Institute for Digital Communications

Prof. Dr.-Ing. Robert Schober
University of Erlangen-Nürnberg

Internship Project

Resource Allocation and Trajectory Design for Secure UAV Communication in the Presence of No-Fly Zones

Unmanned aerial vehicle (UAV) based wireless communication systems have received considerable attention as a promising approach for offering real-time high data-rate communication services. Compared to conventional cellular systems relying on a fixed terrestrial infrastructure, UAV-assisted communication systems can provide on-demand connectivity by flexibly deploying UAV-mounted wireless transceivers over a target area. Moreover, due to their high mobility and maneuverability, UAVs can adapt their trajectories based on the actual environment and terrain which improves system performance. As a result, UAV-assisted communication systems have drawn significant attention from both academia and industry.

However, there are also some new challenges when employing UAVs for wireless communication. First, due to the strong line-of-sight (LoS) air-to-ground wireless links, UAV communications are more susceptible to secrecy issues than conventional terrestrial communication systems, as the UAVs' transmit signals are more likely to be overheard by eavesdroppers over a large area on the ground. Moreover, for security reasons, no-fly zones (NFZs) are commonly imposed on UAVs, which makes the trajectory design for UAV-assisted communications more challenging. The objective of this internship project is to develop a resource allocation and UAV trajectory design algorithm to provide physical layer security for wireless communications in the presence of NFZs.

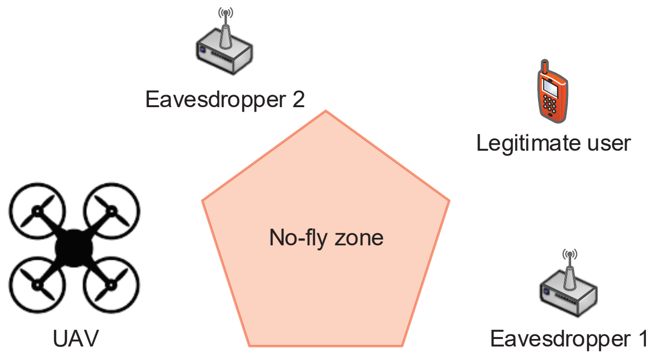

Figure 1: Communication system comprising one UAV-mounted transmitter, one legitimate user, and two eavesdroppers in the presence of a no-fly zone.

Main guidelines for the work:

- Acquisition of basic knowledge in communications and convex optimization theory
- Formulation of the optimization problem and development of a corresponding algorithm
- Verification of the adopted approach and presentation of results via simulation

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Supervisor: Dongfang Xu {dongfang.xu@fau.de}

Student: Tailai Huang
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Prof. Dr.-Ing. Robert Schober
Lehrstuhl für Digitale Übertragung