Jonathan Zak

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EDUCATION

Vanderbilt University, Nashville, TN
Master of Science in Mechanical Engineering, Expected Spring 2026
GPA: 4.00 / 4.00
Bachelor of Engineering in Mechanical Engineering, Minor in Material Science, May 2024
GPA: 3.91 / 4.00, Cum Laude

ENGINEERING EXPERIENCE

Graduate and Undergraduate Research Engineer, Nashville, TN **January 2023 – Present**
Vanderbilt Aerospace Design Laboratory (VADL)

Composite Structure Test Facilities

- Designed and built drop tower and shock-tube facilities to study high-rate strain behavior in carbon fiber vehicle sections.
- Integrated Fiber Bragg Grating (FBG) sensors alongside resistance strain gauges to validate dynamic strain capture and enable direct comparison of fiber optic vs. traditional sensing methods.
- Adapted shock tube for carbon fiber cylindrical sections to investigate transient pressure-induced strain response; coupled experiments with Multiphysics FEA modeling to predict material behavior under shock loading.
- Collaborated with NASA Armstrong Flight Research Center's Fiber Optic Sensing System (FOSS) lab to validate FBG calibration and data acquisition methods for aerospace applications.

Novel UAVs

- Designed and built two innovative aerial systems: a 5-motor drone with decoupled thrust and pitch/roll control, and a foldable autorotative lander for low-drift payload delivery.
- Flight-tested the drone to assess energy efficiency; results informed control refinement and supported an early-stage patent submission.
- Applied CFD and MATLAB modeling to optimize autorotative lander blade geometry, descent rate, and stability; validated design through 400-ft drop tests, achieving a 14 ft/s descent velocity with minimal lateral drift.

NASA USLI Competition Team
Payload Engineer, Safety Officer

- Performed design, testing, and fabrication of novel in-air deployable co-axial drone for 2024 NASA Competition
- Developed payload failure analysis and mitigation matrices, led design of corresponding testing protocols
- Designed in-air drone detachment system for ensuring stable deployment of drone out of a rocket nose cone at 400 ft during rocket descent

Daimler Truck North America, Detroit, MI **May 2023 – August 2023**
Innolab Mechanical Test Engineering Intern

- Commissioned climatic test chamber and developed testing procedures for electric truck batteries
- Designed battery cell test fixtures to ensure proper electrostatic isolation, electrical connection, and stability
- Used additive manufacturing and NX CAD software to protype test fixtures and determine needed design iterations

ADDITIONAL EXPERIENCE

AIAA Reusable Launch and Space Vehicle Technical Committee **January 2025 – Present**
Member

- Co-designing an international student competition focused on reusable launch and entry, descent, and landing (EDL) systems.
- Authoring the 2025 Year-in-Review article on the reusable launch industry for Aerospace America magazine, summarizing global advances in reusability.

Vanderbilt School of Engineering, Nashville, TN **August 2024 – Present**
Teaching Assistant, Energetics Laboratory and Finite Element Analysis

- Led 3 fluids and thermodynamics labs focused on experimental methods and data analysis. Graded corresponding lab reports
- Taught undergraduate and graduate students ANSYS FEA software and math concepts necessary for understanding FEA

TECHNICAL SKILLS

Skills and Programming: MATLAB/Simulink, LabVIEW, ANSYS FEA, Python, CAD/CAM, CNC, Composites, 3D Printing