Wright Electric -- Fixed Wing Autonomous Flight

This project is in cooperation and partnership with Wright Electric Inc. located in Los Angeles, California. The lead is Aaron Rowe.

Wright Electric is a seed stage startup company aimed at developing large airliners that make use of electric propulsion systems. The team at Wright includes alumni from Cessna, Cirrus, Boeing, Lockheed, Fitbit and Tesla. Wright completed the Y-combinator accelerator program.

Project Description

The aim of this project is to develop an autopilot system capable of controlling the takeoff, cruise and landing of a unique model airplane. Students will select off-the-shelf model airplane parts and sensors. They will design a system to steer the model airplane along a preprogrammed flight path.

Statement of the Problem

Wright is constructing an airplane that is propelled by a set of six electric fans. We would like to construct a miniature version of our airplane that can be used as a testbed for flight control algorithms.

Wright has built a 6’ wingspan model of its airplane. We are asking students from UCSB to design a simple system that is capable of autonomously steering this model aircraft during short demonstration flights.

Model airplane motors are often brushless DC motors. The flaps and rudders of model airplanes are often controlled by servo motors. Wright is unaware of any circuit boards that are designed to control six or more BLDCs and six or more servo motors. A custom board that can take input from the flight computer, probably a Raspberry Pi or Arduino, must be designed specifically for the purpose of this project.

Many organizations have developed low-cost sensor packages for autonomous quadcopter flight. We hope to repurpose one of these sensor systems for use on our fixed wing airplane.

Many flight autonomy systems exist, but few are designed for airplanes that use distributed electric propulsion.

Solution Concept

The first goal of the project is to design a system that is capable of controlling motor speed and the position of the flaps, elevators and rudder. This system could be a Raspberry Pi coupled to a sensor package and a custom motor and servo control board designed by the students.

The second goal of the project is to design or select a sensor package capable of providing feedback to the plane for autonomous flight. This would likely include an inertial measurement unit, airspeed indicator, and improvised LIDAR or other rangefinding.

The third goal of this project is the development of algorithms that will allow the aircraft to take off and fly along a preprogrammed flight path.

Ideal Student Qualifications
— Algorithm development experience
— PCB design experience
— Motor control experience
— Familiarity with airplanes and model airplanes is a plus

Student Requirements
Team participants must sign a nondisclosure agreement and an invention assignment agreement.

Assets Provided by Company
— model aircraft
— all necessary components
— two cycles of PCB fabrication

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