Alexander James Citardi

alex.citardi@duke.edu | 713-823-0002 | alexcitardi.com | linkedin.com/in/alexcitardi

Education

Duke University, Durham NC Aug 2023 - May 2027
Pratt School of Engineering: BSE in Mechanical Engineering, Certificate in Robotics & Automation
GPA: 3.98/4.00 | Honors: Fall Dean's List with Distinction, Spring Dean's List with Distinction

Technical Experience

Duke Electric Vehicles, *President* Sep 2023 - Present

- Directing chassis and body architecture for Duke's nationally recognized EV team in the Shell Eco-marathon Urban Concept division while serving as Team President.
- Engineering lightweight carbon-fiber composite chassis and shell; applied Ansys FEA and CFD to optimize structural integrity, manufacturability, and aerodynamic efficiency.
- As 24-25 Mechanical Lead, spearheaded Duke EV's first-ever entry in the Shell Eco-marathon Urban Concept category, overseeing CAD, chassis fabrication, and drivetrain integration, achieving 11th place at Shell Eco-marathon 2025
- Rebuilt and expanded Duke EV by growing active membership 4× and re-establishing the team's competitive presence in the Shell Eco-marathon, building on its legacy as a world-record-holding program

Duke Surgical Robotics Bertram Lab, *Undergraduate Researcher* May 2025 - Present

- Designed and prototyped tendon-actuated continuum robotic endoscope tools, aimed at improving surgical dexterity and visualization during colonoscopies and endoscopies
- Achieved 100° multi-directional bending in tendon-actuated continuum robot prototype through multi-material vertebrae design (PETG/TPU), advancing development toward biocompatible miniaturization within 2.8 mm endoscope channels
- Developed closed-loop tendon actuation system using TI LAUNCHXL-F28379D microcontroller, dual motor controllers, and 4 DC motors; implemented real-time multi-axis control via MATLAB/Simulink

Duke Selective Electroplating Bletsch Lab, *Project Lead* Jan 2025 - May 2025

- Engineered a CNC-based selective electroplating system by integrating custom 3D-printed nozzles and a benchtop CNC router for precision-controlled metal deposition
- Developed Python automation scripts to convert images into G-code toolpaths, implementing gamma correction algorithms to optimize dwell time and plating gradients
- Published open-source documentation (GitHub/Hackaday) with 1.3k+ views, enabling replication by researchers

Professional Experience

Global Health Design Project - Uganda, *Electrical Design Lead* Jun 2024 - Present

- Conducted field research in Uganda, including hospital visits and clinician interviews, to identify barriers in preeclampsia treatment and define engineering design requirements.
- Collaborated with Ugandan engineering students to co-develop a low-cost, portable syringe pump enabling automatic $MgSO_4$ delivery in understaffed hospitals.
- Led electronics system design, integrating an Arduino-based controller, stepper motor with driver, lithium-ion battery, and LED/user-interface for real-time control and monitoring using locally sourced components.
- Directing ongoing refinement, including PCB integration, motor optimization, and biocompatibility testing toward clinical trials and deployment

Teaching Assistant, *Engineering Design Course EGR101* Aug 2024 - Dec 2024

- Guided 40+ first-year students in engineering design course through CAD, microcontrollers, prototyping, and testing skills, providing advanced technical feedback

Magister Training Systems, *Founder and President* Apr 2021 - Aug 2023

- Founded surgical education startup, developing 6+ 3D-printed sinus surgery trainers validated via peer-reviewed publication and resident feedback

Skills and Awards

Fabrication & Prototyping: 3D printing, laser cutting, CNC milling/turning, composite layup, waterjet cutting, rapid prototyping, machining; **Programming/Controls:** Python, MATLAB/Simulink, C++, Robot Operating System (ROS), LabVIEW; **CAD/CAE:** Fusion 360, OnShape, SOLIDWORKS, assemblies, FEA, CFD, Ansys, GD&T; **Hardware and Electronics:** TI C2000, Arduino, soldering, mechatronics design;
Awards: Eagle Scout; FIRST Robotics Impact Award, FIRST Texas District Championship Finalist; 6 research poster presentations (2023-25); 11th place, Shell Eco-Marathon Urban Concept Battery Electric 2025