

Donna Jennings

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Education

Missouri University of Science and Technology

Rolla, MO

Ph.D. Aerospace Engineering, GPA: 4.0/4.0

July 2023

Development of a Mission Design Tool for Computing Libration Point Formations Using Differential Corrections Initialized with a Genetic Algorithm

Missouri University of Science and Technology

Rolla, MO

B.S. Aerospace Engineering, GPA: 3.9/4.0

May 2016

Summa Cum Laude

Primary Teaching Areas of Interest

Astrodynamics, Orbital Mechanics, Spacecraft Mission Design, Spacecraft Design, Dynamics

Secondary Teaching Areas of Interest

Numerical Methods, Optimization, Aerodynamics, Guidance, Navigation, & Control

Experience

Mechanical & Aerospace Engineering Department

Rolla, MO

Course Instructor of Record, Missouri S&T

2021 - Present

- Instructor for junior-level astrodynamics course
- Prepare lessons according to course outline to convey all required material and deepen student understanding of subject matter
- Deliver lectures to undergraduate students on the topic of astrodynamics and preliminary mission design
- Develop homework assessments and exams to assess students understanding of the material
- Evaluate students' assignments and overall performance
- Maintain student progress and attendance records, and provide appropriate feedback on work
- Hold regularly scheduled office hours to advise and assist students
- Attend conferences and seminars designed for early faculty development
- Assign final grades

High-Altitude Balloon Satellite Program

Rolla, MO

Assistant

2016 - Present

- Provide guidance to sophomore-level students in the design of high-altitude experiments
- Assist students in the construction of payloads
- Coordinate with the FAA to obtain clearance for launches and payload retrievals
- Assist with launch procedures by setting up tracking stations
- Assist with campus summer camp where high school students design, build, and launch a payload

Missouri S&T Satellite Research Team

Rolla, MO

Guidance, Navigation, and Control

2015 - 2020

- Served as Lead Engineer of GNC subsystem for three semesters
- Assigned tasks and provided technical direction for developing, designing, and integrating GNC algorithms for the MR & MRS SAT mission
- Developed flight code for determining and controlling spacecraft orbit and attitude
- Motivated team to meet project deadlines
- Performed software testing to verify GNC algorithms
- Responsible for creating and executing development plans
- Drafted/edited technical documents and presented design choices/progress

Spirit Aerosystems

Wichita, KS

Intern Stress Analyst

Summer 2015

- Member of the Boeing 777X Pylon team
- Performed finite element analysis, static analysis, and fatigue analysis on multiple parts of the pylon
- Collaborated with engineers in multiple disciplines to optimize design
- Learned about the manufacturing process through plant tours
- Documented structural checks and presented to leads/managers

Publications & Conference Presentations

1. **Donna Jennings** and Henry J. Pernicka. Identifying Spacecraft Formation Trajectories at the Collinear Libration Points. In *Proceedings of 45th Annual AAS Guidance and Control Conference*, 2023.
2. **Donna Jennings** and Henry J. Pernicka. Two-Level Targeter Convergence Study for Collinear Libration Point Spacecraft Formations. In *Proceedings of 2022 IEEE Aerospace Conference*, Volume 2022-March, Big Sky, Montana, 2022.
3. **Donna Jennings**, Neil Bruhn, and Henry J. Pernicka. Libration Point Spacecraft Formation Trajectory Design Using Genetic Algorithms. In *Proceedings of 44th AAS Guidance, Navigation, & Control Conference*, Breckenridge, CO, 2022.
4. **Donna Jennings** and Henry J. Pernicka. Identifying Relative Trajectory Geometries at Collinear Libration Points Using Genetic Algorithms. In *IEEE Aerospace Conference Proceedings*, Volume 2021-March, 2021.
5. **Donna Jennings** and Henry J. Pernicka. On-Board Relative Guidance for Swarm Missions Near Collinear Libration Points. In *Advances in the Astronautical Sciences*, Volume 175, pages 4135–4147, 2021.
6. **Donna Jennings** and Henry J. Pernicka. Numerical Determination of Natural Spacecraft Formations Near the Collinear Libration Points. In *IEEE Aerospace Conference Proceedings*, 2020.
7. Daniel Newberry, Blakely Mayhall, David Western, **Donna Jennings**, and Henry J. Pernicka. Application of Predictive Control for Desired Attitude Stabilization with Magnetic Actuators. In *Advances in the Astronautical Sciences*, Volume 169, pages 21–32, 2019.
8. **Donna Jennings**, Jill Davis, Pavel Galchenko, and Henry J. Pernicka. Validation of a GNC Algorithm Using a Stereoscopic Imaging Sensor to Conduct Close Proximity Operations. In *Advances in the Astronautical Sciences*, Volume 164, pages 47–58, Breckenridge, CO, 2018.
9. Jill Davis, Pavel Galchenko, **Donna Jennings**, and Henry J. Pernicka. Development and Validation of a GNC Algorithm using a Stereoscopic Imaging Sensor in Close Proximity Operations. In *Advances in the Astronautical Sciences*, Volume 162, pages 3167–3179, 2018.

