Department of Mechanical and Aerospace Engineering

MAE 481: Aerospace Engineering Capstone Senior Design 2020-2021

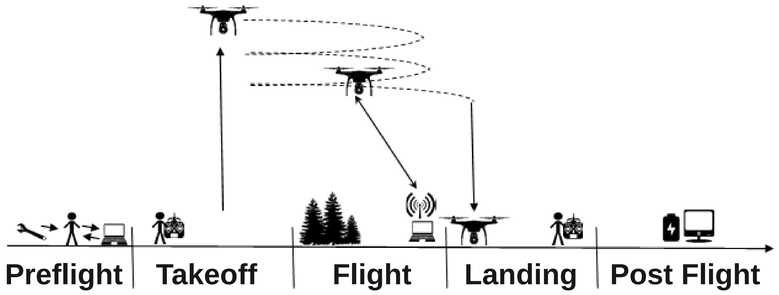
The Forest Flyer

The Forest Flyers: Andrew Abate, Anna Davis, Justin Heston, Chris Hoppe, Dominic Marchese, Alex Nguyen
Stakeholders: Dr. Ewere, Josh Glazer, Kevin Gitushi, Dean Leonard

Project Overview

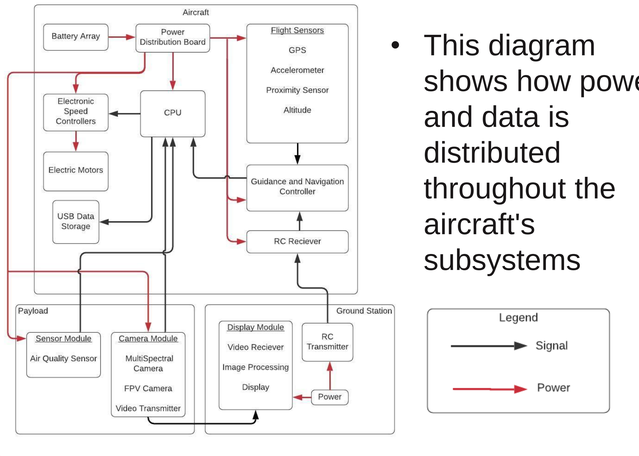
- **Purpose:** Design and build a UAS for US Forest Service
- **Need:** Caring for forest sustainably
- **Goals:** Enable faster, more informed decision making
- **Objectives:** Collect higher quality and quantity of image/video data

CONOPS



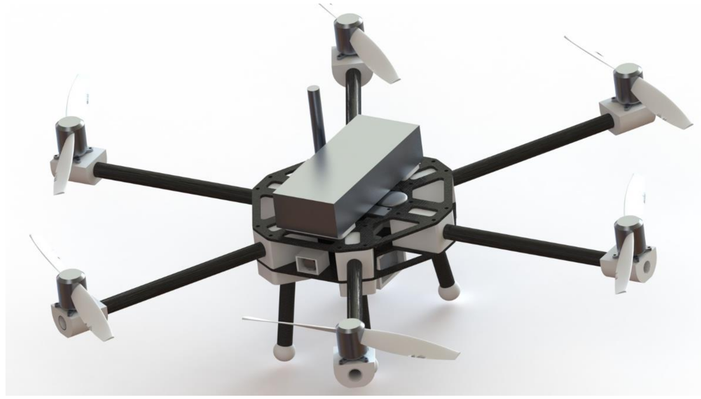
Preflight: Assembly and Complete Preflight checklist
Takeoff: Vertical takeoff from ground and ascend to desired altitude
Flight: Pilot over programmed flight path while collecting photo and data
Landing: Descend and land at ground station
Post Flight: Disassembly, recharge battery, perform image processing and analysis

Functional Block Diagram



- This diagram shows how power and data is distributed throughout the aircraft's subsystems

Design Solution



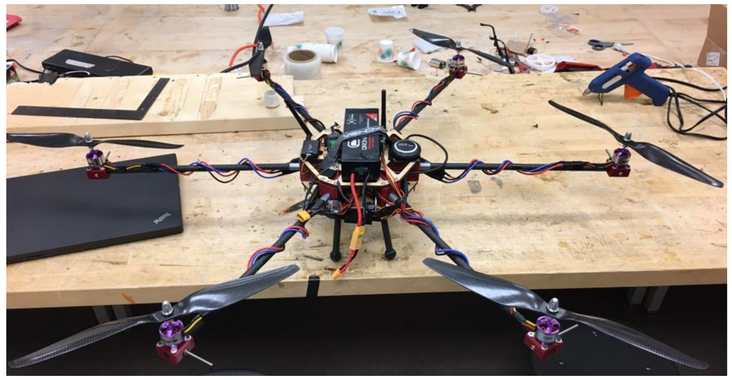
- Six-rotored, semi-autonomous aerial vehicle equipped with a multispectral agricultural camera, an FPV camera, and a gas sensor

Manufacturing

- Laser cut plywood hub plates that provide the central structure of the aircraft

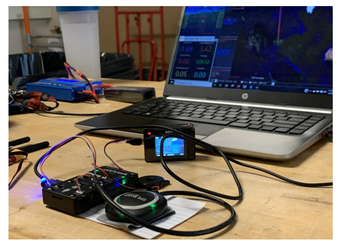
- Landing gear consisting of 3D printed components and carbon fiber rods

Final Prototype

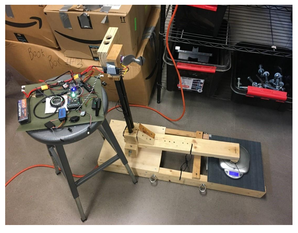


Weight	T/W	Endurance
2800 g	1.5	~13 min

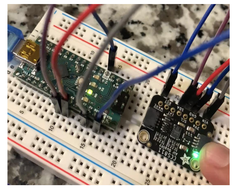
Testing

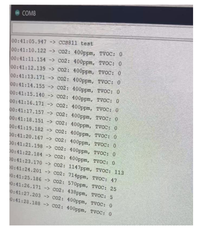


The above photos represent the testing for the AgroCam sensing system; The remote capture capability (Left) and the raw images captured by the camera (Right).



The photo to the left shows the static thrust test setup from which estimates for thrust and endurance were obtained.





The two photos above on the right demonstrate the air quality sensing capabilities, including eCO2 and VOC levels