Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

Onboard Payload Mass Estimation and Electric Propulsion Modeling for Multicopters with Application in Unmanned Aerial Systems

By

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Abstract

Unmanned vehicles are the future. The aim of the future online retailers, delivery and transportation companies would be air delivery using unmanned aerial vehicles. Multicopters are becoming rapidly famous because they offer a relatively easy-to-y platform that is also very stable, and their mechanical simplicity. The possibility of estimating the weight of the multicopter in real time is really useful. A weight estimation system that could be implemented in multicopters with cable suspended payloads without using extra sensors is presented in this thesis.

The weight estimation system uses a functional relationship that correlates PPM signal and the battery voltage with the thrust produced. Monitoring PPM signal and the battery voltage the total thrust produced is estimated. Total weight is equal to total thrust when the multicopter is flying in hover.

Thrust, current drawn, power consumption, efficiency and RPM of the motors are also a function of PPM signal and the battery voltage. The estimation system was enhanced, extending its capability to estimate these performance parameters. A test bench was designed and built to conduct different experiments. As a result of these experiments and further data processing functional relationship that correlates PPM signal and the battery voltage with thrust, current drawn, power consumption, efficiency and RPM was obtained. Finally, the test bench was used to test different ESC-Motors-Propeller combinations and compare their performance.