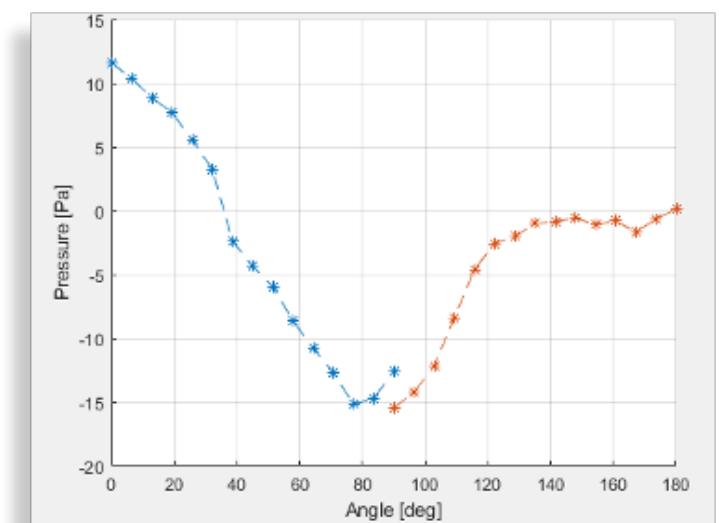
A custom wind tunnel was constructed. An array of custom wireless pressure sensors were implemented and used to measure the pressure distribution.



Theoretical coefficient of pressure curves

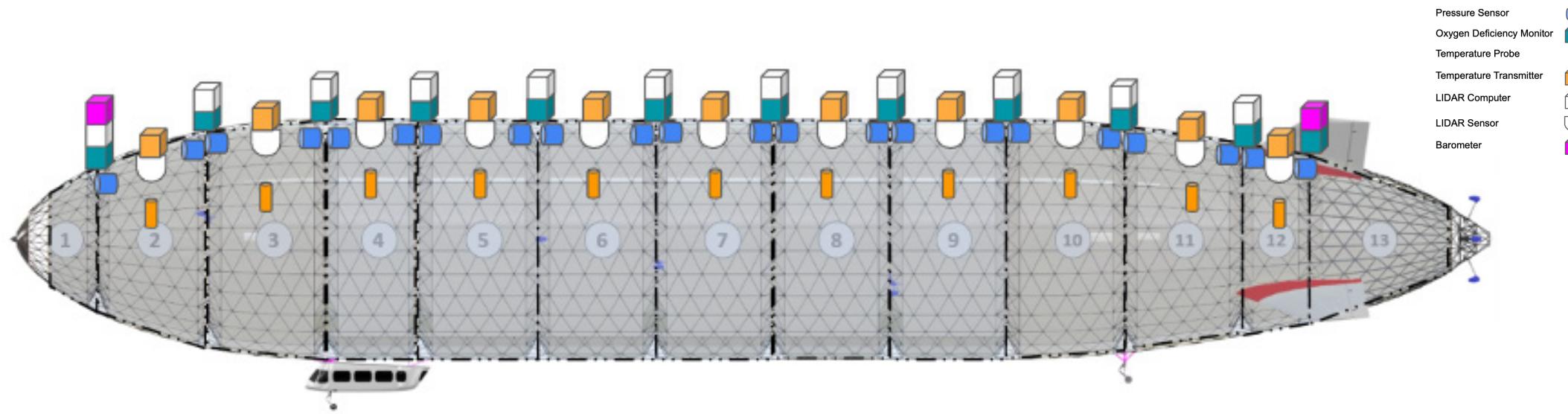


Gust generator construction



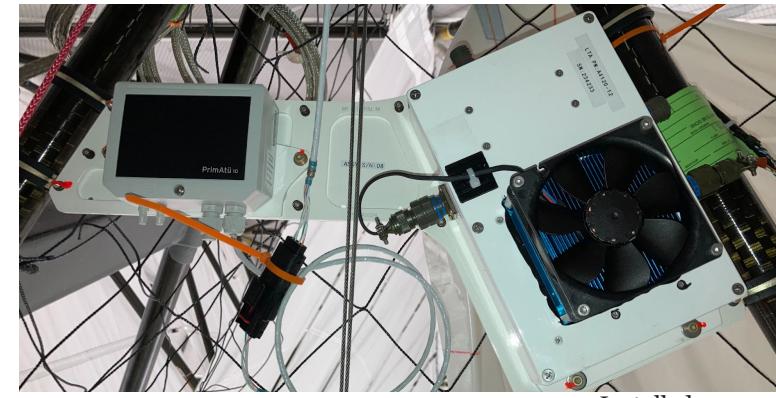
Obtained pressure curve

Airship Monitoring Software



Requirement

Display critical sensor information with zero delay to airship operators. In particular, oxygen levels must be carefully monitored and displayed in real time.



