

Needs Assessment

EML4551-C Senior Design, Fall 2012, Deliverable
Submission Date: 9/27/12

Group # 16

AIAA Design Build Fly Competition

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Project Title:

The project is named for its ancestor of 2010: "AIR HERCULES". The name was chosen based upon its functioned as prescribed by that year's competition rules. This year, the rules have inspired us to name our project PEGASUS (Pedestrian-operable Electronically Generated Aerial Stealth Unmanned System).

Project Scope:

Problem Statement:

Design, prototype, a competition-ready UAV for the AIAA Design Build Fly Competition.

Justification/Background:

The intention of this project is to compete on an international level and bring positive attention to our school and sponsor in the form of high placement in competition. The competition will be held in mid April, 2013, in Tucson, Arizona.

Objective:

Design and prototype, a competition-ready UAV. The design should be a successful one which is theoretically consistent with to the purpose of achieving the competition's missions. The prototype should be fabricated accurately, in order to prepare for tough competition by other engineering programs.

Methodology:

The project will be taken on initially with research into the benefits and drawbacks of certain aeronautical component combinations. The focus will then turn to selecting the ideal structural and aerodynamic forms. Once our preferred form is selected, materials will be chosen to minimize weight. While those materials are being delivered, 3d-modeling will take place in order to quickly fabricate the unit. While the modeling is happening, the electrical components will be selected and purchased based upon weight and geometric restrictions of previous selections. Finally, fabrication will take place. Simultaneously, the airplane's frame, and electrical systems will be mapped. The two systems will be assembled together, in one irreversible completion.

Expected Results

The deliverables that are associated with this project are:

- 1) A competition entry form.
- 2) Preliminary proof of functionality.
- 3) Final Design Report.
- 4) Recognition of competition.

We recognize that in any point in testing or qualifying, the aircraft or control system may malfunction resulting in the complete destruction of our vehicle. If this does occur, the instructor and sponsor will be notified by the next business day, and our proof of completion should be based solely on our design report, provided that photographic and/or videographic evidence that our airplane's existence and flight had already been achieved. Repairs should be considered. Otherwise, our proof of completion should be based upon 1) demonstrating the prototype at senior design symposium 2) competing with the prototype.

Constraints:

The constraints of this project are numerous, like most other. Money is the first concern; we do not know how much the entire system will cost, although we do have a budget as of now. Time is another; we have to have a completed design and report by the end of February, which is well before the date of the final course deliverable. Experience is a large question. We have no electrical engineering seniors in group 16. In general, our largest constraint is that we have to design and operate within the prescribed competition rules, involving geometric, power, weight, and performance parameters. Distance is also a constraint; we have to travel to Arizona on the weekend before final exams.