

Alexander James Citardi

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Education

Duke University, Durham, NC

Aug 2023 - May 2027

Pratt School of Engineering: BSE in Mechanical Engineering, Certificate in Robotics & Automation

GPA: 3.99/4.00 | Honors: Dean's List with Distinction (all semesters)

Professional Experience

Lucid Motors, *Vehicle Architecture Intern*

May 2026 - Aug 2026

- Owned the master packaging envelope for a new vehicle platform, defining 50+ hardpoints in CATIA and arbitrating competing clearance and tolerance demands across body, chassis, powertrain, and interior.
- Redesigned a structural body component after crash failure, running a die-casting vs. stamping vs. extrusion trade study to pick the lowest-cost compliant process; rerouted the adjacent harness to clear it.
- Instrumented an on-vehicle driving test measuring tire and powertrain motion envelopes, correlating measured clearance to prediction within 2 mm against minimum-gap targets from tolerance stack-up.
- Built Python tooling that automated usable-volume packaging studies, replacing manual CAD block-fitting with a signed-distance-field solver, cutting study time 90% and fitting 12% more volume into the same compartment.

Duke Electric Vehicles, *President*

Sep 2023 - Present

- Directed all engineering and operations for Duke's Shell Eco-marathon team as 2025-26 President; grew active membership from 13 to 50+ and annual sponsorship funding to \$40,000 while directing an \$80,000 build budget.
- Led design and fabrication of the team's newest vehicle entry from the ground up, passing full technical inspection and placing 12th overall at Shell Eco-marathon.
- Engineered a vacuum-infused carbon-fiber composite chassis and shell in Ansys FEA and CFD, cutting chassis weight 42% (25% vehicle-level) and drag 45% versus previous aluminum design.

Duke Hospital Surgical Robotics, *Engineering Intern*

May 2025 - Aug 2025

- Prototyped tendon-actuated continuum endoscope tools for gastroscopy, reaching 100° multi-directional bending; closed the loop on tip position in MATLAB/Simulink under PID control on a TI C2000 controller.
- Packaged the full actuation mechanism within a 2.8 mm endoscope working channel; molded the silicone body in a dissolvable plastic core to release internal geometry no rigid tool could unmold.

Projects

Bipedal Walking Robot

Spring 2026

- Architected a 1 kg, 40 cm-tall 6-DOF bipedal robot around a servo torque envelope, sizing per-joint drivetrain topology from worst-case joint torques to centralize mass and cut gravitational torque at the extremities.
- Sized foot geometry from support-polygon analysis to keep the center of mass over the stance foot; validated gait in PyBullet, then walked stably at 3 cm/s on a Raspberry Pi servo stack for a full charge.

Selective Electroplating Gantry Robot

Spring 2025

- Converted a benchtop CNC router into a selective electroplating machine with custom 3D-printed nozzles, holding 1 mm feature resolution across a 5–500 μm controllable deposition thickness.
- Wrote Python automation converting images into G-code toolpaths with gamma-corrected dwell time for controlled plating gradients; published open-source documentation (GitHub/Hackaday) to 1.5k+ views.

Flying Hydrofoil Kayak

Fall 2024

- Built a flying hydrofoil kayak, sizing front and rear foil area and geometry from lift, drag, and thrust budgets to reach foil-borne flight on a 2 kW, 30kgf thrust electric thruster.
- Devised a passive ride-height stabilization system: a buoyant pivoting front foil that sheds angle of attack as it rises toward the surface, self-trimming to an equilibrium ride height of ~1 ft without active ride-height control.

Skills

Design: CATIA, SOLIDWORKS, CAM; Ansys FEA & CFD, GD&T, DFM/DFA, tolerance stack-up analysis

Fabrication: CNC milling/turning, waterjet & laser cutting, composite layup, silicone molding, FDM/SLA 3D printing

Programming & Hardware: Python, MATLAB/Simulink, C++, Git/Linux; PID control; Raspberry Pi

Awards: Eagle Scout; FIRST Robotics Impact Award, 6 research poster presentations (2023-25)