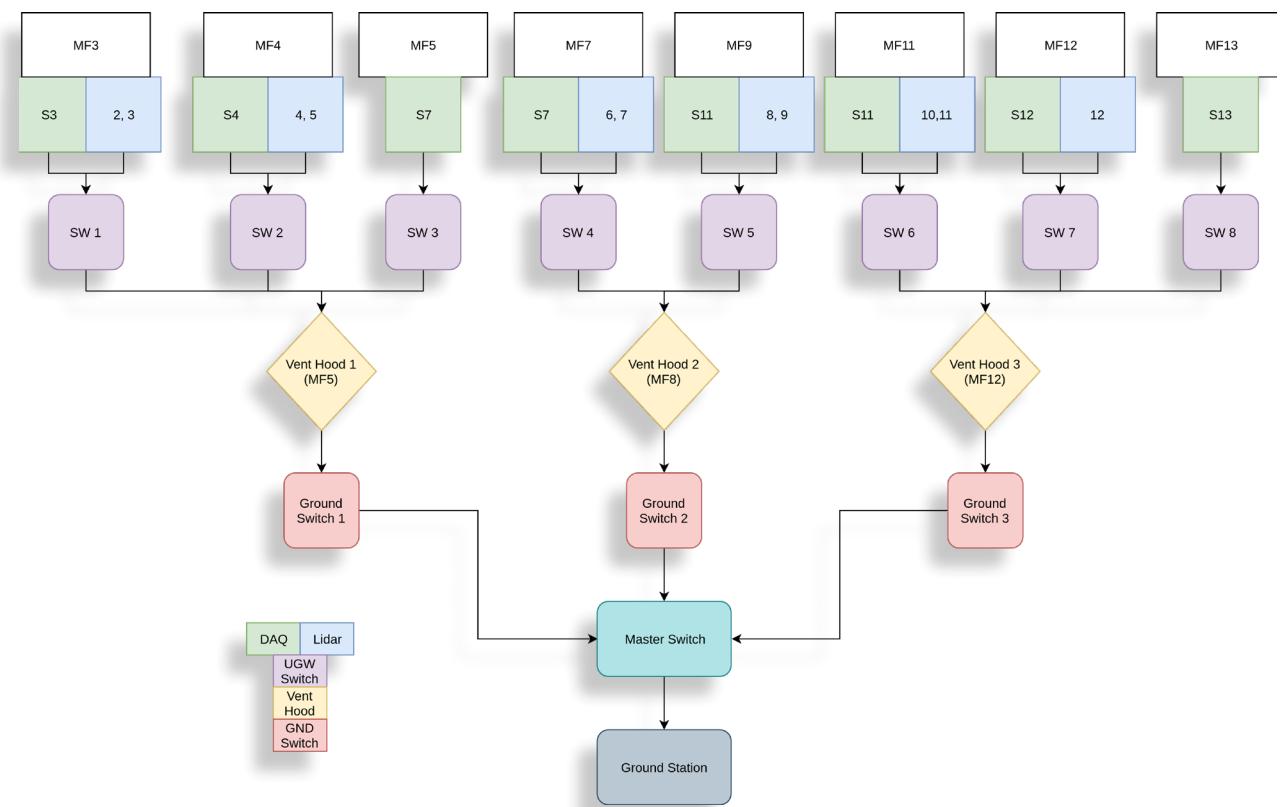
Installed sensors

Methodology

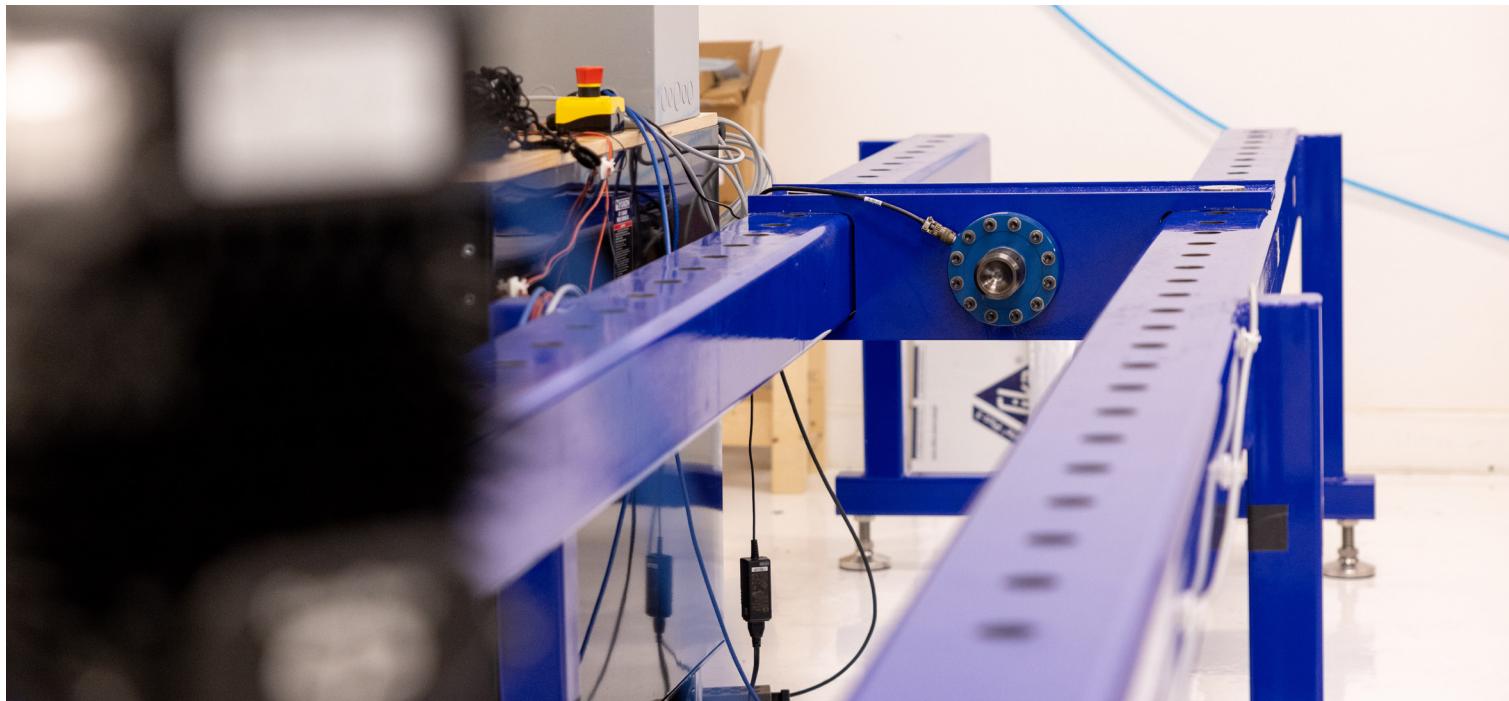
A C++ GUI was written. The GUI interfaces with 8 DAQs and 11 LiDAR sensors in real time. Program was multi-threaded for maximum responsiveness. Data from all sensors is logged.

