# Alex Pascarella

U.S. Permanent Resident • Pasadena, CA

## Experience

2025 – 2026 **Postdoctoral Research Associate**, Cal Poly Pomona Foundation, Inc.
**Visiting Researcher**, NASA Jet Propulsion Laboratory.
Developed a shape-based initial-guess algorithm that seeds JPL's Malto low-thrust design software, improving solver runtime up to fivefold against its built-in ballistic seed.
Taught a graduate optimal control course and mentored undergraduates in the STARS program.

2021 – 2025 **Graduate Research Assistant**, University of Illinois Urbana-Champaign.
Developed a multi-parameter homotopy algorithm for indirect optimal control, efficiently solving minimum-time and minimum-fuel low-thrust transfers with hundreds of revolutions.

2023 **Flight Dynamics Engineer Intern**, Continuum Space Systems.
Implemented a hybrid low-thrust optimization algorithm in Julia, combining indirect and direct methods with orbit-averaged dynamics for rapid preliminary trajectory design.

2022 **Graduate Fellow (JPLGF)**, NASA Jet Propulsion Laboratory.
Analyzed ballistic and low-thrust cislunar transfer options for Gateway's Power and Propulsion Element (PPE).

2021 **Graduate Fellow (JPLGF)**, NASA Jet Propulsion Laboratory.
Designed Earth–Mars cycler trajectories for the Solar System Pony Express NIAC concept.

2019 – 2020 **Visiting Student Researcher (JVSRP)**, NASA Jet Propulsion Laboratory.
Investigated low-energy transfers from GTO to lunar libration orbits for rideshare smallsats.

## Education

2021 – 2025 **Ph.D. Aerospace Engineering**, University of Illinois Urbana-Champaign.
Thesis: *Novel methods for high-fidelity low-thrust spacecraft trajectory optimization and mission design*.
Coursework: Nonlinear and Adaptive Control, Optimal Aerospace Systems, Optimal Spacecraft Trajectories, Dynamical Systems Theory, Asymptotic Methods, Statistics and Probability.

2018 – 2020 **M.Sc. Aerospace Engineering (cum laude)**, Delft University of Technology.
Thesis: *Low-energy transfers from GTO to lunar Halo orbits*.
Coursework: Satellite Orbit Determination, Numerical Astrodynamics, Mission Geometry and Orbit Design, Nonlinear Differential Equations, Space Systems Engineering.

2015 – 2018 **B.Sc. Aerospace Engineering (cum laude)**, University of Padova.

## Skills

Coding Julia, Python, MATLAB, C++
Software Git/GitHub, Docker, Linux, LaTeX
Toolkits Monte, Malto, NAIF Spice, GMAT, CasADi

## Awards and Achievements

2023 **Aerospace Engineering Block Award**, University of Illinois Urbana-Champaign.
2022 **Best Student Paper Award** (second place), 44th Rocky Mountain AAS GN&C Conference.
2019 **Justus & Louise van Effen Research Grant**, Delft University of Technology.

# Publications

## Journal Articles

1. **A. Pascarella**, N. Nakhjiri, E. Taheri, et al., "Generalized pseudo-equinoctial shaping for preliminary low-thrust trajectory design," *The Journal of the Astronautical Sciences*, 2026, under review.
2. **A. Pascarella** and R. Woollands, "Multi-parameter homotopy methods for optimal many-revolution low-thrust transfers with eclipse constraints," *Journal of Guidance, Control, and Dynamics*, 2026, under review.
3. B. C. Cline, **A. Pascarella**, R. M. Woollands, and J. L. Rovey, "Indirect optimal control techniques for multimode propulsion mission design," *Acta Astronautica*, vol. 223, pp. 759–776, 2024. DOI: 10.1016/j.actaastro.2024.07.020
4. **A. Pascarella**, R. Bommena, S. Eggl, and R. Woollands, "Mission design for space telescope servicing at Sun–Earth L2," *Acta Astronautica*, vol. 224, pp. 397–414, 2024. DOI: 10.1016/j.actaastro.2024.08.031
5. **A. Pascarella**, R. Woollands, E. Pellegrini, et al., "Low-thrust trajectory optimization for the Solar System Pony Express," *Acta Astronautica*, vol. 203, pp. 280–290, 2023. DOI: 10.1016/j.actaastro.2022.11.046
6. B. Patrick, **A. Pascarella**, and R. Woollands, "Hybrid optimization of high-fidelity low-thrust transfers to the Lunar Gateway," *The Journal of the Astronautical Sciences*, vol. 70, no. 4, 2023, Art. no. 27. DOI: 10.1007/s40295-023-00387-7

## Conference Proceedings

1. **A. Pascarella** and R. Woollands, "Multi-parameter virtual-eclipse homotopy for optimization of many-revolution low-thrust transfers," in *35th AAS/AIAA Space Flight Mechanics Meeting*, 2025.
2. **A. Pascarella** and R. M. Woollands, "Adaptive Picard–Chebyshev methods for bang-bang control dynamics," in *AIAA SCITECH 2024 Forum*, 2024. DOI: 10.2514/6.2024-1282
3. J. Fofrich, **A. Pascarella**, and R. Woollands, "Optimal low-thrust trajectory from NRHO to LLO using high-fidelity dynamics," in *33rd AAS/AIAA Space Flight Mechanics Meeting*, 2023.
4. **A. Pascarella** and R. Woollands, "Low-thrust trajectory optimization for transporting Gateway's Power and Propulsion Element to a near rectilinear halo orbit," in *33rd AAS/AIAA Space Flight Mechanics Meeting*, 2023.
5. **A. Pascarella**, R. Woollands, and S. Eggl, "Solar electric propulsion mission design for space telescope refueling and servicing," in *AAS/AIAA Astrodynamics Specialist Conference*, 2021.
6. **A. Pascarella**, R. Noomen, and R. Wilson, "Low-energy trajectories from geosynchronous transfer orbits to lunar libration orbits," in *AAS/AIAA Astrodynamics Specialist Conference*, 2020.