AA241X: Design, Construction, and Testing of Autonomous Aircraft

Final Report
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Authors:

Degree & Department:

Kartikey Asthana
kasthana@stanford.edu

Ph.D. Candidate
Aeronautics & Astronautics

Peter Blake
psblake@stanford.edu

M.S. Candidate
Graduate School of Business

Brandon Jennings
bjennin@stanford.edu

M.S. Candidate
Mechanical Engineering

Erik Moon
emoon1@stanford.edu

M.S. Candidate
Graduate School of Business

Sravya Nimmagadda
sravya@stanford.edu

Ph.D. Candidate
Aeronautics & Astronautics

Akshay Subramaniam
akshays@stanford.edu

Ph.D. Candidate
Aeronautics & Astronautics

Ian Villa
ianvilla@stanford.edu

B.S. & M.S. Candidate
Aeronautics & Astronautics

Jerry Watkins
watkins2@stanford.edu

Ph.D. Candidate
Aeronautics & Astronautics

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1 Introduction

Since the early 2000's, Stanford Aeronautics and Astronautics has taught the AA 241X: Design, Construction and Testing of Autonomous Aircraft course with various missions over the years. In Spring of 2014, teams were tasked with developing an autonomous aircraft to search and accurately locate four targets within the perimeter of Lake Lagunita. Among these teams was Skynet, a group of eight individuals from different backgrounds and expertise who, throughout the ten weeks, collaborated to organize, design, test, and fly various aircraft, guidance, control, and mission systems to optimally complete the search and rescue. The following report outlines the team's structure, mission strategy, aerodynamic design, control strategy, fabrication accounts, flight test data, and overall competition performance.

2 The Team

2.1 Team Structure

Skynet began as a team of eight individuals from Stanford Aeronautics and Astronautics, Mechanical Engineering, and the Graduate School of Business. In order to effectively tackle the assigned problem sets and deadlines, the team began by designating Ian as team lead and the other members as sub team leaders in the different disciplines required by the class. These areas were Aerodynamics/Configuration Design/Propulsion, Guidance/Navigation/Control, Hardware/Fabrication, Software, Aircraft Performance, and Mission Planning as outlined in the first lecture by Professor Alonso. The initial team structure is outlined below.

Initial Design Sub-Teams	Lead	Members
Aerodynamics/Configuration Design, Propellers/Propulsion	Jerry, Akshay, Kartikey	Sravya, Ian
Guidance, Navigation & Control	Brandon	Jerry, Sravya, Akshay
Hardware	Erik	Brandon, Peter
Software	Ian	Brandon, Erik, Jerry, Akshay, Sravya, Kartikey
Aircraft Performance	Sravya	Jerry, Akshay, Ian, Peter, Kartikey
Mission Planning	Peter	Everyone
Fabrication	Erik	Brandon, Peter, Akshay, Jerry, Kartikey

Table 1: Initial Team Divisions

2.2 Team Communication & Logistics

In order to facilitate group discussions, a when2meet form was utilized online. Based on its results, the team met briefly after class on Mondays and Wednesdays for brief sub team status updates and coordination. Major team meetings were held on Fridays during the typical class time on the second

floor of Durand and were spent discussing topics requiring everyone's attendance such as aircraft design and mission strategy.

The team also utilized online methods to meet communication needs. A Google Group was utilized for formalized notices and e-mail discussions. Short-form and quick information relays were handled by a GroupMe that could be accessed via phone or computer.

Data Storage and problem set completion was made possible via our Google Drive, Google Docs, and a Wordpress. All team data, code, and photos were uploaded into categorically defined folders in our Google Drive. Spreadsheets recording budget, weather data, contact information, useful links, and most importantly, problem set requirements were also held here. Having all of these documents in a single location and accessible by all of the team was the last step in facilitating good communication and ensured proper problem set completion. Once written, relevant text, data, graphs, and videos were uploaded to skynet241x.wordpress.com.

Flight	Date	Phase 1	Phase 2	Total	Comments
1	6/6/2014			76.84	
2	6/6/2014			50.26	Dropped
3	6/6/2014			25.27	Dropped
4	6/6/2014			74.61	
5	6/6/2014			35.76	Dropped
Overall	75.725				

Table 2: Official Flight Results