Fakultät für Luft- und Raumfahrttechnik
Institute of **Space Technology** & Space Applications
Professur für Raumfahrttechnik LRT 9.1
Univ. Prof. Dr.-Ing. R. Förstner

der Bundeswehr
Universität München

Space Traffic Management and Collision Avoidance: Capabilities of Artificial Intelligence

Bachelor-/Project-/Master Thesis

The collision between two satellites in 2009 caused the amount of space debris in orbit to rise drastically. Especially, the announced mega-constellations with thousands of satellites to be launched in the next few years will increase the amount of satellites in orbit even more. Even before, in the early 2000s when the satellite launches per year increased the call for Space Traffic Management (STM) arose.

In order to keep the access to space and the satellites in orbit safe and secure, a framework of laws and policies but also necessary technology to avoid collisions automatically or to communicate amongst different spacecraft are not yet defined. The more and more arising methods of the Artificial Intelligence (AI) regime look promising to support the development and operation and can facilitate the autonomy of STM and collision avoidance systems.

The aim of this thesis is to give a broad overview of the current status of STM and collision avoidance in terms of technology. Furthermore, it shall explore the capabilities of AI to support STM and collision avoidance.

Objectives

- Familiarization with the topic of STM and collision avoidance
- Survey on current technologies for collision avoidance and satellite tracking
- Survey on the current status of AI and how its methods can support STM
- Documentation of results

Literature

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3. Z. Rongzhi, Y. Kaizhong: *Spacecraft Collision Avoidance Technology*, Academic Press, 2020.

Supervisor contact details

M.Sc. **Maren Hülsmann**
E-mail: maren.huelsmann@unibw.de
Tel: +49 89 6004 3599
Building 35, Raum 1401

Prof. Dr.-Ing. **Roger Förstner**
E-mail: raumfahrt@unibw.de
Tel (Sek.): +49 89 6004 3570