Master-Thesis in the fixed-wing aerial robotics group of ASL/ETHZ

Path planning for fixed-wing Unmanned Aerial Vehicles

Within the fixed-wing aerial robotics sub group of ETH Zurich’s Autonomous Systems Lab (ASL, www.asl.ethz.ch), research has been focusing on the development of solar-powered Unmanned Aerial Vehicles (UAVs) for long duration flight. UAVs such as AtlantikSolar or SenseSoar (see images) are foreseen to be used for industrial mapping and search-and-rescue applications. Due to the operation in potentially cluttered terrains and dynamically changing environmental conditions, navigation and path planning form an integral part of achieving safe and efficient flight. The aircrafts are equipped with a visual-inertial sensing and processing pod to perform the mapping, navigation and planning functions.

Thesis description:

This thesis will be integrated into ongoing research on building up a versatile navigation and path planning framework for ASL’s fixed-wing UAVs. The framework assumes a pre-existing map of the environment and is running on-line on the aircraft within a Linux and Robot Operating System (ROS) environment. Potential topics and subtopics within this continuously advancing research field include:

- Implementation of a high-fidelity simulator (including a fixed-wing aerodynamics model) for path planning based on the ROS Gazebo simulator
- Energy optimal path planning for solar-powered UAVs, including environment estimation and modeling (horizontal wind fields and thermal up/downdrafts)
- Aircraft-envelope aware planning
- Obstacle avoidance and terrain following
- Automatic landing

Requirements:

- Knowledge of robotics, and especially navigation and path planning
- Solid experience with C/C++ is a plus
- Experience with Linux and ROS is a plus

Contact:

Please contact philipp.oettershagen@mavt.ethz.ch – along with your CV and a short description of your previous experience – to learn more about currently available topics. We are looking forward to receiving your application.