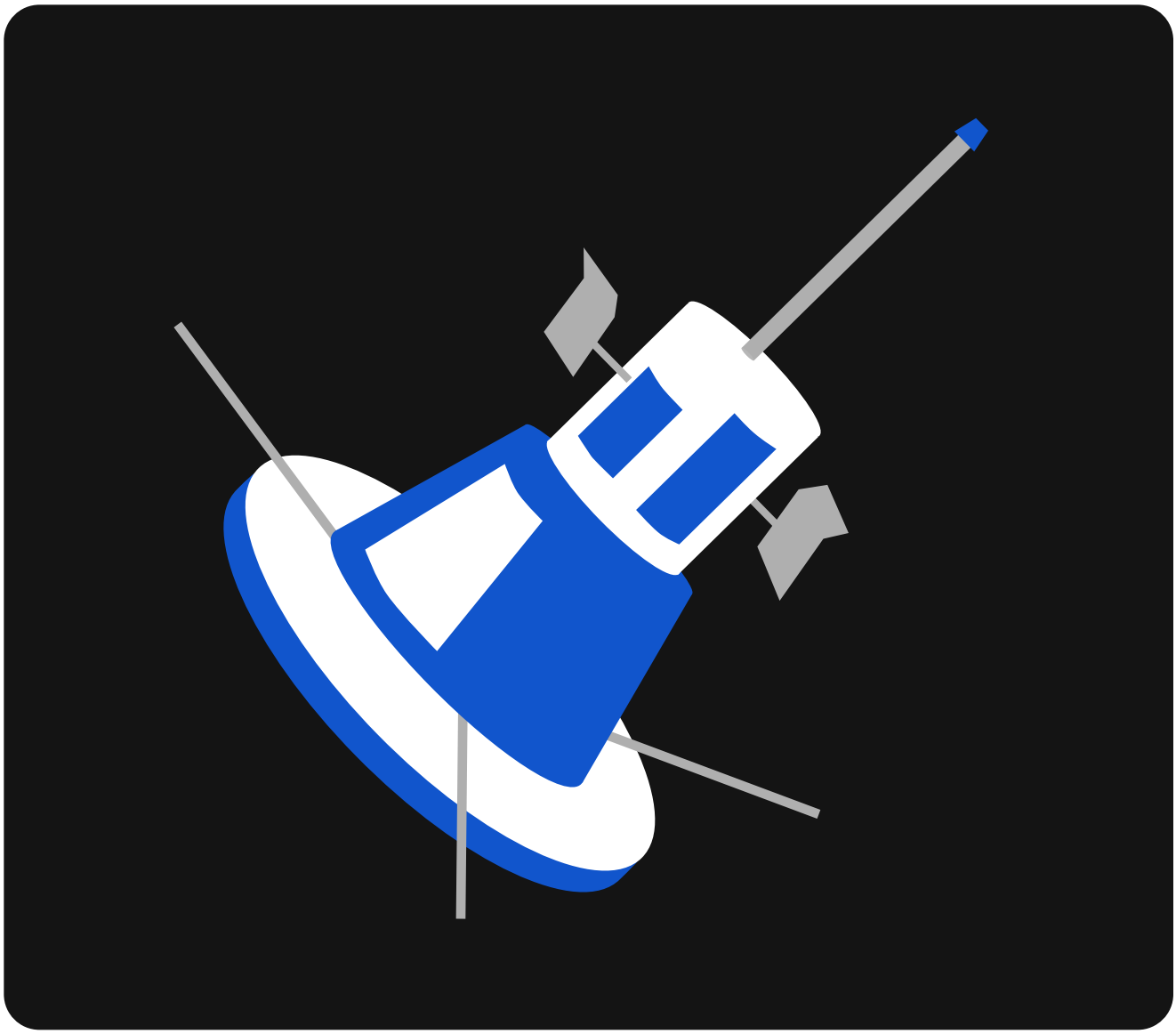

Fig. 1 My rendition of the Parker Solar Probe, one of my favorite satellite missions.

Candace Do

Engineering Portfolio

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Updated August 1, 2023

PRINCETON
School of Engineering and Applied Science

Hi, I'm Candace!

I'm a rising senior at Princeton University studying Mechanical and Aerospace Engineering, with minors in Computer Science and Robotics. My primary interests are spacecraft design and exploration, but I love all things mechanical design!

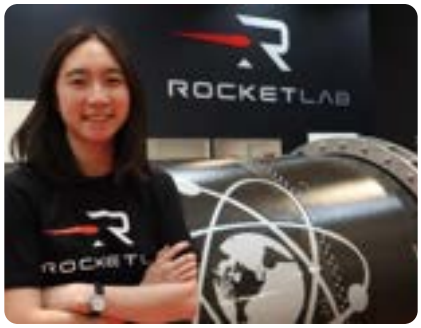


Fig. 2 Rocket Lab was a blast!

