Maxwell Heil

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Education

The Ohio State University, BS in Aerospace Engineering with Research Distinction, GPA: 3.6 Aug 2021 – May 2025

- **Coursework:** Statics, Circuits, Thermodynamics, Flight Vehicle Dynamics & Controls, Aerodynamics, Numerical Methods, Aerospace Structures, Astronautics, Gas Dynamics, Heat Transfer, Propulsion, Design of Space Vehicles

The Ohio State University, MS in Aerospace Engineering, GPA: 4.0 Aug 2024 – May 2026

- **Coursework:** GNC of Aerospace Vehicles, Orbital Mechanics, Advanced Space Propulsion, Experimental Fluid Mechanics

Experience

Space Systems Graduate Researcher, June 2024 – Present
Laboratory for Autonomy in Data-Driven and Complex Systems (LADDCS) – Columbus, OH

- Explore intent estimation theory in the Hill frame by analyzing and categorizing unknown spacecraft maneuvers to determine best-fit intent models, leveraging probabilistic methods and game-theory approaches
- Expand on current work by developing a larger set of basis maneuvers to more accurately predict intents
- Incorporate Adaptive Monte Carlo (AMC) methods for Bayesian inference to reduce uncertainties in maneuver detection
- Determine kill chain methods for acquiring, tracking, and asset protection in space as per the SDA TAP Lab

Avionics Manufacturing Engineering Intern, Collins Aerospace – Cedar Rapids, IA May 2024 – Jan 2025

- Built robust simulations in Visual Components to evaluate bottlenecks in automated manufacturing modules
- Presented renderings and results to leadership resulting in $3M in funding for the automation project
- Utilized Markforged Metal X and Prusa printers to design and implement 3D-printed components, optimizing strength-to-weight ratios and reducing production costs by over $24,000
- Oversaw end-to-end validation of RFID system performance to streamline WIP tracking and enhance traceability
- Contributed to NPI testing to evaluate the impact of various environmental conditions on avionics systems
- Operated Boeing 737 MAX simulators to develop expertise in test bed setup and troubleshooting methodologies

Aerospace Controls Undergraduate Researcher, Sept 2023 – Present
Systems, Optimization, and Autonomous Robotics Laboratory (SOAR) – Columbus, OH

- Develop and validate data-driven control systems for UAVs using extended dynamic mode decomposition (EDMD) and model predictive control (MPC) techniques in MATLAB and ROS
- Investigate the impact of dither quantization on UAV control performance in resource-limited environments
- Perform SITL and HITL testing using a PX4-Starling Autonomy drone to analyze real-world UAV dynamics
- Design robust methods for experimental testing, including scheme implementation, flight tests, and benchmarks

Projects

Terrain Electromagnetic Reconnaissance and Regional Analysis Satellite (TERRASat) Aug 2024 – Present

- Design, build, and launch 12U CubeSat with electric propulsion to measure Mar's magnetic field for signs of life

Avionics & Propulsion Engineer, Buckeye Space Launch Initive (BSLI) Dec 2021 – Aug 2022

- Worked with a team of engineers to create and test rocket avionics and solid rocket motors for the Spaceport America Cup

Integrated Modeling and Prediction of Atmospheric Reentry Trajectory (Project IMPART) Aug 2024 – Present

- Develop a physics-based framework to predict reentry and impact footprint using atmospheric and orbital decay models

Search and Reacquisition of Resident Space Object Aug 2024 – Present

- Leverage AI, AMC, and least squares regression (GLSDC) to identify and propagate orbits for reacquiring objects in space

Airfoil Design and Build Aug 2022 – Dec 2022

- Designed, modeled, and tested airfoils using XFLR5, Ansys, and wind tunnel testing with flow visualization techniques

Skills & Certifications

Technologies: MATLAB, Python, LaTeX, Simulink, Ansys Fluid/STK, SolidWorks, LabVIEW, XFLR5, Altium, ROS, MS Office

Certifications & Awards: Ansys STK Level 1 Certified (Oct 2024, Ansys), Undergraduate Teaching Assistant Award Finalist (Aug 2024, Ohio State), Private Pilot Certificate (Jan 2024, FAA), Microsoft Office Specialist (Jan 2018, Microsoft)