Title: UAV Airframe C.1 - A Robust Aerial Platform

Date: November 7, 2010

Statement of Work:

The goal of this project is to build on the past successes in the UAV family of projects from AY08 & AY09. Last year P10232 – Airframe C successfully designed and built an aircraft suitable to meet the payload and flight requirements for the aerial imaging system (15-lb payload, 30 minute flight time). However, due to the fast timeline of MSD I&II testing of this aircraft was extremely limited totaling only 20 minutes over three flights. In fact the first flight resulted in a crash during landing of the aircraft due to moderately severe weather resulting in a rebuild of the landing gear and nose of the fuselage. The task of this year's team is to utilize the Airframe C design with the goal of system robustness as a primary goal in addition to the flight requirements of the UAV. The expectation is that this aircraft will be suitable for 100+ hours of flight time with minimal maintenance. It will be capable of flight from an adequate R/C airfield under reasonable weather conditions with flight characteristics similar to a trainer style aircraft. This aircraft should be expected to behave as a test "mule" for many UAV research projects such as remote aerial imagery work by CIS, experimental inertial sensor research by RIT faculty, aircraft structural and flight actuator fault detection and diagnosis research, etc. Limited design changes are allowed for this aircraft if sufficient evidence is presented to warrant a change from P10232. What is expected is that material types may change, connection points may be redesigned, mounting options for propulsion, batteries, payload, and controller may change, etc.

At some point the controller/measurement/telemetry unit completely by a parallel project during AY2010 will reside within this aircraft. It is not necessary for its installation and flight to prove the success of this project but would be considered a stretch goal. Likewise this aircraft must show that up to a 15-lb imaging system is capable of easy installation within this aircraft with a 30-min flight time to an altitude of 1000ft.

It is expected that a survey of existing UAV designs be a strong component of this project especially at the start. It is not acceptable to simply use existing R/C or engineering intuition to determine project direction. A complete analysis of existing university UAV aircraft, commercial UAV aircraft, and UAV club aircraft of the same class, size, and performance be compiled with documentation regarding each be performed prior to any construction of this aircraft. Keep in mind 100+ hours of flight time is the goal not an innovative aircraft. No product would reach the marketplace if it failed in 5 hours from the slightest mishap.

Remember Airframe C worked. Iterate on it don't redesign it. Remember this aircraft is a slow moving trainer capable of scientific research not performing autonomous barrel rolls, dog-fighting an enemy, or dodging SAMs.

Senior Design Quarters: Winter/Spring AY2010-2, 3

Requested Personnel: 4 – ME (aero)

Budget: $3,000

Contacted Engineers: Jordan Carrick, Tim Spath(ME), Chris Rukas(ME), Nathan Hardman(ME), Scott Melchionno(ME), Tiffany Heyd (ME), Michelle Bailey (ME), Michael Navarre (ME)

Sponsor: Impact Technologies