Drone Navigation for Agricultural Waypoint Monitoring

Project Description:

The use of drones in agriculture has been growing rapidly due to their abili ty to enhance precision farming through field monitoring, crop analysis, and data collection. One of the core functionalities of agricultural drones is **autonomous waypoint navigation**, where the drone follows a pre-defined path to gather data across large farmlands efficiently. However, achieving precise and stable navigation in dynamic environments remains a challenge.

This project aims to develop a control system for a drone to autonomously navigate between multiple waypoints within a controlled environment. The focus will be on improving navigation accuracy using onboard sensors and designing control algorithms that ensure stability during the navigation process.

Objectives:

The project objectives include, but are not limited to:

- **Preliminary analysis** of agricultural drone navigation and identification of key challenges.
- **Literature review** of existing solutions for drones in agrucultural applications.
- **Design and implementation** of a control system for navigating through pre-defined waypoints.
- **Integration** of the control system with onboard sensors and drivers.
- **Real-time testing and validation** of the navigation system by using the VICON motion capture system as localization system.
- **Evaluation** of system performance in terms of navigation accuracy and stability.

Contact Person:

Name: Shahab Heshmati-Alamdari
Title: Associate Professor
E-mail: shhe@es.aau.dk
Aalborg University