Skills

C++, data acquisition, networking, Linux.



Mechatronics



Mechanical Test Frame

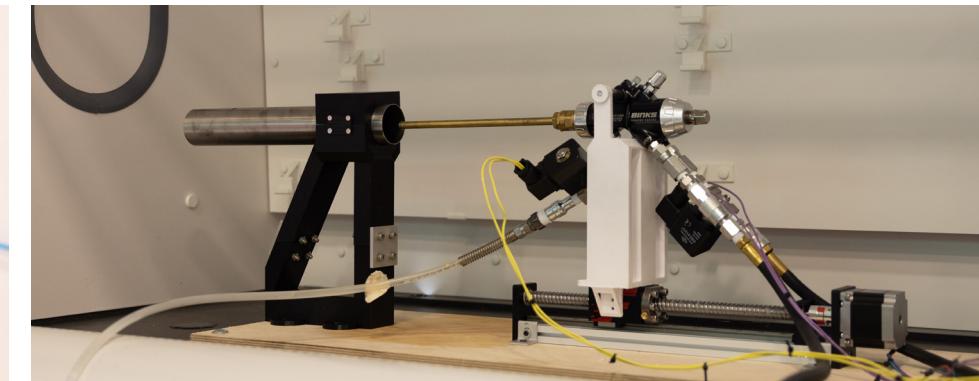
Designed lab grade test frame
with 725W AC servo motor,
Integrated LabView VI, and C++
PID motor controller.

