Giovanni Fereoli, M.S.

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Education

- **Ph.D. Aerospace Engineering, University of Colorado Boulder** January 2024 – Present
  Track: Astrodynamics and Satellite Navigation Systems *GPA: 4.00/4.00*
  - **Research**: Development of navigation algorithms for interplanetary missions and small-body exploration, with emphasis on gravity and shape modeling, small-force estimation, Bayesian orbit determination via Markov Chain Monte Carlo methods, multi-spacecraft navigation, and machine learning applications.
  - **Advisor**: Dr. Jay W. McMahon, ORCCA Laboratory.
- **M.S. Space Engineering, Politecnico di Milano** September 2021 – December 2023
  Focus: Spacecraft GNC, Astrodynamics, Estimation Theory, Numerical Methods *Grade: 110/110 cum Laude*
  - **Thesis**: Meta-Reinforcement Learning for Spacecraft Proximity Operations Guidance and Control in Cislunar Space. Published findings in the *Journal of Spacecraft and Rockets*.
  - **Advisor(s)**: Dr. Pierluigi Di Lizia, SPIRE Laboratory. Dr. Hanspeter Schaub, AVS Laboratory.
- **B.S. Aerospace Engineering, Politecnico di Milano** September 2018 – July 2021
  Focus: Calculus, Control Theory, Aerodynamics, Structural Mechanics *Grade: 107/110*
- **Liceo Scientifico** 2013 – 2018
  Focus: Mathematics, Physics, and Natural Sciences *Grade: 98/100*

Experience

- **Research Assistant, ORCCA Laboratory** University of Colorado Boulder
  Spacecraft Navigation Engineer *January 2024 – Present*
  - **Navigation System Development**: Supported the navigation system for the Emirates Mission to the Asteroid Belt in collaboration with the Laboratory for Atmospheric and Space Physics (LASP).
  - **Software Development**: Contributed to the development of an interplanetary navigation software package, focusing on dynamical modeling and derivatives, radiometric measurement models and sensitivities, and filtering algorithms (sequential, batch, and smoothing methods, from covariance-based to factorized information-based formulations) for state and parameter estimation.
- **Visiting Researcher, AVS Laboratory** University of Colorado Boulder
  Machine Learning Engineer *March 2023 – December 2023*
  - **Research Contribution**: Conducted research on the application of Reinforcement Learning for spacecraft guidance and control, focusing on proximity operations between spacecraft.

Skills

Languages: Python (NumPy, SciPy, TensorFlow, PyTest, Matplotlib), C++ (Eigen), MATLAB, Julia, LaTeX, AMPL
Applications: Git, SPICE Toolkit, SolidWorks, Solid Edge, Autodesk Inventor, Atlassian Suite (Confluence, Jira, Bitbucket)

Honors & Awards

- **John V. Breakwell Student Award**: Awarded at the 2025 AAS/AIAA Astrodynamics Specialist Conference in Boston, MA, for outstanding student research in astrodynamics (August 2025).
- **Europe-Colorado Program Scholarship**: Awarded by the University of Colorado Boulder College of Engineering & Applied Science (April 2022).

Languages Spoken

- **English**: Full Professional Proficiency (Speaking, Reading, Writing)
- **French**: Elementary Proficiency (Speaking, Reading, Writing)
- **Italian**: Native (Speaking, Reading, Writing)

Licenses & Certifications

- **C++ for Programmers Course**: Codecademy, Issued Jan 2024 (Credential ID: 659C8613AB)
- **Dynamics and Real Time Simulation (DARTS) Lab Course**: NASA Jet Propulsion Laboratory, Issued Aug 2023
- **Learn Python 3 Course**: Codecademy, Issued Sep 2022 (Credential ID: 631F07BB45)
- **TOEIC (985/990)**: ETS, Issued Aug 2021
- **Space Exploration: From Past to Future**: Politecnico di Milano, Issued Dec 2019
- **BLS-D (Basic Life Support and Defibrillation)**: Croce Rossa Italiana, Issued Mar 2017

Journal Papers

- **Meta-Reinforcement Learning for Spacecraft Proximity Operations Guidance and Control in Cislunar Space**: Giovanni Fereoli, Hanspeter Schaub, Pierluigi Di Lizia, *Journal of Spacecraft and Rockets*, October 2024, DOI: 10.2514/1.A36100
- **Interior Gravity Characterization of Small Celestial Bodies Using Cylindrical Harmonics**: Giovanni Fereoli, Jay McMahon, *Celestial Mechanics and Dynamical Astronomy*, currently under review

Conference Papers

- **Meta-Reinforcement Learning for Spacecraft Proximity Operations Guidance and Control in Cislunar Space**: Giovanni Fereoli, Hanspeter Schaub, Pierluigi Di Lizia, presented at the *46th AAS Guidance, Navigation, and Control Conference*, Breckenridge, Colorado, February 2024.
- **Design and Preliminary Results of Scarabaeus: A New Open-Source Navigation Tool for Interplanetary Spacecraft Navigation**: Jay McMahon, Mattia Pugliatti, Dahlia Baker, Anivid Pedros-Faura, Giovanni Fereoli, Kian Shakerin, Santhosh Pattamudu-Manoharan, Zachary Ellis, Mohamed Almashjari, Mohamed Kuleib, Wendy Frank, Jacopo Villa, Jeremy Knittel, presented at the *47th Rocky Mountain AAS GN&C Conference*, Breckenridge, Colorado, February 2025.
- **On Cylindrical Harmonics for Local Gravity Field Modeling**: Giovanni Fereoli, Jay McMahon, presented at the *2025 AAS/AIAA Astrodynamics Specialist Conference*, Boston, Massachusetts, August 2025.
- **The Scarabaeus Open-Source Navigation Tool: Preliminary Results and Real Measurements**: Jay McMahon, Mattia Pugliatti, Giovanni Fereoli, Santhosh Pattamudu-Manoharan, Zachary Ellis, Annalise Cabra, Mohamed Almashjari, Mohamed Kuleib, Wendy Frank, Jeremy Knittel, presented at the *2025 AAS/AIAA Astrodynamics Specialist Conference*, Boston, Massachusetts, August 2025.
- **Efficient Posterior Sampling for Small-Body Orbit Determination**: Giovanni Fereoli, Jay McMahon, manuscript in preparation.
- **A Measurement Formulation of Tightly-Coupled Visual Odometry for Small-Body Orbit Determination**: Giovanni Fereoli, Jacopo Villa, Jay McMahon, Jeremy Knittel, manuscript in preparation.

Workshops

- **Reinforcement Learning for Proximity Operations Applications**: Giovanni Fereoli presented at the *8th AIAA Intelligent Systems Workshop*, Boulder, Colorado, July, 2023

Professional Service

- **Peer Reviewer**: Served as a peer reviewer for the following journals:
  - *AIAA Journal of Guidance, Control, and Dynamics* (2025) — 1 manuscript reviewed
  - *Acta Astronautica* (2025) — 1 manuscript reviewed
  - *Journal of Open Source Software (JOSS)* (2025) — 1 software package reviewed: `JSOSolvers.jl`

Supervision

- **Claudia Muñoz (M.S. Student, Technische Universität München)**: Visiting student at University of Colorado Boulder. Supervised her project *"Deep Learning-Based Online Density Adaptation for Aerocapture Guidance"* (2025).

Media Mentions

- **Radio Duchessa Interview**: Interviewed about space engineering and research journey on Radio Duchessa (2025).