Jiwoo Song

Curriculum Vitae

484-719-4385 | jzs6565@psu.edu | 321 ECoRE Bldg. University Park, PA 16802

Education

Pennsylvania State University — Aug. 2024 – Present
Ph.D. in Aerospace Engineering (GPA: 4.00/4.00) — University Park, PA

Pennsylvania State University — Aug. 2022 – May 2024
M.S. in Aerospace Engineering (GPA: 4.00/4.00) — University Park, PA

Pennsylvania State University (Schreyer Honors College) — Aug. 2018 – May 2022
B.S. in Aerospace Engineering (GPA: 3.95/4.00)*; Minor: Physics* (GPA: 4.00/4.00) — University Park, PA

Publications

Preprints

[P1] Song, Jiwoo, Daning Huang, and John Harlim. “Learning solution operator of dynamical systems with diffusion maps kernel ridge regression.” *Submitted to Journal of Computational Physics, 2026*

Journal Articles

[J1] Song, Jiwoo, and Daning Huang. "Toward the Global Description of Supercritical Flutter Dynamics via Koopman Theory." *AIAA journal* (2026): 1-20

[J2] Song, Jiwoo, and Daning Huang. "Modal Analysis of Spatiotemporal Data via Multivariate Gaussian Process Regression." *AIAA journal* 63.2 (2025): 732-749

Conference Papers

[C1] Song, Jiwoo, et al. "Multi-objective Optimization of Rotorcraft Blade Structure with Multi-disciplinary Constraints." 81st Annual Vertical Flight Society Forum and Technology Display, FORUM 2025

[C2] Song, Jiwoo, and Daning Huang. “Parametrized Global Linearization Models for Flutter Prediction.” *AIAA SciTech*, 2025

[C3] Song, Jiwoo, and Daning Huang. “Modal Analysis of Spatiotemporal Data via Multi-fidelity Multi-variate Gaussian Processes.” *AIAA Aviation Forum*, 2023

Funded Projects

1. Sponsor: National Science Foundation — 2026 – Present
Title: Leveraging Geometric Structure in Learning Dynamical System
Role: Graduate Research Assistant

- Developed kernel ridge regression model to learn solution operator of complex nonlinear dynamical systems
- Achieved long-term stable time series predictive model with data and time efficiency

2. Sponsor: US Army via Vertical Lift Research Center of Excellence — 2024 – 2025
Title: Task 1.11B: Composite Blade Structural Design and Optimization Studies
Role: Graduate Research Assistant

- Optimization of advanced composite blade structure for the development of next generation rotorcraft
- Coupled aeroelastic simulations with composite structural optimization tools
- Investigated design trade-offs for morphing unmanned aerial systems under aeroelastic constraints

3. Sponsor: U.S. Army — 2022 – 2023
Title: STTR Phase I: Rapid Aeroservoelastic Design Framework for Morphing Unmanned Aerial Systems
Role: Graduate Research Assistant

- Developed a rapid aeroservoelastic design framework enabling multidisciplinary analysis and optimization
- Coupled aeroelastic simulations with structural optimization tools
- Collaborated with other institutions; AnalySwift, University of Tennessee Knoxville, and University of Texas Arlington

Teaching Experience

Penn State Aerospace Engineering Jan. 2022 – May 2022; Aug. 2022 - Dec. 2022
Teaching Assistant, Aerospace Engineering State College, PA

- Aerospace Analysis: mathematical methods applied to aerospace engineering
- Advanced Aerospace Structures: design and analysis of aerospace structures (composites)

Telepossible Jan. 2022 – May 2022
Mechanics and Electricity and Magnetism Tutor Remote

- Held regular sessions to help Korean students with conceptual understanding and applied problem solving of physics problems

Sigma Gamma Tau (SGT) Engineering Tutoring Aug. 2021 – May 2022
Student Tutor, Aerospace Engineering State College, PA

- Attended weekly tutoring sessions for junior aerospace engineering students on assignments and projects

Penn State Learning Jan. 2020 – May. 2020
Math Tutor State College, PA

- Tutored undergraduate mathematics courses covering calculus with engineering applications and analytic geometry

General Physics: Mechanics Aug. 2019 – Dec. 2019
Learning Assistant State College, PA

- Guided students with in-class questions and supported problem-solving; attended regular prep meetings
- Proctored physics exams

Other Research Experiences

Dynamic Modal & Stability Analysis of Hall Thruster Dec. 2021 – May 2022
Undergraduate Honors Thesis Penn State

- Simulated Hall thruster dynamics using fluid model to emulate particle physics using fluid mechanics code
- Identified dominant dynamics using nonlinear regression along with low-rank modal analysis.

Deep Learning with Koopman Based Autoencoder May 2021 – Dec. 2021
Senior project Penn State

- Developed PyTorch code to solve a nonlinear panel flutter problem using a Koopman-based autoencoder network.
- Actively collaborated with a colleague for code development

Presentations

Technical Presentations

VFS Vertical Lift Structures & Survivability meeting Dec. 2025
Multi-objective Optimization of Rotorcraft Blade Structure with Multi-disciplinary Constraints Remote

2025 SIAM New York - New Jersey - Pennslyvania (NNP) Section Conference Nov. 2025
Modal Analysis of Quasi-Periodic Systems via Multi-variate Gaussian Process Regression University Park, PA

VFS Forum 81 May 2025
Multi-objective Optimization of Rotorcraft Blade Structure with Multi-disciplinary Constraints Virginia Beach, VA

2025 AIAA SciTech Forum Jan. 2025
Global Description of Flutter Dynamics via Koopman Theory Orlando, FL

2023 AIAA Aviation Forum Jun. 2023
Modal Analysis of Spatiotemporal Data via Multi-fidelity Multi-variate Gaussian Processes San Diego, CA

Poster Presentations

Graduate Exhibition 2025 Mar. 2025
Multi-objective Optimization of Rotorcraft Blade Structure with Multi-disciplinary Constraints University Park, PA

Institute for Computational and Data Sciences (ICDS) Symposium Oct. 2023
Modal Analysis of Spatiotemporal Data via Multi-fidelity Multi-variate Gaussian Processes University Park, PA

Skills

Programming : Python, C++, MATLAB
Tools : SHARPy, iVABS, LaTeX

Awards & Scholarships

Vertical Flight Foundation (VFF) Scholarship Apr. 2024
For support of education in rotorcraft and vertical take-off-and-landing (VTOL) aircraft technology

American Statistical Association DataFest Competition April 2022
Best visualization award

Korean National Full College Scholarship Aug. 2018 – May 2022
Awarded to 20 students nationwide to support full undergraduate study abroad for national talent development

Certification

Korean Sport Air Drone Instructor Level 3
Korean Sport Air Drone Association

Professional Membership

American Institute of Aeronautics and Astronautics (AIAA), Student Member

Vertical Flight Society (VFS), Student Member

Society for Industrial and Applied Mathematics (SIAM), Student Member

Sigma Gamma Tau (SGT) – Aerospace Engineering Honor Society