

Semester / Master Thesis:

## Towards Self-Sustainable Unmanned Aerial Vehicles

**Motivation** In recent years, the popularity of unmanned aerial vehicles (UAV's) has soared. The most common type of UAV's, the quadcopter, requires a large amount of energy to create lift and stay in the air. For this reason, it suffers from very large charging times and very short flight times. In this project, we explore another type of UAV, a blimp, whose helium filled balloon makes it lighter than air. While this limits the speed and maneuverability of the craft, it significantly reduces its energy needs. We want to explore the feasibility of using energy harvesting to recharge the battery during flight, and possibly have a self-sustaining, autonomous blimp.



Figure 1: Lighter-than-air Vehicle

**Your Project** During this project you will develop novel energy-aware control algorithms. After characterizing the energy needs for the blimp's rotors, you will determine the dimensions of the energy harvester. The control algorithm should move the blimp in short thrusts to move in a particular direction, depending on both the harvesting conditions and the battery's state of charge. You will need to validate your approach theoretically and experimentally, using our initial prototype to test your implementation. This project is a collaboration between TIK and IIS, under the supervision of both Prof. L Thiele and Prof. L Benini.

**Requirements:** You should be highly motivated, be comfortable with Linux OS and have experience with Matlab and embedded system programming in C.

**Interested? Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!**

### Contacts

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