Recently I interned at Rocket Lab designing satellite components and at Firefly Aerospace designing spacecraft avionics. I've also worked in a CubeSat lab and a robotics lab at Princeton. Hobby rocketry is what first got me into engineering, and my most recent rocket project is a minimum diameter high-power rocket that my team launched at the Spaceport America Cup!

Some of my non-engineering hobbies include hiking, cooking, and playing badminton :)

I'm always on the lookout for my next project. If you like what you see, feel free to reach out!

Fig. 3 My brother and I at Mount Rainier.

CubeSat Shaker Table

TigerSats Lab · January–May 2023
Advised by Michael Galvin

Developed a **small, cost-effective CubeSat-scale shaker table for sine vibration testing**. Designed and prototyped electro-mechanical solution consisting of a high-torque, high-speed motor that uses rotational to linear motion to drive a linear stage. Testing showed that this is a viable solution for inexpensive in-house vibration testing and provides an accessible testing option for high schools and universities.

Used **Creo** to design the shaker table, **Arduino** to collect data from an IMU, and **Python** to analyze the data.

I will continue working in the TigerSats Lab for my senior thesis.

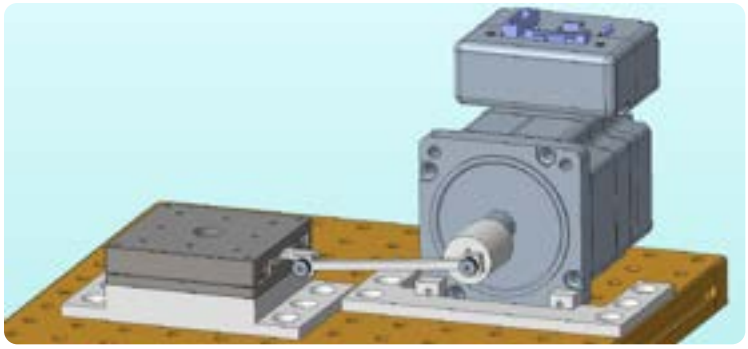


Fig. 4 CAD model of shaker table.

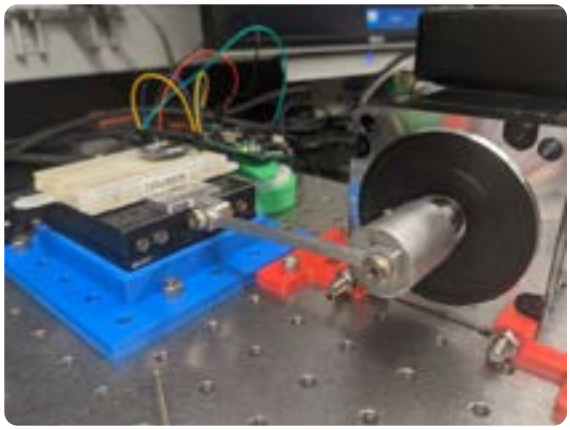


Fig. 5 Machined prototype.

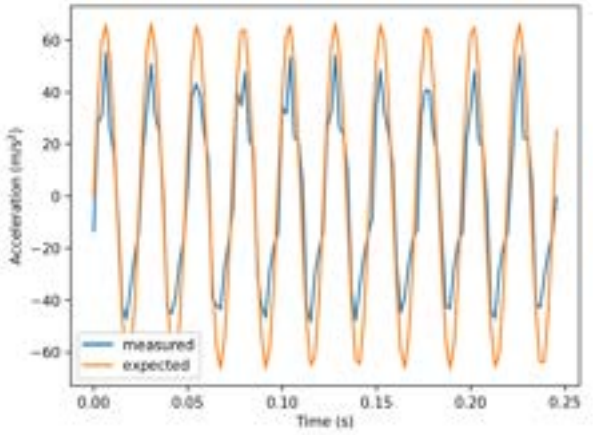


Fig. 6 Measured acceleration vs. expected acceleration at 41 Hz.

Spaceport America Cup

Princeton Rocketry Club · September 2022–June 2023

Co-led Princeton's Spaceport America Cup team to compete for the first time in four years. Successfully launched our 4 in minimum-diameter rocket in the 30k COTS division on a N-class motor with a predicted apogee of 32,000 ft. Unfortunately, loss of GPS signal prevented us from recovering the rocket.

Focused on the technical aspects of designing and building the launch vehicle, such as designing the recovery train and completing a carbon fiber layup for the fins.

Used **OpenRocket** to design the launch vehicle and simulate launches, **Creo** to prototype 3D-printed components, and **Cura** to slice prints.