Grants and Fellowships

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| GAANN Fellowship Recipient <i>Department of Education, Missouri University of Science and Technology</i> | 2022-Present |
| Graduate Research Fellowship Recipient <i>NASA-Missouri Space Grant Consortium</i> | 2021-2022 |
| Amelia Earhart Fellow <i>Zonta International</i> | 2020 |
| 1st Place - AGI University Grant Competition <i>Verification and Validation of Student-Designed Guidance, Navigation, and Control Algorithms</i> <ul style="list-style-type: none">- Utilizes STK's high precision orbit propagation to generate sensor data for GNC algorithms- Guest speaker for AGI's webinar discussing research - March 2018 | 2017 |
| Chancellor's Distinguished Fellowship Recipient <i>Missouri University of Science and Technology</i> | 2016-2020 |

Awards & Honors

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| CEC Dean's Graduate Educator Award <i>Missouri University of Science and Technology</i> | 2022-2023 |
| Nominee for the 2023 Excellence in Teaching Award, Midwestern Association of Graduate Schools <i>Missouri University of Science and Technology</i> | |
| Graduate Teaching Award <i>Academy of Mechanical and Aerospace Engineers, Missouri S&T</i> | 2021-2022 |
| Runner-Up in 11th Graduate Fellows Poster Session <i>Missouri University of Science and Technology</i> | 2020 |
| 3rd Place Student Paper Competition, Guidance, Navigation, & Control Conference <i>AAS Rocky Mountain Section</i> | 2018 |
| Tau Beta Pi National Engineering Society <i>Initiated 2014</i> | |
| Sigma Gamma Tau Aerospace Engineering Society <i>Initiated 2014</i> | |

Professional Activities

- Student member of American Astronautical Society (AAS)
- Student member of American Institute of Aeronautics and Astronautics (AIAA)
- IEEE Aerospace Conference Session Chair (2022)
- Missouri S&T's Co-Coordinator for NASA's Academy of Aerospace Quality (2018-2019)
 - Attended kick-off meeting at Auburn University
 - Oversaw implementation of training software at Missouri S&T
- Graduate Student Representative - Missouri S&T's Department of Mechanical & Aerospace Engineering Chair Search Committee (2018-2020)
- Guest lecturer for aerospace engineering courses (2018-present)
- Expanding Your Horizons Conference volunteer (2018 & 2019)
- Reviewed submission for *Aerospace Journal* - "Maintenance of Orbital Elements of Satellite Constellation in Tundra Orbit" (2018)

- Assisted in writing a grant proposal to AFRL SBIR/STTR - "Verification and Validation of Algorithms for Resilient Complex Software Controlled Systems" (2018)

Skills & Qualifications

- **Programming Languages:** Proficient in: MATLAB
Also basic ability with: C++, Arduino, VBA
- **Industry Software Skills**
 - AGI's System Tool Kit (STK) - Level 3 Certified
 - AGI's Orbit Determination Tool Kit (ODTK) - Level 1 Certified
 - Matlab - Advanced
 - Simulink - Advanced
 - \LaTeX - Advanced Git - Intermediate

Hobbies & Interests

- **Community Service:** Enjoy helping out the local community and have participated in two international mission trips to Haiti that focused on providing clean drinking water
- **Local Organized Sports:** Participate in a summer softball league and also enjoy tennis, racquetball, and basketball
- **Cycling**
- **Alpine Skiing**
- **Indoor Gardening**