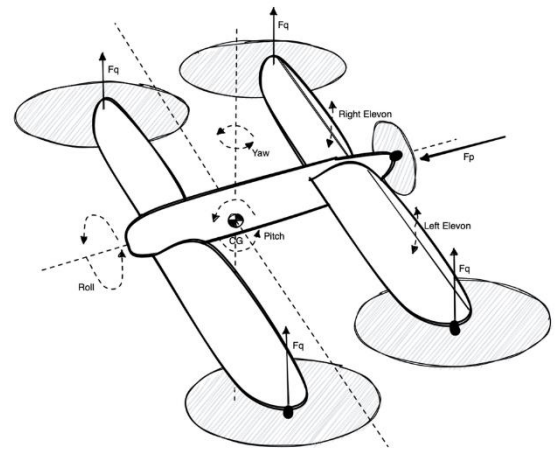


## Small and Fast VTOL Aerial Robot for Cluttered Flight

**Abstract:** This project aims to develop a small-scale fast and agile quad-plane. The robot shall have a wingspan in the region of 1m and be able to fly fast and safely in an obstacle-filled environment such as a forest under the canopy.

### Tasks:

- Study convertible vertical take-off and landing (VTOL) vehicles that transition to forward flight.
- Study options for wing profiles based on their aerodynamic properties in relation to the vehicle's velocity.
- Study modeling and control for convertible VTOL platforms.
- Design the envisioned agile quadplane for cluttered flight.
- Integrate aviation electronics, design and implement the system's flight controller.
- Testing in an open environment.
- Testing in a cluttered environment.



### Literature (indicative):

- [1] Muraoka, K., Okada, N. and Kubo, D., 2009, April. Quad tilt wing vtol uav: Aerodynamic characteristics and prototype flight. In AIAA Infotech@ aerospace conference and AIAA unmanned... unlimited conference (p. 1834).
- [2] Verling, S., Weibel, B., Boosfeld, M., Alexis, K., Burri, M. and Siegwart, R., 2016, May. Full attitude control of a VTOL tailsitter UAV. In 2016 IEEE international conference on robotics and automation (ICRA) (pp. 3006-3012). IEEE.
- [3] Rohr, D., Stastny, T., Verling, S. and Siegwart, R., 2019. Attitude and cruise control of a VTOL tiltwing UAV. IEEE Robotics and Automation Letters, 4(3), pp.2683-2690.

**Main supervisor:** Kostas Alexis, Professor, NTNU

Project relevance: DIGIFOREST, SPEAR (two European Commission projects)