

Master Thesis | Semester Thesis

Design and Development of Double-Tethered Drones for In-Canopy Manipulation

Robotics, Mechanical Engineering, Control

Professorship of eAviation

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Description

This project focuses on designing and controlling a dual-tethered drone system, where two drones work together to perch, disentangle, and traverse between tree branches for in-canopy manipulation. As part of the eAviation project, ongoing for two years, it supports forest ecology and data collection in collaboration with Imperial College London, EPFL, Bristol University, and EMPA Zurich.

The research involves refining the mechanical design, integrating real-time sensing, and developing coordinated control strategies. While the prototype is reliable, further improvements will optimize mechanical performance and enhance interaction with dynamic branches.

Experiments will be conducted in a motion-tracking-equipped flight arena. The system is operational but may require occasional maintenance, supported by a student community.

The project aims to contribute to research publications in peer-reviewed journals and conferences.

Work packages

WP1 Understand the double-tethered drone system, its mechanical structure, and control architecture.

WP2 Design and optimize the dual drone system connected via tethers, focusing on mechanical robustness and system integration.

WP3 Develop coordinated mechanical strategies for perching, disentangling, and tree-to-tree transitions, ensuring seamless hardware interaction.

WP4 Conduct indoor and outdoor experimental validation.

WP5 Contribute to research publications in top-tier journals and conferences.



Double-tethered drones for in-canopy perching and manipulation.

Requirements

- Student in a relevant field, e.g., robotics, mechanical, aerospace engineering, or control.
- Experience with system design and integration, including CAD modeling.
- Knowledge of drone dynamics and modern control system design.
- Hands-on experience with hardware experiments and testing is beneficial.

Application

- CV and motivational letter.
- Transcript of records.
- Portfolio of projects.
- A brief description of your experience and research interests.

Timeline

Immediate start possible.