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Zachary Maldonado

Portfolio available @ zachmaldo.com



Aug 2023 - May 2027

EDUCATION

Duke University

B.S. in Mechanical Engineering; Aerospace Engineering Certificate

GPA: 3.93/4.00

Relevant Coursework/Expertise: 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
- **Manufacturing:** CNC Milling, Waterjet, Additive Manufacturing, Composite Layup/Resin Infusion, Drill Press
- **Programming & Controls:** MATLAB, Python, LabVIEW
- **Hardware:** Electronics, Soldering, Sensors/Instrumentation, High-Pressure & Vacuum Systems
- **Clearance:** Active DoD Secret

RELEVANT PROFESSIONAL EXPERIENCE

Mechanical Systems Engineering Intern, AEDC Hypervelocity Wind Tunnel 9

May 2026 - Aug 2026

- Brought hypersonic pulsed tunnel online to support aero-optical techniques used in Mach 7-18 hypersonic reentry tests
- Designed control system for fast-acting valves, sensors, and pressure vessels and implemented it with LabVIEW
- Modeled & managed large CAD assemblies of tunnel; designed and manufactured electrical housings and mounts
- Analyzed electrical schematics and built driver board to interface control signals with fast-acting valves
- Built high-pressure infrastructure, maintained vacuum systems, and integrated pressure transducers and thermocouples
- Developed full concept for active nozzle automation; analyzed associated thermal/structural loads to select components
- Ran design reviews; tested and verified LabVIEW code, valve actuation system, and hardware

Lighting & Electrical Intern, Energy Select Solar + Solutions

May 2025 - Aug 2025

- Worked with the interior lighting team to integrate various kinds of energy-efficient LED lighting systems
- Managed onsite operations; contracts across private businesses, universities, schools
- Assembled, tested, and installed a large array of fixtures; responsible for changes to existing building electrical layouts

TECHNICAL & LEADERSHIP EXPERIENCE

President, Duke Combat Robotics

Aug 2026 - Present

- Currently lead the design, structural and dynamic analysis, manufacturing of Duke's first 12 lb combat robot
- Mentor several other subteams to rapidly design lightweight robotic systems; compete throughout both semesters
- Design and manufacture structural and weapon assemblies using aluminum, UHMW, TPU, carbon fiber, and steel
- Package control electronics, weapon and drive motors, wiring harnesses into lightweight designs
- I fully designed 3 antweight (1 lb) assemblies, built & competed with 2 of them and 1 beetleweight (3 lb) robot myself

Mechanical/Structures Subteam, Duke Electric Vehicles (DEV)

Sep 2025 - May 2026

- Used SolidWorks surface modeling & flow simulation to design an aerodynamic profile for vehicle exterior structure
- Utilized resin infusion techniques and foam core material to manufacture structural & aerodynamic carbon fiber pieces
- Designed exterior architecture, locking mechanisms; worked with other subteams to successfully integrate designs

Electric Hydrofoil Kayak Study

Aug 2024 - Dec 2024

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

Structures Subteam, 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 CNC milling, waterjet cutting, and carbon-fiber wet layups