Matthew Powers

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Objective — To secure experiences that will provide insight to learn and gain experience in the aerospace community.

Education

University of Kansas, Lawrence KS **May 2025**
Bachelor of Science in Aerospace Engineering
GPA: 4.0/4.0

Honors

Highest Distinction Graduate **May 2025**
School of Engineering, University of Kansas, Lawrence KS

University Honors Graduate **May 2025**
University of Kansas, Lawrence KS

Funding Advisory Committee **Aug. 2024 - May 2025**
School of Engineering, University of Kansas, Lawrence KS
- Nominated as one of two aerospace seniors to serve on the student-led funding committee to allocate funds for School of Engineering organizations for the 2024-2025 academic year

Undergraduate GNC Scholar **Jan. 2025**
AIAA SciTech Forum, Orlando FL
- Awarded one of five positions as an Undergraduate Guidance, Navigation, and Control Scholar for the AIAA SciTech Forum

Experience

Automatic Flight Controls System Intern **May 2025 - Aug. 2025**
Garmin, Olathe KS
- Developed Monte Carlo analysis simulation for analysis of Emergency Autoland for a Non-Linear Aircraft Model to analyze the performance envelope of the algorithm
- Investigated impact of inner-loop gains on Emergency Autoland performance to recommend improvements to algorithm
- Consolidated findings into report and presentation delivered to a large audience (50 - 100 people)

Undergraduate Research Assistant **Sept. 2023 - Present**
Garrison Flight Research Laboratory, University of Kansas, Lawrence KS
- Focused in Guidance, Navigation, and Control
- Independently researched and developed Lyapunov vector field based guidance algorithm for UAS target tracking
- Developed sensitivity analysis and Monte Carlo simulation for an optimized autonomous landing algorithm

Aviation Systems Test Intern **Sept. 2024 - Aug. 2024**
Garmin, Olathe KS
- Utilized Hardware-in-the-Loop systems to test avionic products for both bench and flightworthy candidacy
- Conceptualized and created automated testing scripts in Python following aircraft manufacturer requirements
- Collaborated with small team to troubleshoot testing for avionics suite

Projects

Unsteady Wildfire Boundary Tracking **Jan. 2025 - Present**
- Led research development of guidance algorithm utilizing Lyapunov potential fields to track and follow an unsteady, time-varying boundary
- Flight tested algorithm for proof-of-concept using a ground vehicle to simulate an unfixed desired waypoint
- Consolidated methodology into report for NSF FIRE grant proposal

Dynamic Modeling Method Comparison **Nov. 2023 - Dec. 2024**
- Led a small team (3) to design, build, and fly UAS aircraft to verify CFD and dynamic modeling techniques
- Condensed research into a publication and presented at AIAA SciTech 2025

Design, Build, Fly **Sept. 2021 - Dec. 2021**
- Collaborated with large team (20) to conceptualize and materialize a functioning flying-wing UAS capable of autonomous flight
- Condensed research into a tangible final report and presented to peers

Publications and Presentations

- Jeffrey Xu, Jeb Marshall, **Matthew Powers**, and Shawn S. Keshmiri, "Guaranteed Fixed-Wing UAS Lateral Safety Via Control Barrier Functions," *2025 International Conference on Unmanned Aircraft Systems (ICUAS)*. doi: 10.1109/ICUAS65942.2025.11007881

- Jeffrey Xu, **Matthew Powers**, Yuwen Li, and Shawn S. Keshmiri, "Time-Fixed, State Constrained, Optimal Landing Trajectory for Fixed-Wing UAVs," *AIAA Aviation Forum and Ascend 2024*. doi: 10.2514/6.2024-3656

- **Matthew Powers**, Adam Baruth, and Avery Hantla, "Comparison of Low and High Fidelity Dynamic Modeling Software for Small UAS Based on Flight Data," *AIAA SciTech 2025*. doi: 101.2516/6.2025-0140

Skills

Languages MATLAB/Simulink, Python

Programs Advanced Aircraft Analysis (AAA), Sparse Nonliner Optimization (SNOPT), Athena Vortex Lattice (AVL)

Other Proficiency in Lyapunov vector field guidance, Nonlinear Dynamic Inversion Control/Linear Dynamic Inversion Control, Model Predictive Control/Quadratic Programming Model Predictive Control, Model Following Control, Rate-Based LQR Control, Observer-based Control, L1/LN guidance, LQR-based guidance, classical control theory, optimal control theory, and robust control theory; familiarity with EICAS and avionic systems