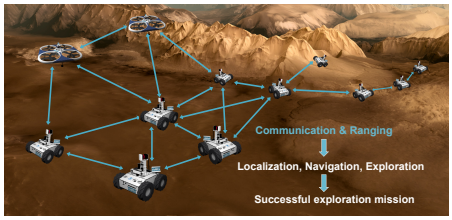
Master Thesis
Routing in Multi-Agent Networks for Space

Future space exploration missions will rely on multi-agent systems with multiple robots collaboratively exploring the unknown. Communication is the key to enable collaboration. Through information exchange, the agents can cooperatively navigate, share resources, and reason on the sensed data to accelerate exploration. In general, communication infrastructure is not available. Wireless ad-hoc networks with decentralized architecture are required to establish communication links among different devices, such as robots and stationary sensor nodes, and dynamically route information within the network accordingly.

Mission

DLR [1] developed a PHY- and MAC-layer concept for a multi-agent system jointly enabling decentralized communication and radio-localization, that was transferred to software-defined radios. Yet, higher layer protocols are missing. This is a large research topic of the working group ComSys [2]. In this work, known routing protocols shall be evaluated through simulation of different multi-agent scenarios with the PHY- and MAC-layer concept of DLR. Promising protocol candidates shall be identified and optimized.

This topic is in cooperation with DLR and ComSys. It offers the possibility to work cooperatively in Munich and in Magdeburg to get an insight in both institutes.



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Qualifications

- C++ programming
- Simulation environments
- Knowledge about the network stack
- Independent and cooperative working

Goals

- Realization of the DLR PHY- and MAC-layer in a simulation environment
- Simulation and evaluation of multi-agent scenarios and routing protocols
- Improvement of a promising candidate protocol

References

[1] Institute of Communications and Navigation. Communication Systems.
DLR (Deutsches Zentrum für Luft- und Raumfahrt) München.
`http://www.dlr.de/kn/en/desktopdefault.aspx/tabid-4308/6940_read-46646/admin-1/`

[2] ComSys (Communication and Networked Systems).
OVGU (Otto-von-Guericke-Universität) Magdeburg.
`http://www.comsys.ovgu.de/`

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