Manufacturing

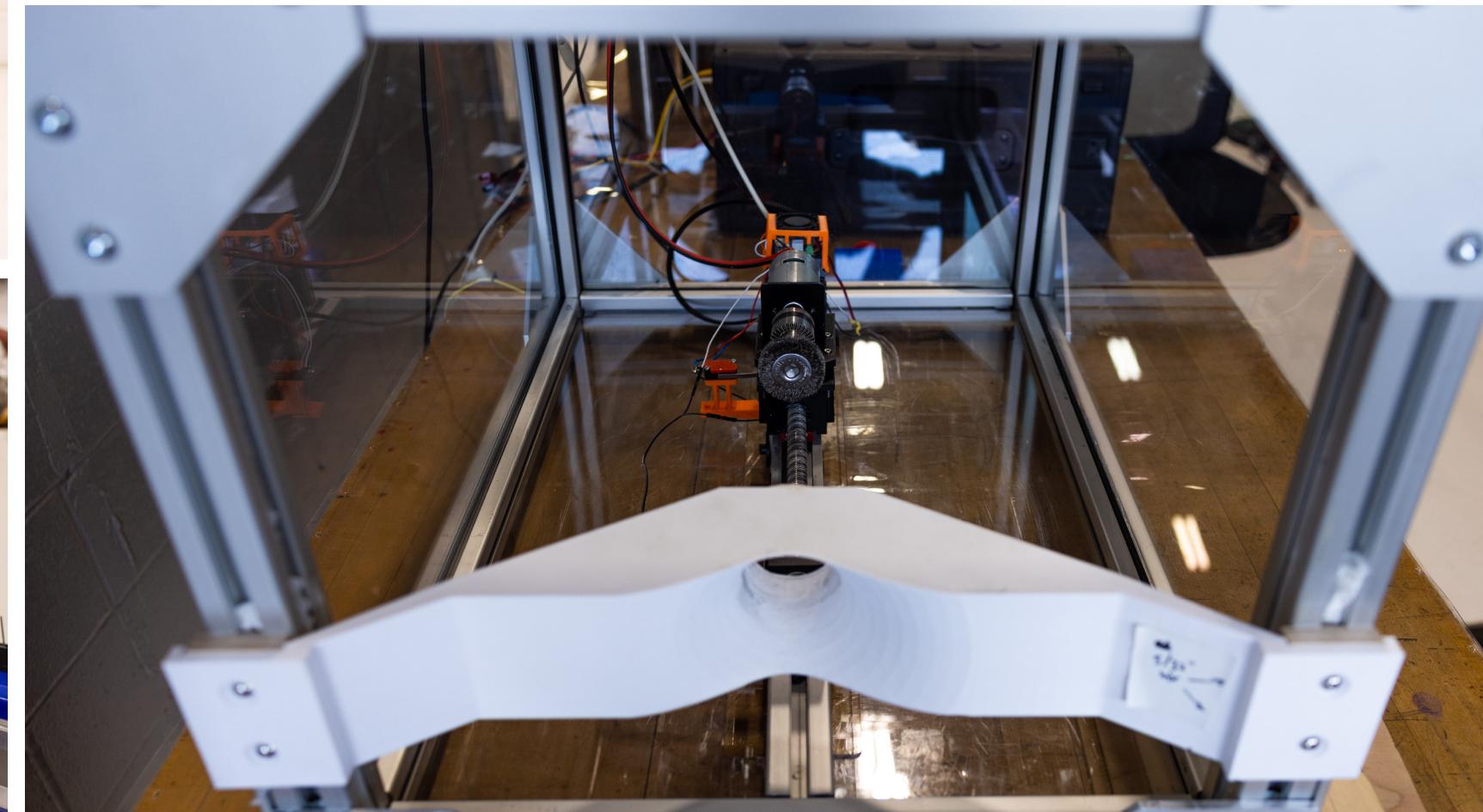
Designed assembly line type
process for in-house Titanium
surface treatment. Includes
chemical etching and abrasion of
Titanium hubs.



