Institute of
Flight System Dynamics

Technical University of Munich

Semester Thesis / Master Thesis

Implementation of Incremental Nonlinear Dynamic Inversion on the Crazyflie

Task Description:

In this project, you will implement the control method 'Incremental Nonlinear Dynamic Inversion' (INDI) for the Crazyflie platform. INDI is a control method that can cope with limited model information and severe disturbances, because it makes use of the onboard inertial sensors to obtain an estimate of the forces and moments acting on the vehicle.

The Crazyflie platform is open source, and it is used by many universities for all kinds of research topics. Therefore, implementation of INDI on this platform can help many others to perform their research.

Work Packages:

- *Literature research on INDI control.* Understand the important elements for quadrotor control.
- *Understanding how controllers are implemented on the Crazyflie platform.* What sensor data is available, what are the required outputs, what is the controller frequency?
- *Coding and debugging the controller in C.*
- *Identification of the actuator dynamics and the control effectiveness.* We have a Crazyflie with high speed logging capabilities available, so identification based on flight data is a viable option.
- *Flight testing and evaluation.* You get to fly your own controller!

Requirements:

- Programming in C (or equivalent).
- Knowledge of INDI control.
- Enthusiasm for embedded systems.

Kickoff: As soon as possible.

Contact: **Ewoud Smeur** 089 (289) 16047
MW3602 ewoud.smeur@tum.de

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