Managed four team leads, as well as the build schedule and budget.

Fig. 7 Carbon fiber layup on the fins.

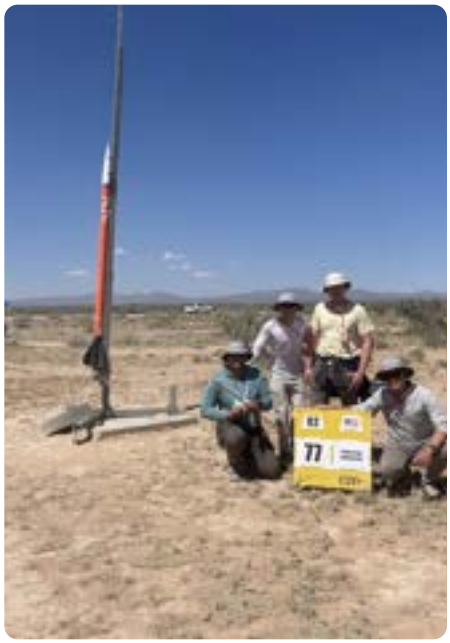


Fig. 8 Ready for launch!

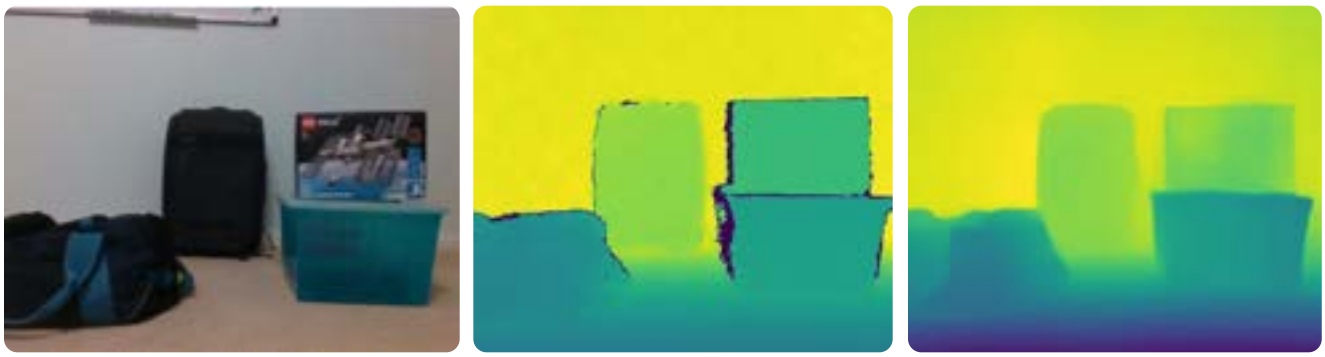
Monocular Depth Estimation

Intelligent Robot Motion Lab · August 2022-January 2023
Advised by Professor Anirudha Majumdar

Developed a method for **monocular absolute depth estimation for small FPV drones** using modified version of merged-depth estimating depth from a monocular image, that takes a ground-truth input of the maximum depth in the environment.

Conducted tests using a RealSense camera to compare predicted depth vs. actual depth. This model could be a viable solution for monocular absolute depth estimation in well-lit, high-contrast environments where the bounds of the operating area are known.

Used **Python** to implement machine learning techniques for depth estimation. Packages used include **OpenCV2** and **PyTorch**.



(a) Sample frame. **(b)** Real depth. **(c)** Estimated depth.

Fig. 9 Sample frames and depth maps from depth estimator implementation.

Wing Design Project

MAE 321 (Engineering Design) Final Project · April–May 2022

Collaborated with six other students to build a cantilevered structure modeled after an airplane wing that would support a 75 lb load at one end.

Designed and analyzed wing structure in PTC Creo.

Created CNC manufacturing instructions for the wing spar and bulkheads in PTC Creo.

Used bandsaw, lathe, drill press, CNC, and 3D printing to manufacture airplane wing parts.

Wing was ultimately successful in lifting 75 lbs.

Fig. 10 Final assembly of the wing.