AC servo motor and drivetrain

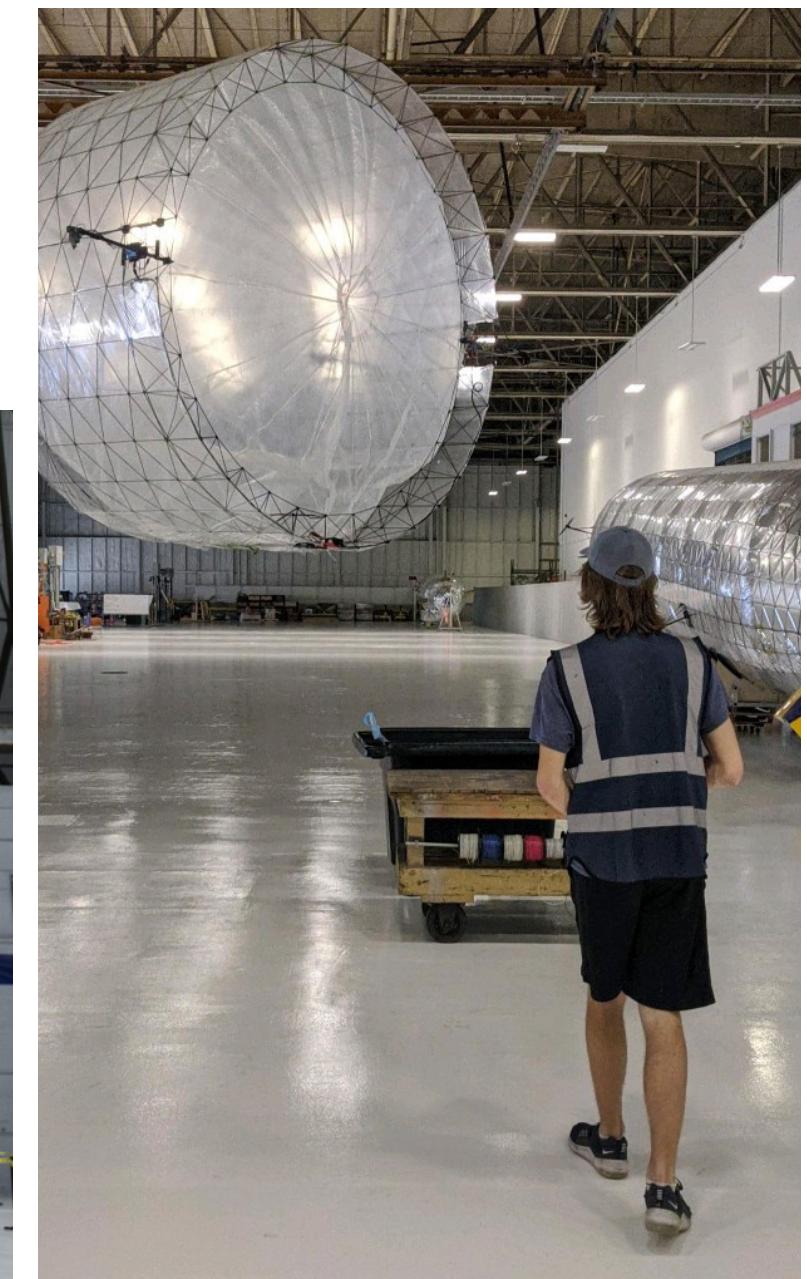


Primer atomizer on ball screw, driven by stepper motor



Abrasion brush on ball screw driven by stepper motor

Scale Airship Flight Tests



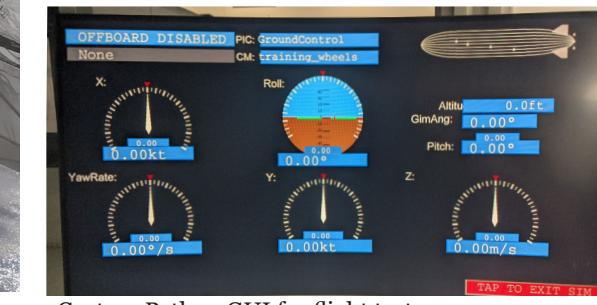
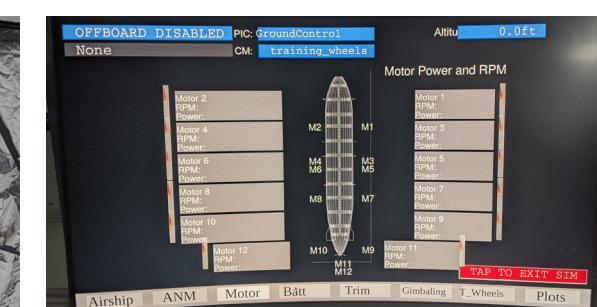
Flying the "burrito"

Flight Test Engineer

Wrote software to collect and display telemetry data during model airship flights for GNC debugging. Performed repairs and maintenance for model airship such as helium inflation. Constructed balsa wood fins. Piloted model airship during flight tests.



Installed balsa wood fin



Custom Python GUI for flight tests

