

RESEARCH MASTER INTERNSHIP

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INTERNSHIP DESCRIPTION

Domain : Control

Title : **ADVANCED CONTROL LAWS ANALYSIS AND FLIGHT TEST FOR A QUADROTOR**

BACKGROUND: As part of UAS research projects, ISAE laboratories developed several micro air vehicles: Vision'Air (Coaxial Tailsitter), Mavion (Tilt-body fixed wing aircraft), Corsica (Long Endurance Aircraft) and quadrotors of various size. We would like to improve quadrotor attitude stabilization in order to have complete control on the attitude in all conditions (indoor but also adverse outdoor conditions).

OBJECTIVE:

In this context, various control techniques could be advantageously tested on the available quadrotors (different size and weight): PID, modal control, H-infinity synthesis, adaptive control or backstepping. A complete quadrotor model was developed and is currently being improved to fit bench evaluations adding measurement noise, delays, ...

The main objective of the project is to compare control techniques through simulations but also experimentally, first on a single axis test bench, then in indoor and outdoor flight conditions.

The main steps of the project are the following :

- Model identification using flight test results with the available PID setting.
- Controller design using some of the aforementioned techniques
- Stability, precision and robustness analysis of the controllers
- Comparative analysis of the controllers and design techniques
- Implementation and flight test of the designed controllers on the quadrotors to validate their expected performance.

10 % Theoretical Research

40 % Applied Research

50 % Experimental Research

Possibility to go on a Ph.D.:

APPLICANT PROFILE

Knowledge and required level:

Advanced control techniques, Matlab/Simulink , C/C++

Applications should be sent by e-mail to the supervisor.