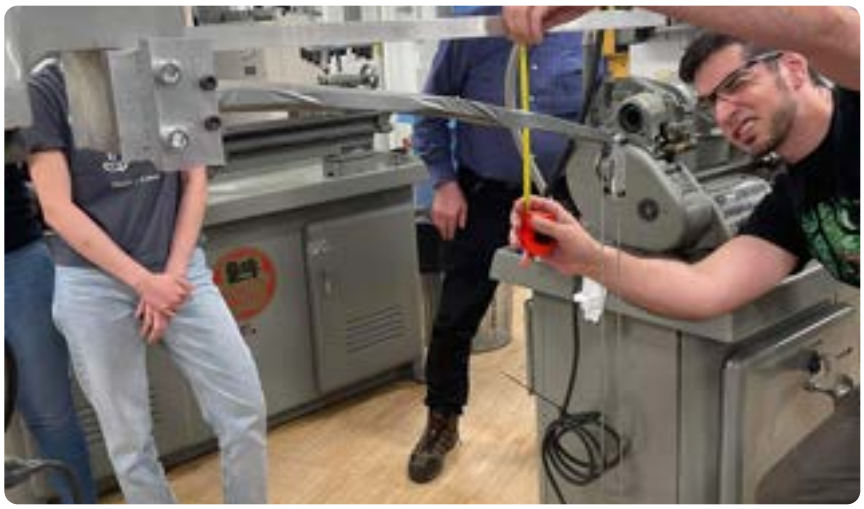


Fig. 11 Measuring the deflection of the wing under load.

Ion Source Research Project

Princeton Space Physics Lab · **September 2021 - May 2022**

Collaborated with seven other students to work on the Space Physics Lab's ultra-high vacuum system, which will ultimately be used to calibrate space instruments built in the Space Physics Lab.

Researched ion source design to learn about the lab's ion source. **Proposed experiments** to collect data on ion source capabilities, such as beam intensity and ion species. **Presented PDR** to lab leads and other staff.

Simulated ion source in SIMION software. Collected simulation data to compare to ion source data. **Analyzed** differences between simulation and real data and proposed reasoning behind discrepancies in a **CDR**.

Acquired laboratory skills, including using lab electronics, cleaning space instrument and vacuum system parts, and working with SIMION and Python.

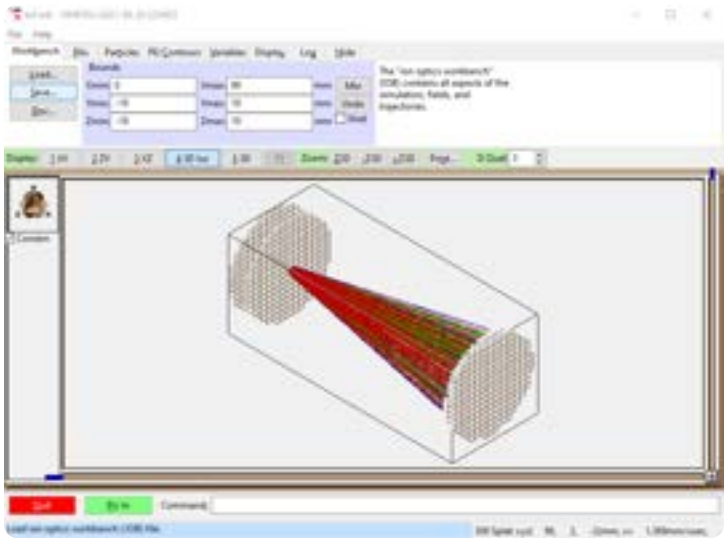


Fig. 12 An example model in SIMION.

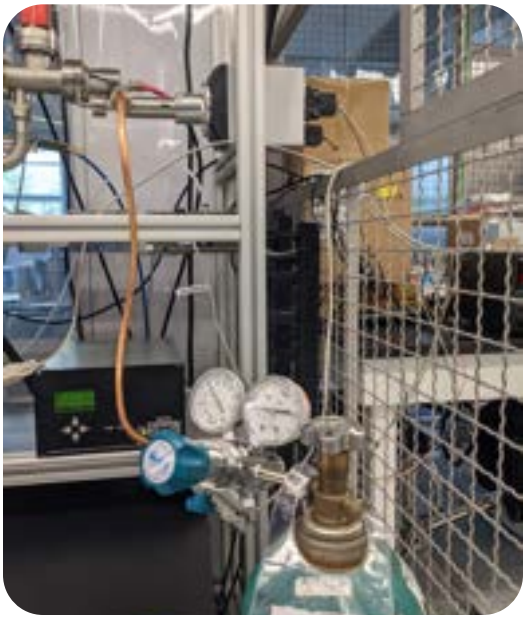


Fig. 13 The ion source and precision leak in the vacuum system.

NAR High Power Rocketry Level 1 Certification

Personal Project · May 2018

Built a high-power rocket using Apogee Components' Sumo kit.

Simulated the rocket in OpenRocket to determine key launch parameters, such as motor choice and additional nose weight.

Launched the rocket at Fire in the Sky in Mansfield, WA.

Successfully recovered the rocket to receive my National Association of Rocketry (NAR) High Power Rocketry Level 1 Certification.

Fig. 14 Preparing to paint the rocket.

Fig. 15 Launch!
Image courtesy of Venkatesh Rao.