

Graduate Assistantship in Astrodynamics and Planetary Mission Design

Two Research/Teaching Assistant positions are available in the Astroplorer Lab (APL). Astroplorers conduct cutting-edge research in astrodynamics, guidance, and optimization to secure and advance planetary exploration and operations, as well as to address space environment and planetary defense issues (e.g., space debris, hazardous asteroids, and space weather effect).

Space stations and logistics hubs to be established in cislunar space, such as the Lunar Gateway, can serve as waypoints for spacecraft, facilitating transportation to the Moon, asteroids, Mars, and beyond. APL aims to develop techniques and technologies for cost-effective planetary exploration, transportation, and resource retrieval. Students are encouraged to apply analytical astrodynamics techniques—providing insights into dynamics governed by gravitational forces (Sun, Earth, Moon, etc.) and impulsive and continuous thrust—alongside numerical and empirical machine learning methods.

Graduate research projects include but are not limited to:

- 1) Design and optimization of spacecraft trajectories for cislunar transportation and beyond.
- 2) Embedded navigation system design and development for autonomous proximity operations.
- 3) Adaptive aerobraking for both trajectory design and atmosphere study.
- 4) Space object tracking and orbit determination.

Resources:

- Access to the Texas Advanced Computing Center (TACC).
- Use of UTA's observatory for space object tracking.
- Research funding for developing and testing embedded on-board navigation systems.
- Support for attending conferences (e.g., AAS/AIAA Space Flight Mechanics Meeting, AAS/AIAA Astrodynamics Specialist Conference, IEEE Aerospace Conference).

- The graduate teaching assistantship pays tuition fee, insurance, tax, and an additional stipend of 1700-1800\$/month for 9 months a year. The teaching assistantship can be upgraded to the research assistantship. Excellent U.S. candidates can compete for the [Maverick Doctoral Bridge Fellowship](#).

[Dr. Hongru Chen](#), the group lead, collaborates with JAXA (Japan's space agency) and Paris Observatory on mission studies for Martian Moons Exploration (MMX) and Venusian EnVision missions. This position offers a unique opportunity to contribute to the emerging cislunar economy, near-future planetary exploration, and space sustainability. Applicants should meet the minimum entry requirements for admission (see <http://catalog.uta.edu/engineering/mechanical/graduate/#doctoraltext>) and this position.

Essential skills:

- Code programming (MATLAB, C/C++, Python, and/or similar)

Desired skills:

- Knowledge of Astrodynamics/ Orbital/Celestial mechanics
- Knowledge of optimization techniques
- Experiences with hands-on experiments and hardware development
- Experiences with machine learning
- Independent thinking

To apply, please visit <https://www.uta.edu/admissions/apply/> and note your interest in working with Dr. Hongru Chen at the MAE Department. You will need to submit official transcripts, a research statement, three reference letters, GRE score (can be waived with a strong track record), and TOEFL/IELTS (for international applicants). Interested candidates are welcome to discuss the research plan with Dr. Chen.

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