

# Spring Semester Restated Project Scope and Plan

Team Six: Autonomous Unmanned Aerial Vehicle

*FAMU-FSU College of Engineering, Tallahassee, FL*

*EML 4552C & EEL 4914/5C – Senior Design – Spring 2014*

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*Friday, January 17, 2014*

## Brief Work Statement and Project Scope

The main objective of this project is to design and build an Autonomous Aerial Vehicle capable of performing specific search and rescue oriented tasks. The aircraft will be submitted to the 2014 Undergraduate Students Unmanned Aerial Systems Competition and will be evaluated on the quality of the performed tasks as well as the consistency of its technical design and report.

In continuing with the project from last semester, the major goals include completing the final modifications on the airdrop system, hard mounting the GoPro camera system to the underbody of the plane, and completing the very intensive programming of the autopilot and image analysis software. In order to complete the aforementioned tasks, there will be an immense amount of testing and debugging involved. A major goal of this semester is to stay on track, with regards to our schedule and Gantt chart, so that the team has plenty of time to complete everything. Once these goals are completed, Team 6 will be ready to take the plane to the competition. If we achieve our main objectives with extra time left before the end of the semester, then the team will look into pursuing some of the additional secondary competition objectives, which allow for bonus points in competition.

## Modifications and Corrections

Relative to the final report for Fall 2013, the sole modification to this project is the state of the inherited airplane. The damages to the wing and body caused by the crash in the fall have been almost completely repaired, allowing for another test flight in the near future. No corrections have been necessary, and the project has stayed on schedule.

## Sponsor Requests

During the final presentation of the fall, our sponsor requested that data related to the velocity and opening time of the trap door mechanism be added to the report. This was then added to the written final fall report. The section is repeated here for clarity:

Using Autodesk® ForceEffect™ simulation (Figure 1) and calculation tools, the minimum time required for full opening of the trap door is 0.14 seconds, with an additional 0.14 seconds to close the doors. This is taken at top servo motor operating speed, or 79.2 rpm. At less than two tenths of a second, the opening time is effectively negligible for consideration in the air drop timing.

Additionally, as it is our sponsor's hope that the project be ready to compete in the summer, Team Six has begun the registration process for the AUVSI competition.

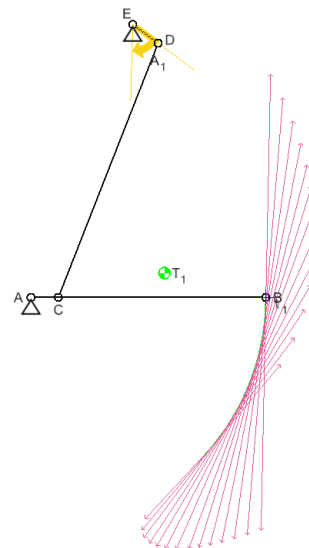


Figure 1 - Fourbar Simulation

## New Developments

Over the winter break the team began working on the automatic target identification software using OpenCV. The team is using a method of machine learning called Support Vector Machine which requires the system to be trained, similar to an athlete training for the Olympics. The training process for identifying the shape of the target is taking much longer than anticipated. Depending on the training parameters for the classifier, training session has taken up to 12 hours before the classifier could be tested. The training time is proportionate to the quality of the classifier. In order for the classifier to be more versatile in identifying objects, the classifier must be trained with more positive and negative samples. The more samples (positive and negative) used, the longer each training session takes. The classifier is slowly getting better, however the team has yet to train the classifier as to consistently identify certain shapes. Because of the unforeseen troubles with training the system, the team is in the process of working with technical advisors to help increase the rate of success in training. To summarize, the team is working with signal processing experts in the ECE department for guidance because the image processing is progressing, however the rate of progression is not sufficient to compete in the summer.

## Procurement and Schedule

The team has had a setback in procuring essential batteries for the aircraft. Towards the middle of November, the team put 2-5Ah batteries on order through the virtual store, HobbyKing. HobbyKing, along with nearly all other distributors, is located in China. The supplier is currently struggling with their hazardous material export for unknown reasons. The team was notified by the financial advisor, Jon Cloos, that the batteries were not likely to come in as his statement still did not have a charge posted from HobbyKing. In order to avoid further delay, the team is opting to purchase the same two batteries from a local company; Fouraker Electronics or HobbyTown are the local suppliers that the team hopes to get the parts from within the next week. Other than the missing batteries, the team has most of the essential hardware that it needs for the competition.

Attached in the next pages is the updated Gantt chart with the spring schedule and deadlines.



