

Madeline Bowne

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Professional Summary

Versatile PhD candidate from Georgia Tech with interdisciplinary foundation in mechanical, aerospace, and systems engineering, combining advanced design and simulation expertise for improved decision-making. 5+ years of combined intern/research across 7 internships (Gravitics, Relativity Space, Redwire, Lockheed Martin, Northrop Grumman) spanning mechanical, GNC, systems, and propulsion engineering as well as business development and advanced concepts. Cross-disciplinary research integrates engineering, space policy, and economics to develop practical frameworks for commercial space infrastructure. Proposal writing experience and strong communication background with English minor and 4 years of leadership in Formula SAE. Passionate about sustainability and circular economies.

Education

Georgia Institute of Technology: *MS and PhD (Dec 2025 graduation), Aerospace Engineering*

- **Dissertation:** "Flexibility Framework to Screen Strategies & Options for Sustainable On-Orbit Servicing Infrastructures in LEO". Thesis proposed April 2024 and defended November 2025.
- **GPA:** 4.0/4.0 — **Highlighted Coursework:** Orbital Mechanics, Regression Analysis, System Design Optimization, Scenario Writing and Path-gaming, Rocket Propulsion, System of Systems Engineering, Advanced Design Methods, Aircraft Design 1&2, Statistical Methods and Probability, Space Logistics)

Rutgers University: *BS in Mechanical Engineering, Minor in English*

- **GPA:** 3.738/4.0 — Summa Cum Laude with Highest Honors. Rutgers Alumni-Industry Scholar.
- **Formula SAE:** Design Lead (2019-2020), Vice President (2017-2019), General Member (2016-2017)
 - Designed, simulated, tested, and manufactured various components
 - Started the data acquisition subteam and developed analysis architecture using MATLAB, Excel, and MoTeC
 - Led sponsor relations, industry partnerships, outreach, and fundraising initiatives

Professional Experience

GNC/Avionics Engineering, Business Dev/Advanced Concepts Intern

Marysville, WA

Gravitics

Summer 2025

- Mission Planning: Designed sensor coverage models and trajectory studies using STK, determined satellite disposal options with STK and DAS, calculated propellant budgets and control authority for attitude control system ops.
- Technical Proposals & Business Development: sole author for two federal funding proposals for advanced concepts
- GNC Software Development: Coded Python utility functions for guidance, navigation & control suite
- Hardware Integration: Assembled/tested wire harnesses and Raspberry Pi software for prototype hatch doors
- Advanced Design: Created parametric magnetorquer design tool that provides best performing configuration given a set of constraints and requirements

Propulsion Components Engineering Intern, Turbomachinery

Long Beach, CA

Relativity Space

Summer '22 & Fall '23

- Weight Optimization: Redesigned 3D-printed turbomachinery components for significant mass reduction
- Advanced Design Methods: Developed rapid design iteration methodology to develop novel geometries for 3D-printed turbomachinery components

Mechanical Engineering Intern, Archinaut Satellite

Jacksonville, FL

Redwire (prev. Made in Space)

Summer 2021

- Mission-Milestone Contribution: Designed mass off-loader for 10m-beam print demonstration
- Problem Resolution: Diagnosed jamming error in Transform Detection System, developed solutions
- Test Engineering: Designed mechanical GSE for solar surrogate array thermal vacuum testing

Systems Engineering Intern, AEGIS Command & Decision

Moorestown, NJ

Lockheed Martin

Summer 2020

- Code Development: Created MATLAB tool integrating threat sim. data w/ C++ propagation algorithms
- Analysis & Validation: Implemented Monte Carlo simulation to evaluate accuracy of the propagation method

- Test Engineering: Performed torque & thermal testing for Propellant Disconnect Initiators
- Process Improvement: Created Excel VBA tool to streamline As-Designed/As-Built comparison
- Software Testing: Helped perform work packages to test launch commodity control software changes
- Test Engineering: Designed test fixtures and performed Instron load testing on 3D-printed components
- Analysis & Problem-Solving: Completed several structural analyses of ground support equipment (GSE), identified issues in previous analyses and proposed cheap & effective solutions

Featured Research Experience

Aerospace Systems Design Lab: Graduate Research Assistant, 2020-Present

- **Thesis dissertation:** Developing a flexibility framework to evaluate novel Collection-as-a-Service (CAAS) CONOPs for satellite servicing in LEO. Incorporated multiple flexible options, sources of uncertainty, and policy schemes within a discrete event simulation, using Monte Carlo analysis. Identifying servicing architectures that reduce costs and emissions while supporting sustainable operations like satellite collection and refurbishment to advance a circular space economy. Inspired GTRI funding and other ASDL projects related to space sustainability.
- **Developed several tools and simulations to inform decision-making:**
 - Built a satellite constellation trade study tool using graph theory and discrete event simulation to optimize capabilities for battlespace awareness, simulating impact of AI on data quality and allocation. Created data visualization dashboard
 - Applied CASA software to study passive millimeter wave imaging in satellite formation design and developed image quality assessment method for the optimization program
 - Formulated reliability analysis tool based on probabilistic risk assessment for NASA Marshall's Robust Mars trade study and authored internal report for NASA
 - Developed parametric geometry/material sizing tool for 3D printed bistable mechanism given force and displacement requirements. Chain beam constraint method and classical lamina theory formulation validated with FEA and physical testing. Created data visualization dashboard
 - Created LS-Dyna (Ansys) simulations for Active Debris Removal with net capture. Validated results with physical net drop testing and determined manufacturing requirements.

Technical Skills

Programming: MATLAB, Python (proficient with SciPy and Scikit-learn), R, VBA, Linux

Software: STK, Siemens NX & Teamcenter, SolidWorks, Inventor, AutoCAD, ANSYS, LS-Dyna, Abaqus, DAS

Manufacturing: Manual Mill, Lathe, Carbon Fiber Lay-Ups, 3D Printing (FDM, SLA, PBF)

Data Analysis: JMP Statistical Analysis, Excel, R, Regression Analysis

Mathematics: Calc 1-5, statistics & probability

Design, Modeling, & Simulations: Advanced Design Methods, System Design Optimization, Surrogate Modeling, Graph Theory, Discrete Event Simulations

Digital Media: Video & Photo Editing, Adobe Creative Cloud Software, Final Cut Pro

Interpersonal: Technical & Proposal Writing, Public Speaking, Event planning, Project Management

Featured Publications and Presentations

- ["Impact of Policy on the Establishment of the LEO-based Collection-As-A-Service Concept"](#) ↗ Bowne M, Sarton du Jonchay T, Mavris DM. AIAA ASCEND 2025.
- ["Collection-As-A-Service to Incentivize On-Orbit Servicing in LEO"](#) ↗ Bowne M, Sarton du Jonchay T, Mavris DM. AIAA SciTech 2025.
- "Leveraging Flexibility to Create Circular Space Economies" 2025 SGx Lightning Talks. ↗ Slides on website ↗
- ["Satellite Formation Design to Enhance Passive Millimeter Wave Imaging Mission Performance"](#) ↗ Bender T, McNabb J, Birbasov N, Bowne M, Robertson BE, Sudol A, Mavris DM, Lourenco N.

Honors, Invitations, and Awards

Space Generation Fusion Forum Delegate (2025) | Matthew Isakowitz Fellow (2021) | Rutgers Alumni-Industry Scholarship (2018) | Boeing Leadership Scholarship (2018) | Science Ambassador Scholarship Finalist (2017) and runner-up (2018) | 6x National C-SPAN StudentCam Competition Winner (2011-2016)