Searching Unmanned Aerial Vehicle

Overview
Each year in the United States thousands of search and rescue missions take place. Our sponsors from Boeing challenged us with creating a searching unmanned aerial vehicle (SUAV) capable of completing a maze. The maze consisted of blind corners, vertical obstacles, and heat sources that needed to be identified.

Objectives
As the mechanical subsystem on this project, our team’s goal was to create a structural body to support all flight hardware. We also needed to design a flight control system for our SUAV that would provide stable flight that was responsive to user inputs.

Approach
● The team determined our customer needs included being able to fit in a 15” x 15” area, have stable flight capabilities, be responsive to pilot inputs, and have space for thermal imaging technology.
● We designed a body using two wood plates and two aluminum arms that would provide a structure to mount our other components.
● A landing gear was designed that could absorb an impact from a 6” drop at maximum potential weight.
● FEA analysis was completed for all structural components.
● All parts were manufactured using a variety of methods including milling, laser cutting, and 3D printing.
● Flight hardware including a flight controller, motors, propellers, electronic speed controllers, a power module, a voltage regulator, a receiver, a transmitter, and a telemetry package were carefully researched and purchased.
● Electrical connection for flight were connected using a modular system of bullet connectors and interchangeable parts for easy repairs.
● The flight controller was calibrated and fine tuned for stable flight.
● The receiver, transmitter, and telemetry units were bound for wireless communication.
● Testing was completed to validate our design including battery life tests and maneuverability tests.

Outcomes
● Total footprint of 15”x15” at the widest points
● Approximate flight time of 11 minutes
● Maintained stable hovering and precise maneuvering during flight
● Capable of identifying warm-bodies with its thermal IR sensor in an aerial vantage point to ultimately aide in search and rescue operations
● Capable of being flown through line of sight or with a mounted mono-vision camera