

Thesis Title:

Morphology Optimization of a Tilt-Rotor MAV

Short Abstract:

In omnidirectional platforms with changing propeller axes, the selection of morphology is not a straightforward problem. Various factors influence the desired morphology, such as flight efficiency, omnidirectionality, and control authority. The aim of this project is to design an optimization problem for a tilt-rotor MAV to include these factors, and obtain several optimal solutions given the criteria. Verification of the proposed platform will then be completed in simulation. Areal prototype of the system will then be designed and implemented, and test flights performed to validate the design, and evaluate the optimization scheme.

Work packages:

- Literature review
- Define morphology optimization problem and obtain solutions
- Verify solution in simulation (neglects airflow interaction)
- Design and build system prototype to validate complete system
- Evaluate optimization scheme based on results

Some reference literature:

[https://www.ethz.ch/content/dam/ethz/special-interest/mavt/dynamic-systems-n-control/idsc-](https://www.ethz.ch/content/dam/ethz/special-interest/mavt/dynamic-systems-n-control/idsc-dam/People/bdario/brescianini_dandrea_omnidirectional_aerial_vehicle.pdf)

[dam/People/bdario/brescianini_dandrea_omnidirectional_aerial_vehicle.pdf](https://www.ethz.ch/content/dam/ethz/special-interest/mavt/dynamic-systems-n-control/idsc-dam/People/bdario/brescianini_dandrea_omnidirectional_aerial_vehicle.pdf)

<https://arxiv.org/pdf/1801.04581>

<http://homepages.laas.fr/afranchi/robotics/sites/default/files/2018e-TogFra-preprint.pdf>

https://hal.archives-ouvertes.fr/hal-01134829/file/ICRA15_1795_FI.pdf

<https://arxiv.org/pdf/1709.05398.pdf>

<http://ieeexplore.ieee.org/abstract/document/7759254/>