MUNICH AEROSPACE – NEW HORIZONS IN AVIATION AND SPACE

In 2010, through Munich Aerospace and its pooling of research, graduate programmes and teaching, an alliance has been formed between the Technical University Munich (TUM), the Bundeswehr University Munich (UniBwM), the German Aerospace Center (DLR), as well as Bauhaus Luftfahrt (BHL).

To promote excellent, scientific young academics, Munich Aerospace awards a PhD scholarship on

Machine-Learning Based Dynamic Radio Resource Allocation for Future Satellite Systems

Research group

The research works will be conducted in the group "**Machine Learning for Network Management and Resource Allocation in Future Satellite Systems"** led by Prof. Andreas Knopp from the Chair of Signal Processing at the Bundeswehr University Munich. In cooperation with the DLR Institute of Communications and Navigation, challenges related to the design of 5G and Beyond satellite systems should be addressed. The research work focuses on the management of complex non-terrestrial networks involving flexible digital satellite payloads in various orbits (e.g. LEO, GEO). Due to the high-dimensionality of the related optimization problems, the supervision of the resources at the network and the physical layer level requires new approaches. In this context, machine-learning techniques are investigated to enable the deployment of a self-organizing space system.

Your tasks and qualifications

The PhD student will explore novel approaches for the dynamic allocation of radio resources in next-generation satellite systems. Deep reinforcement learning (DRL) will in particular be considered for the automated optimization of the available power, bandwidth and time resources given the traffic demands. In light of the multilayered architecture under study, distributed solutions implying the cooperation of several agents in the decision-making process will especially be investigated. The theoretical performance limits of the proposed approaches will be analyzed. Moreover, their complexity will be assessed to guarantee the feasibility of their deployment in practical systems.

Your profile

- Master degree in electrical engineering, mathematics, physics or a similar programme
- Expertise in satellite communication systems
- Good knowledge of machine learning tools
- Programming skills: Matlab, Python, TensorFlow, Pytorch

The Chair of Signal Processing from the Bundeswehr University Munich is one of the few academic research institutes in Germany with a focus on satellite communications. Its expertise includes several topics related to radio resource management (spectral-efficient techniques, multiple access for IoT, spectrum management) and the integration of satellites into 5G networks. Its international team offers an ideal research environment for a successful and timely completion of the PhD programme.

The Scholarship

The Munich Aerospace scholarship amount is 1.575 € per month granted for a minimum of 12 months and limited to a maximum of 3 years. Munich Aerospace scholarship holders are entitled to attend the Munich Aerospace Graduate School, formed by the TUM Graduate School and the DLR_Graduate_Program, and have access to special events and trainings. An additional grant of up to € 6.100 per year will be available to cover expenses that are directly related to the PhD project (e.g. textbooks, laptop, conference travels, public transport, housing subsidy). The scholarship holder is part of a Munich Aerospace research group and receives additional technical support from the research group head. The candidates receive their PHD from TUM or UniBwM.

Interested?

Please send us your application including relevant documents (cover letter, CV, diplomas, transcript of records) in PDF format to office.sp@unibw.de and stipendien@munich-aerospace.de.

We are looking forward to your application!