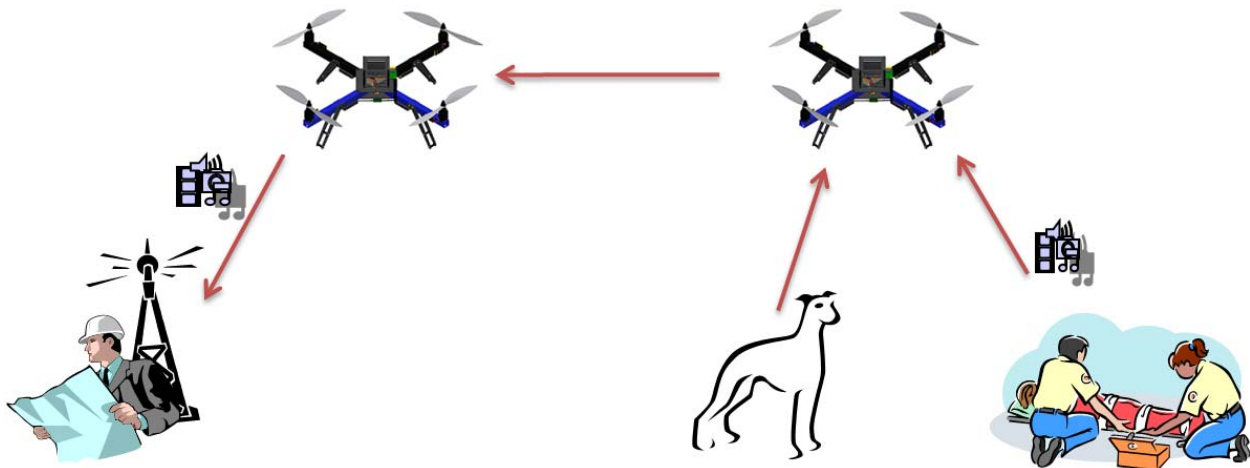




## Designing a Routing Algorithm for UAV Swarms based on Simulation and Measurements

Master/Semester thesis for a student in the department D-ITET/D-INFK

Rescue missions require timely and flexible communications operating even in absence of infrastructure networks. In the SWARMIX project, we investigate the interactions of heterogeneous agents in a search and rescue mission. A team comprises rescue professionals, dogs, and UAVs (Unmanned Aerial Vehicles) cooperating to find a victim as fast as possible. Communications comprises the transfer of images, voice recordings, GPS positions, and other sensor data sent from each agent back to the ground station via an ad hoc network.



Due to the agents' mobility, two nodes may move out of wireless range of each other and become disconnected. A swarm of UAVs may set-up a wireless multi-hop network in the air to connect remote agents. End-to-end data delivery requires an appropriate routing algorithm that considers the geo-location of the UAVs but also the data to be sent, and link quality.

The goal of this thesis is to provide a simulation model and setup a simulation platform to study and evaluate an existing geographical routing algorithm for UAVs and to propose enhancements. The selected simulator should comply well with the available in-house quadrocopter testbed, i.e., being capable of modeling mobile nodes and supporting Wi-Fi ad-hoc 802.11n. The routing algorithm should be implemented by means of simulation and validated against the quadrocopter testbed. Different (realistic) test scenarios should be proposed and studied. The algorithm should be evaluated along various metrics including delay, achieved throughput, routing convergence time and the like. The work is partially based on simulation and partially on real world measurements.

**Kind of Work:** 50% implementation, 20% measurement, 30% theory

**Requirements:** Basic knowledge of wireless networking, C/C++ programming, Linux experience

**Contact Persons:**

Mahdi Asadpour, [mahdi.asadpour@tik.ee.ethz.ch](mailto:mahdi.asadpour@tik.ee.ethz.ch), ETZ G96, +41 44 63 27539

Dr. Karin A. Hummel, [karin.hummel@tik.ee.ethz.ch](mailto:karin.hummel@tik.ee.ethz.ch), ETZ H85, +41 44 63 22976

**Professor:** Prof. Dr. Bernhard Plattner