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Zachary Maldonado

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EDUCATION

Duke University

Aug 2023 - May 2027

B.S. in Mechanical Engineering; Aerospace Engineering Certificate

GPA: 3.93/4.00

Relevant Coursework: Mechanics of Materials, Fluid Mechanics, Thermodynamics, Heat Transfer, Dynamics, Control Systems, Mechatronics, Aircraft Performance, Computational Fluid Dynamics, Space Systems, Product Design

KEY COMPETENCIES

- **CAD & Analysis:** SolidWorks CAD, Autodesk Fusion 360, ANSYS FEA, SolidWorks Simulation/Flow Simulation, Onshape
- **Manufacturing:** CNC Milling, Waterjet, Additive, Composite Layup & Resin Infusion, Shop Fabrication, DFMA, GD&T basics
- **Programming & Controls:** MATLAB, Python, LabVIEW
- **Hardware:** Electronics & Soldering, Sensors/Instrumentation, Electric Motors, System Integration
- **Clearance:** Active DoD Secret

RELEVANT PROFESSIONAL EXPERIENCE

Mechanical Engineering Intern | U.S. Air Force Hypervelocity Wind Tunnel 9 (BNH)

May 2026 - Aug 2026

- Designed system architecture and implemented it using LabVIEW and mechanical/hardware infrastructure to bring an adjustable-contour nozzle Mach 5-7 wind tunnel online to support aero-optical diagnostic development
- Assembled and integrated trigger-interface circuitry for timed solenoid and poppet valve actuation for mass flow
- Created full tunnel 3D CAD assembly; designed and fabricated electrical housings, mounts, T-slot framing scheme
- Built pebble-bed heater, high pressure nitrogen plumbing, vacuum seals; Integrated pressure transducers and TCs
- Conducted technical design reviews; verified that LabVIEW controls correctly enabled cyclic, 60 ms long runs
- Developed conceptual design and detailed CAD assembly for an actuated nozzle to automate Mach number adjustment; justified design decisions against thermal, space, and manufacturing constraints, loading scenarios, target Mach range

Interior Lighting & Electrical Intern | Energy Select Solar + Solutions

May 2025 - Aug 2025

- Retrofitted energy-efficient LED systems and modified building electrical layouts across businesses, universities, schools
- Coordinated onsite operations; wired, installed junction boxes, routed metal-clad cable; Assembled & installed fixtures

EXTRACURRICULAR TECHNICAL EXPERIENCE

President | Duke Combat Robotics (Formerly Social Outreach, VP)

Aug 2024 - Present

- Currently leading the design, structural analysis, and fabrication planning for Duke's first 12 lb combat robot
- Mentor several separate teams to rapidly design lightweight robotic systems; compete throughout both semesters
- Design and manufacture structural and weapon assemblies using aluminum, plastics, impact-resistant filaments, steel
- Package control electronics, motors & mechanical power transmission, wiring harnesses; Interface structures with PCBs
- Individually designed 3 antweight (1 lb) assemblies, built & competed with 2 of them and led beetleweight (3 lb) robot team

Mechanisms/Structures Engineer | Duke Electric Vehicles (DEV)

Sep 2025 - May 2026

- Used SolidWorks surface modeling & Flow Simulation to design the aerodynamic profile for battery-electric vehicle
- Manufactured stiff, lightweight carbon-fiber components by vacuum-assisted resin infusion and structural core material
- Designed exterior architecture (windows, doors, etc.), locking mechanisms; Integrated vehicle dynamics subassemblies

Electric Hydrofoil Kayak Study | Pratt School of Engineering

Aug 2024 - Dec 2024

- Designed and built a remote controlled hydrofoil kayak prototype using hydrofoil lift and vectored aquatic thrust
- Analyzed & built mechanically self-adjusting canard system to investigate methods of passive lift control and stability
- Led design of the rear wing; Performed lift calculations; Interfaced with & waterproofed wiring harness
- 3D printed, coated airfoils and aerodynamic profiles to fit over aluminum framework and thruster adapter
- Completed successful on-water testing; received Fall 2026 innovation grant from Duke Co-Lab to evolve the project

Structures Subteam Member | Duke Aero

Jan 2024 - April 2025

- Designed the rocket nose cone assembly in SolidWorks and performed structural FEA in ANSYS of internal bulkhead
- Manufactured airframe components using 3-axis CNC milling, waterjet cutting, and carbon-fiber wet layups