Maxwell Heil

heli.115@osu.edu | (585)626-8417 | maxheil5.github.io/maxheil5/ | linkedin.com/in/max-heil | US Citizen

Education

The Ohio State University Aug 2021 – May 2025

BS in Aerospace Engineering with Research Distinction, GPA: 3.6

- *Coursework:* Statics, Circuits, Thermodynamics, Flight Vehicle Dynamics & Controls, Aerodynamics, Numerical Methods, Aerospace Structures, Astronautics, Gas Dynamics, Heat Transfer, Propulsion, Design of Space Vehicles
- *Undergraduate Thesis:* Effect of Quantization on Data-Driven Model Predictive Control of Quadcopters
- *Thesis Link:* https://kb.osu.edu/handle/1811/105739

The Ohio State University Aug 2024 – May 2026

MS in Aerospace Engineering, GPA: 4.0

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

Experience

Systems Engineering Intern May 2025 - Present

Sierra Space – Denver, CO

- Led the development of on-orbit GNC calibration strategies for a classified satellite mission in GEO
- Coordinated cross-disciplinary efforts between subsystems such as propulsion, GNC, EPS, and C&DH
- Designed and validated CONOPs and a MATLAB-based calibration tool to give expected performance on-orbit
- Contributed to the launch efforts of the team by integrating calibration with mission control activities
- Algorithms have potential to assist mission control operators during LEOPs
- Participated in key internal design reviews and supported end of project efforts

Project Manager Jan 2025 - Present

NASA HuLC – Columbus, OH

- Led a multidisciplinary team of 12+ engineers through all phases of design, simulation, and documentation for a lunar cryogenic refueling system selected as a NASA Human Lander Challenge (HuLC) finalist
- Directed the integration of thermal modeling, mechanical design, and AI-based docking algorithms into a cohesive autonomous coupler architecture aligned with Artemis mission needs
- Oversaw design reviews, milestone presentations, and budget management while balancing technical deliverables
- Managed development of a hardware-in-the-loop Stewart platform prototype to validate sub-centimeter alignment precision and electromechanical control under realistic mission constraints
- Created computational fluid dynamics and thermal simulations to verify flow capacity and sealing performance
- Coordinated system-level decisions on material selection, emergency disconnect mechanisms, and additive manufacturing
- Authored and edited a 15+ page technical paper synthesizing subsystem contributions for evaluation by NASA engineers

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 May 2024 – Jan 2025

Collins Aerospace – Cedar Rapids, IA

- 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

Undergraduate Teaching Assistant Aug 2023 – May 2025

The Ohio State University – Columbus, OH

- Supported instruction for AE 2200, AE 3521, and AE 3522 over several semesters
- Graded homeworks, exams, and lab reports with attention to technical accuracy and clarity
- Collaborated with faculty to develop supplemental materials and exam review content to reinforce complex engineering concepts
- Recognized as a finalist for the Undergraduate Teaching Assistant Award for excellence in teaching and mentorship

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

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

Effect of Quantization on Data-Driven Model Predictive Control of Quadcopters June 2023 – Present

- Investigate quantization effects on quadcopter control using Koopman theory, MATLAB, and hardware validation

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, Thermal Desktop, SolidWorks, LabVIEW, XFLR5, Altium, ROS, DOORs, Visual Components, 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)

Technical Skills:

Guidance, Navigation, and Control (GNC), Mechanical Design, Orbital Mechanics, Model Predictive Control, Cryogenic Systems, Thermal Modeling, Additive Manufacturing, CFD Analysis, Dynamic Mode Decomposition (DMD), Kalman Filtering, Hardware-in-the-Loop Testing, System Architecture, Requirement Derivation, Monte Carlo Simulation, Failure Mode and Effects Analysis (FMEA), Team Leadership, Technical Writing and Presentation

Soft Skills:

Technical leadership, team collaboration, project management, effective communication, critical thinking, problem solving, adaptability, time management, cross-disciplinary coordination, presentation skills, initiative, attention to detail, resilience under pressure, mentoring, curiosity, decision making, conflict resolution, professional writing