

Quadrotor Estimation and Control

This project contains a dynamical simulation of a medium-sized quadrotor. The dynamical model was implemented using Newton's Second Law taking into account effects such as motor dynamics, blade flapping, and ground/ceiling effects. An open-loop trajectory and attitude controller was designed from first principles and gains were tuned to satisfy a set of performance specifications. Trajectory and attitude reference was visually tracked in MATLAB. Estimation (UKF) techniques were used for robust vehicle guidance, navigation, and control. Sensor measurement models were implemented in MATLAB.

Work in Progress: The next steps of this project is to implement this control algorithm on a physical UAV. Often, there are UAV applications that requires very precise trajectory control that might not be possible with human control. For example, traversing a circle precisely to take images might be a possible application.