

Rowand Zara

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Education

University of Maryland, A. James Clark School of Engineering College Park, MD
Double Degree: *B.S. Aerospace Engineering* | *B.S. Applied Mathematics* — GPA: 3.7/4.00 Expected May 2029
• Quality Enhancement Systems and Teams (QUEST) Honors Program | Cohort 48 Citation Dec 2028

Experience

U.S. Army DEVCOM Army Research Laboratory | UMD Hypersonic Wind Tunnel College Park, MD
Hypersonics Engineering Intern June 2026 - Present

- Trained a multimodal PyTorch model (ResNet-18, CNN, SVD decoder) predicting IR heat-flux fields from Schlieren video
- Built a 5-stage Python pipeline extracting shock angle, intensity, and position from Mach 6.25 hypersonic Schlieren video
- Automated bow-shock detection via OpenCV polynomial fitting, generating 50k+ samples across 24 test conditions
- Computed heat flux from FLIR IR thermography using the Cook-Felderman inverse method, porting MATLAB to Python
- Executed hypersonic wind-tunnel tests and designed/machined custom parts for the Schlieren optical setup using water jet

NASA HUNCH Design and Prototype Competition | Project Website: [Click Here](#) Glenelg, MD
Thermal Engineer Sep 2024 - May 2025

- Constructed a prototype CubeSat system with space-grade MLI blankets and silver Teflon, barring aluminized Kapton
- Selected as NASA program finalist out of 200+ teams for Design and Prototype by NASA program directors
- Reduced simulated orbital temperatures by $\sim 47^{\circ}\text{C}$ in direct sunlight through thermal analysis in Thermal Desktop
- Conducted 20 physical thermal test trials in a controlled insulated environment to verify simulated orbital calculations

Vertex Aerospace, LLC Greenbelt, MD
Thermal Engineering Intern May 2024 - Aug 2024

- Analyzed 3 spacecraft systems with thermal modeling in Thermal Desktop; reviewed/approved by senior engineers
- Decreased component temperatures by up to $\sim 110^{\circ}\text{C}$ in direct sunlight cases and maintained 25°C in eclipse cases
- Applied emissivity and absorptivity properties using Stefan-Boltzmann equations, optimizing radiator/heater configuration
- Rendered transient simulation results and orbit animations that informed thermal system effectiveness on CAD models

Skills

Computer-Aided Engineering: FEA - Thermal Desktop, CFD - OpenFOAM, CAD - Fusion360 Certified, SolidWorks, Onshape
Prototyping & Fabrication: DFM, CNC Machining, Water Jet, 3D printing, Laser Cutting, Lathe Machining, Soldering
Programming: MATLAB, Python, PyTorch, C++ (Arduino IDE), GitHub, Linux

Relevant Projects

University Rover Challenge | UMD LOOP Team College Park, MD
Mechanical Engineer - Arm Subteam Oct 2025 - Present

- Designed a 3-degree-of-freedom ball wrist and concentric gearbox with Solidworks, integrated with competition rover
- Manufactured 3 prototype iterations using CNC, water jet, and 3D printing, improving with rapid prototyping
- Decreased weight by $\sim 30\%$, streamlining the efficiency and maintenance with optimized lightening and DFM
- Increased load distribution by $\sim 10\%$ using helical and compound gearing, improving compactness and longevity with CAE

International Rocket Engineering Competition | Terrapin Rocket Team College Park, MD
Simulations Engineer - Spaceshot and Aerostructures Subteams Sep 2025 - Present

- Performed CFD and FEM for aerothermal/aerostructural analyses on the level II rocket to optimize geometry, resulting in improved predicted hypersonic performance with OpenFOAM (C++/Linux-based CFD)
- Graphically estimated propulsion height vs. time for various level I and II rocket models with OpenRocket and FinSim
- Attended design reviews and collaborated across subteams, maintaining documentation of task progress through GitHub

Flexible Skins for Morphing Aircraft Research College Park, MD
Student Researcher Sep 2025 - Dec 2025

- Calculated deformation slopes of 0.4 - 1.1 cm/kg by leveraging a negative Poisson's ratio and elastomeric behavior in Miura-ori origami structures, determining it as a feasible candidate for morphing aircraft wings
- Developed and fabricated a 4-part PLA squeeze mold and custom fixtures using FDM printing and Solidworks, casting and curing the specimen for 24 hours before testing with incremental weights and plotting with MATLAB

Over-Terrain Vehicle (OTV) Seed Planting College Park, MD
Intro to Engineering - Team member Sep 2025 - Dec 2025

- Selected 1st of 126 UMD teams, winning "Sustainability Award" for the design with the lowest environmental impact
- Reduced \$50+ worth of fasteners by modelling OTV with dovetail joints and reusable material for DFM using Onshape
- Implemented embedded systems involving machine-learning vision to traverse randomized obstacles in Python and C++
- Assembled tripod propulsion system and electronics using torque, power, runtime, and battery calculations with soldering