

The Chair of Astrodynamics is offering a

## Ph.D. Position in Spaceflight Mechanics of Self-Assembled Orbital Robotic Systems (m/f/d)

### About us and the position

At the Chair of Astrodynamics, we advance spaceflight science and engineering through pioneering research, from theory to experimentation and flight. Our research foci include spaceflight mechanics, orbital robotics and systems engineering for advanced space missions.

This university-funded Ph.D. research will investigate both fundamental and applied engineering aspects of spaceflight mechanics and Guidance, Navigation, and Control (GN&C) of self-assembled orbital robotic systems. These systems consist of multiple artificial satellites that, starting from proximal orbital flight, autonomously dock with one another to form a larger, integrated orbiting system. This system is self-controlled in terms of attitude and orbital maneuvering, offering mission capabilities that are unattainable by individual units. Potential future applications include very large space systems for astronomical science or Earth observation, robotically assembled space stations for in-space manufacturing, and space-based solar power stations.

### Your main Responsibilities

- Conduct original and excellence-driven research: This will include
  - Develop and analyse mathematical models for the dynamics of evolving self-assembled systems (orbital, attitude, multi-body, RV-docking), as well as for guidance and control algorithms
  - Conceptualize and develop sample scenarios, roadmaps and trade-off analyses
  - Develop software code and execute computational simulations
  - Contribute to the design and development of an advanced test facility for experimental testing of key aspects regarding the dynamics and control in self-assembled space systems
  - Design and execute experimental campaigns in laboratory settings
- Publish research findings in high-impact international journals, and present at leading conferences
- Mentor undergraduate and master's students
- Develop expertise and stay current with the latest advancements in this research area
- Contribute to teaching and examinations for TUM students at the Chair of Astrodynamics
- Participate in administrative tasks at the Chair of Astrodynamics
- Contribute to inventions and patent applications
- Support grant writing and collaborative proposal development to obtain research funding

### Required Skills & Experience

- A Master of Science/Engineering degree (or equivalent) with excellent academic results in Aerospace Engineering, Mechanical Engineering, Electrical/Computer Engineering, Physics, or a related field at the time of appointment
- Required knowledge
  - Excellent knowledge of spaceflight mechanics or engineering mechanics
  - Excellent mathematical, analytical and problem-solving skills
  - Good understanding of control theory
  - Basic knowledge of robotic manipulator mechanics and control
  - Proficiency in English (written and spoken)

- Proficiency in MATLAB; good knowledge of Python, or C/C++, with strong willingness to improve
- Basic knowledge of 3D engineering software, with willingness to expand this knowledge
- Required skills
  - High motivation, and persistence in overcoming research challenges
  - Ability to formulate research questions and investigate them systematically
  - Strong interest in, ability to, and basic experience with writing high-quality technical papers
  - Capacity to work independently as well as collaboratively within a team environment
  - Commitment to research excellence
- Advantageous knowledge/skills
  - Prior experience in experimental research or a strong interest in developing the needed skills
  - Previous research experience and publications in related fields
  - Knowledge of the German language is an advantage but not mandatory
- The successful candidate must fulfill the requirements for admission to a Ph.D. program at TUM. More information on a doctorate at TUM can be found on the websites of the [TUM Graduate School](#) and of the [Graduate Center of Engineering and Design](#)

*Appointments  
for talents*

### What we offer

- Full-time position (100% / 40h, pay grade E13, TV-L) with a 3 year contract and the goal to obtain a Ph.D.
- Engaging research in a welcoming international team, highly motivated to shape the future of Space
- Stimulating working environment at one of the top technical universities in Europe
- An academic ecosystem fostering entrepreneurial initiatives and the possible creation of spin-off startups
- A large network of peers in the international space business and academia
- The position is based at the TUM Ottobrunn Campus in the vicinity of Munich, Bavaria, Germany
- We value diversity, equity, and inclusion and encourage candidates from underrepresented groups to apply. We are dedicated to offering an inclusive research environment and encourage applicants of all backgrounds to apply, including individuals with disabilities. The position is suitable for persons with disabilities.

### Application

Interested candidates should send their application (including motivation letter (maximum 1 page), CV in Europass format, also listing your nationality/nationalities, list of publications, full bachelor and master transcripts including grades, at least two letters of reference, as well as any supporting documents) via email:

**positions.coa@ed.tum.de** (Important: Please attach a single PDF and use the subject: "[your name] for PHD-COA-1"). The application deadline is: 17 March 2025 (the position will remain open until filled). The aim is for the position to start in Spring 2025.

We look forward to your application!

### Technische Universität München

TUM School of Engineering and Design

Chair of Astrodynamics

[Prof. Dr. Marcello Romano](#)

Lise-Meitner-Str. 9, 85521 Ottobrunn

### Data Protection Information:

As part of your application, you provide personal data to the Technical University of Munich (TUM). Please view our privacy policy on collecting and processing personal data in the course of the application process pursuant to Art. 13 of the General Data Protection Regulation of the European Union (GDPR) at <https://portal.mytum.de/kompass/datenschutz/Bewerbung/>. By submitting your application, you confirm to have read and understood the data protection information provided by TUM.