Luke W. Pritchard

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RESEARCH INTERESTS

Bio-inspired robots, collective underwater sensing and decision making, hydrodynamics of fish schools and robotic collectives, embodied intelligence and fluid structure interaction for multi robot systems.

EDUCATION

University of Virginia (UVA) Dec. 2025
Bachelor of Science, Aerospace Engineering GPA: 3.7

Piedmont Virginia Community College (PVCC) May 2023
Associate of Science, Magna Cum Laude GPA: 3.7

RESEARCH EXPERIENCE

UVA Bio-Inspired Engineering Research (BIER) Group *Jan. 2025 – Aug. 2025*
Undergraduate CFD and Robotics Researcher *Charlottesville, VA*
Advisors: Prof. Haibo Dong and Dr. Guo

- Ran CFD workflows using MATLAB, PuTTY (Fortran), WinSCP, and Tecplot 360 on UVA Rivanna supercomputer to model pressure distributions and vortex formations in complex flow regimes.
- Quantified schooling performance, finding 20 percent higher propulsive efficiency in loose diamond formations and 20 percent higher thrust in tight formations compared with solitary swimming.
- Built a tendon-driven soft robotic leech tuned to 2 Hz to match simulated undulation for validation.

UVA Senior Capstone Design - Sounding Rocket "Hoo-Rizon" *Aug. 2024 – May 2025*
Propulsion Lead *Charlottesville, VA*
Advisor: Prof. Haibo Dong

- Led propulsion integration for UVA's first successful rocket launch, reaching 4,000 ft.
- Designed, analyzed with FEA, and laser cut centering rings sized for a 500 lbf axial load during boost; coordinated with structures and avionics teams to ensure alignment and clearance.
- Built a quantitative trade space for candidate rocket motors, managing cost, performance, and integrability with existing structures and avionics to down select the final propulsion configuration.

UVA Engineering Link Lab *Jan. 2025 – Present*
Undergraduate Research and Program Assistant *Charlottesville, VA*
Advisor: Prof. Daniel Quinn

- 3D Modeled and manufactured 1/25th scale replica of new UVA water channel for demonstration.
- Estimated pump power and volume requirements for safe realistic flow conditions on robotics.

LEADERSHIP AND SERVICE

UVA Engineering Student Council *Jul. 2024 – Dec. 2024*
Academic and Professional Development Chair *Charlottesville, VA*

- Led a team of 10 managing Big/Little program, Wahoo Welcome, and events supporting students.
- Surveyed the entire undergraduate engineering body to identify employer interests and helped increase career fair company participation by about 30 percent.

ENGINEERING EXPERIENCE

NASA Johnson Space Center | Propulsion and Power Branch Aug. 2024 – Dec. 2024
Propulsion Engineer Intern Houston, TX

- Developed and tested Johnson Space Center's first hybrid rocket engine using nitrous oxide (N2O) and 3D-printed ABS fuel, achieving 330 lbf thrust and 150 s specific impulse.
- Designed and built a test stand from 80/20 extrusion to measure and withstand 1,000 lbf of thrust with a 3.0 factor of safety (FOS); performed in-place calibration of the load cell while pressurized.
- Integrated an upper fluid system with nitrogen pressurization of the N2O run tank, a dedicated purge line, and relief valves to prevent liquid lock; enabled successful pressure system checkout.
- Collected and analyzed hot-fire data during on-site testing at Intuitive Machines to validate modal propellant gauging under extreme acoustic noise; achieved 2 to 3 percent error from true fuel level.

NASA Langley Research Center | Configuration Aerodynamics Branch *June 2023 – Aug. 2023*
Wind Tunnel Researcher Intern *Hampton, VA*

- Delivered $50,000 annual savings by replacing vendor calibrations with an in-house mass-flow calibration service using choked nozzles, validated against Multiple Critical Venturi measurements.
- Supported wind tunnel operations through model proof testing, sting-balance calibration with deadweights, Pitot tube replacements, and instrumentation checks to ensure high-fidelity data.

TEACHING EXPERIENCE

UVA Dept. of Engineering and Society Jan. 2024 – Aug. 2024
Teaching Assistant: Engineering Ethics Charlottesville, VA

- Led weekly discussions and occasional lectures for a 64 student engineering ethics course, helping students connect ethical frameworks to real engineering decisions.
- Graded written assignments and provided feedback on safety, responsibility, and professional conduct, reinforcing habits that are critical in autonomous systems.

HONORS AND AWARDS

Piedmont Scholar Scholarship, University of Virginia Aug. 2023 – Dec. 2025

- Merit based scholarship recognizing academic excellence, awarded to a small number of engineering students.

President's List, PVCC & UVA Aug. 2021 – Dec. 2025

- Recognized for earning top academic standing for various terms from 2021 to 2025.

TECHNICAL SKILLS

Robotics and embedded systems	Arduino, servo-based actuation, tendon routing, microcontroller programming for robotic prototypes.
Programming and data analysis	MATLAB, Python, basic Fortran workflows, Bash, Linux, SLURM job submission, remote computing tools such as PuTTY and WinSCP.
Simulation and modeling	CFD workflows on Rivanna supercomputer, Tecplot 360, ANSYS, numerical methods for ODEs and PDEs, basic structural FEA, post processing of unsteady flow fields.
Design and fabrication	SolidWorks, GD&T (ASME Y14.5), 3D printing, basic CNC machining, lathe operation, pressure fittings and leak checks.