

Education

Carnegie Mellon University

Mechanical Engineering, Master's of Science, Research Track

Aug 2024 – May 2026 (*Expected*)

Georgia Institute of Technology

Mechanical Engineering, Bachelor's of Science

Aug 2020 – Dec 2022

Experience

Graduate Research Assistant - Space Robotics

CMU Biorobotics Lab - Space Systems Technology Institute

Aug 2024– Present

Pittsburgh, PA

- Developing adaptive control systems for **space-based inspection robots** designed for satellite structural assessment in orbit
- Implemented an adaptive **anchoring behavior algorithms** using **Pinocchio** that enable a serial kinematic chain robot to transition between floating-base and fixed-base configurations for maneuvering in 3D space structures in **pyBullet**
- Deployed closed-loop control policy on hardware using **ROS1** and **Python** on a custom 3D test bed simulating microgravity structural inspection scenarios
- Contributed to **mechanical design and hardware integration** of a novel snake robot with embedded torque sensing capabilities for autonomous space structure inspection missions

Research Engineer - Aerial Decelerator Systems

Earthly Dynamics, LLC

Jan 2023– Aug 2024

Roswell, GA

- Designed and optimized novel **bleed-air spoiler control systems** for parafoil aerial decelerators using **CFD analysis** to enhance precision airdrop capabilities
- Led **experimental flight-testing program** validating control authority improvements in single-surface parafoils, contributing to **3 peer-reviewed publications** in a journal and AIAA conferences
- Directed development and testing of a novel **powered-paraglider deployment system** for autonomous aerial delivery applications

Mechanical Engineer - Airdrop Systems

Earthly Dynamics, LLC

May 2021– Dec 2022

Atlanta, GA

- Performed **system identification and characterization** of actuation systems for **parafoil airdrop platforms** through torque-speed and load-case analysis in **Matlab**, optimizing performance for precision aerial delivery
- Built and tested a remote-controlled paramotor platform using **rapid prototyping** techniques for **flight control algorithm validation** in aerial decelerator systems

Projects

Non-Linear MPC (NMPC) for RoboRacer

Optimal Controls and RL

Jan 2025– May 2025

- Developed real-time trajectory tracking using the full non-linear dynamic model and constraints with **Casadi** to support maneuvers like drifting
- Integrated full-state and control sensors into prediction to accurately represent non-linearities for robust tracking in a **pyBullet** simulation

Teleoperated Underwater Submarine

Advanced Mechatronic Design

Aug 2024– Dec 2024

- Wrote custom libraries in **Embedded C/C++** for **STM32 Microcontroller** to support **real-time operation** of an underwater submarine from the remote control
- Designed electrical circuitry in **KiCad** to add peripherals to the STM32 Microcontroller to develop a remote control for the submarine

Publications

- Ward, D.J., **Vu, A.L.**, Costello, M., "Control Authority of a Single-Surface Parafoil with Bleed-Air Spoilers," *Journal of Aircraft*, Vol. 61, No. 6, 2024
- Ward, D.J., **Vu, A.L.**, Costello, M., "Bleed Air Actuation for a Single Surface Parafoil," *AIAA Aviation Forum*, AIAA 2024-4519, July 2024
- Ward, D.J., **Vu, A.L.**, Ward, M., Costello, M., "Bleed-Air Control of a Single Surface Parafoil Canopy," *AIAA SciTech Forum*, AIAA 2022-2716, 2022