UAV FORGE

Inspiring Innovation for Personal Autonomous Systems

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BACKGROUND

The origins of UAV Forge can be traced back to a defunct DARPA (Defense Advanced Research Projects Agency) competition wherein participants were tasked with designing and building a portable unmanned aerial vehicle (UAV) for under $10,000. Unfortunately, after much trial and error, the competition was shuttered after none of the competing teams were able to fully meet the requirements set forth by DARPA. In the spirit of this competition, UAV Forge was revived as a senior design project here at UCI as a continuation of efforts to develop an aerial system that will satisfy all original competition requirements.

OVERVIEW

UAV Forge is a research project dedicated to the design, fabrication, and testing of unmanned aerial vehicles (UAV) in addition to developing the software required to operate them. The primary application for these UAVs is to provide surveillance / reconnaissance capability to frontline personnel in a law enforcement or military context without endangering them.

OBJECTIVE

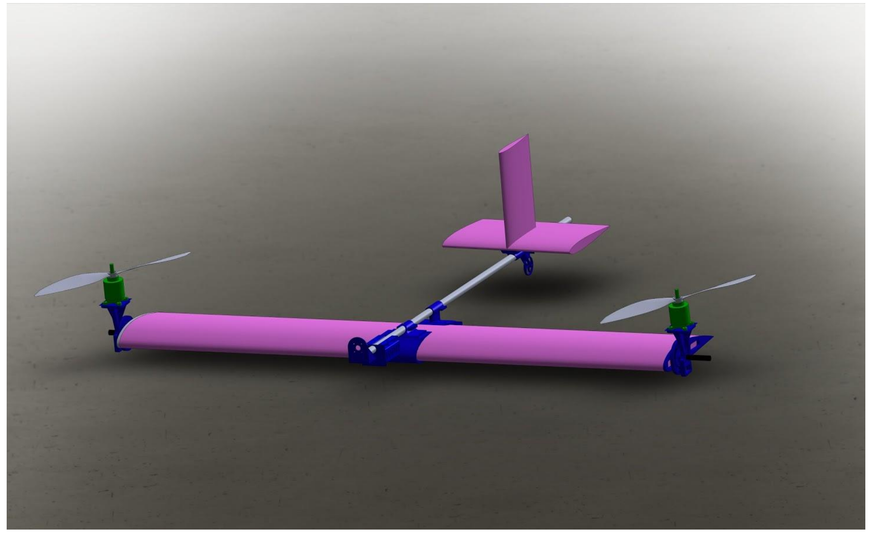
Our objective is simple: create a UAV system that will satisfy the original DARPA competition requirements.

REQUIREMENTS

The project requirements closely mirror the original DARPA competition specifications. Major requirements include:

- VTOL (Vertical Take-Off / Landing) capability
- Autonomous waypoint navigation
- Obstacle avoidance capability
- Observation system (Real-time video or photograph transmission)
- 2.0 mile range
- Vehicle control user interface

INNOVATION

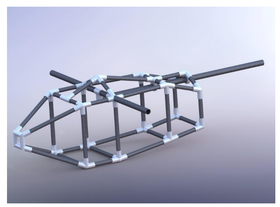


In order to best satisfy the competition range and VTOL requirements, we have settled upon a tiltrotor configuration for our flight vehicle. This presents unique aeromechanical challenges such as ensuring static and dynamic stability, sturdy tilt mechanism design, and weight optimization.

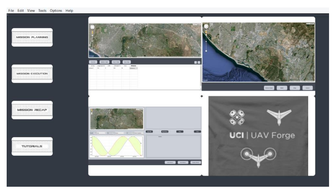
PROGRESS

Quadcopter Testbed

Quadcopter-Tilt Hybrid



Tiltrotor Structure



Ground Station Software

Over the past year, our ground station team has built a mission planning interface that features:

- Wireless UAV uplink and downlink
- Map-based visual waypoint planning
- Live telemetry display
- Post-mission telemetry analysis

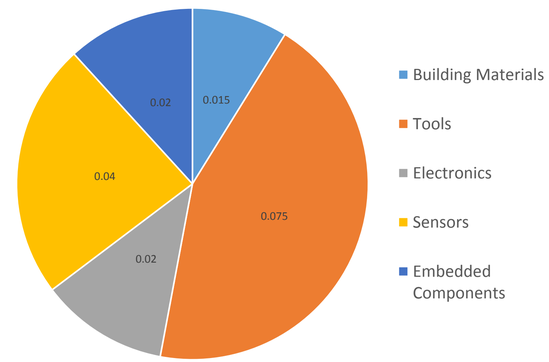
PROJECT DETAILS

Structure

Timeline

Time Frame	Milestone
March 2016	• Quadcopter-tilt hybrid v2 fabrication • Quadcopter testbed initial autonomous flight • Ground station software moved to beta phase
April 2016	• Tiltrotor design completion • Implement high-level robotic navigation controller
May 2016	• Create stability augmentation system for tiltrotor
June 2016	• Tiltrotor fabrication completion • Initial tiltrotor flight test

Expenditures



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