Unmanned Aerial Systems Competition

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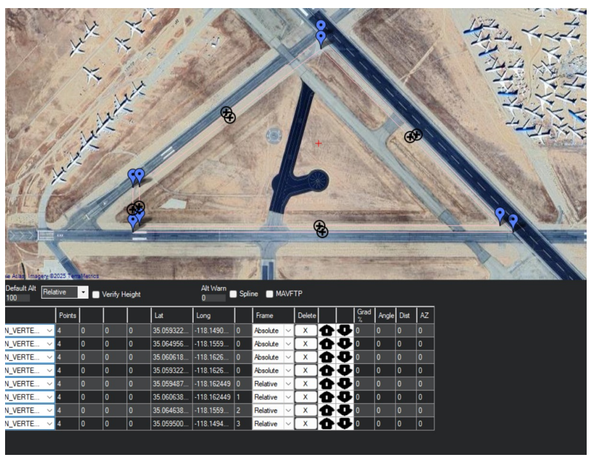
Liaison: American Society of Mechanical Engineering

Departments of Mechanical and Electrical Engineering
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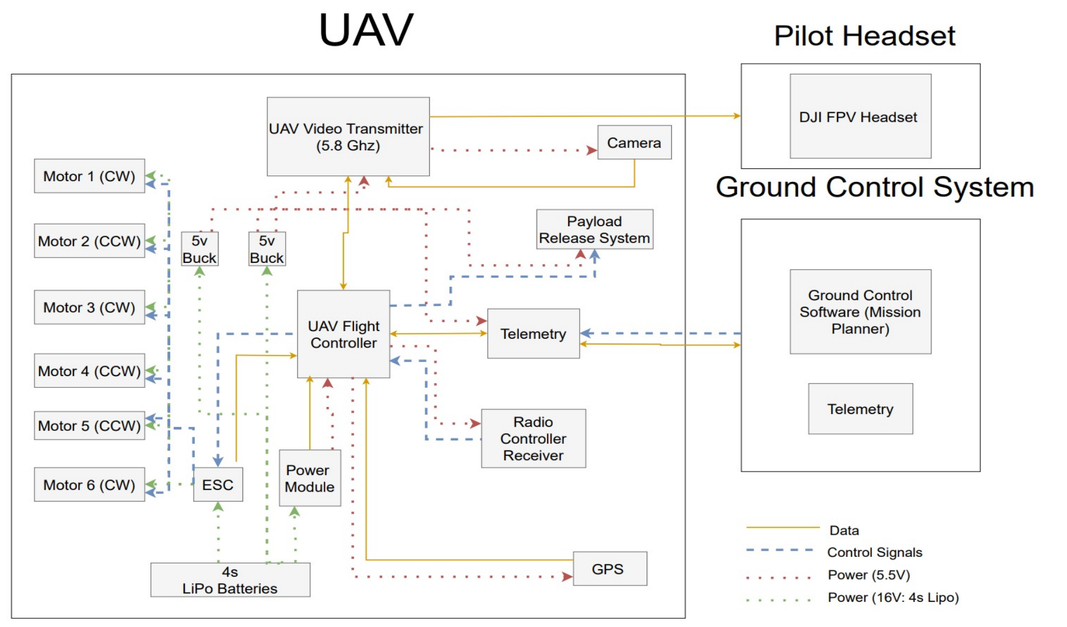
Background

The design of the UAS stems from the California Unmanned Aerial Systems Competition (C-UASC) at the Mojave Airport, with the competition goals being:

- **Autonomous Flight**
  - The UAS must navigate a series of waypoint autonomously
- **Object Detection, Classification, Localization**
  - The UAS will detect, classify and localize objects of interest
- **Air Delivery**
  - The UAS autonomously drops an undamaged payload object at a target position

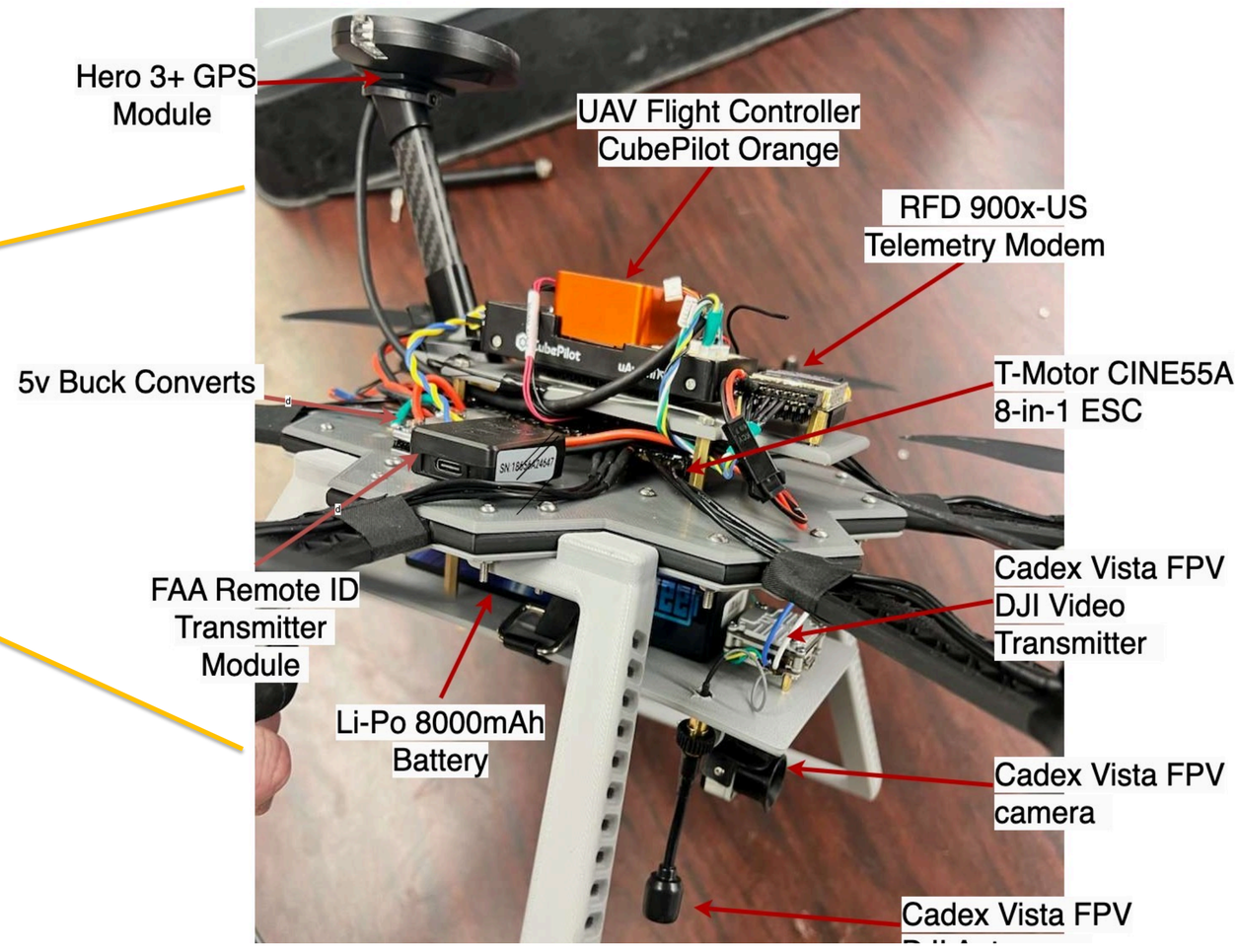


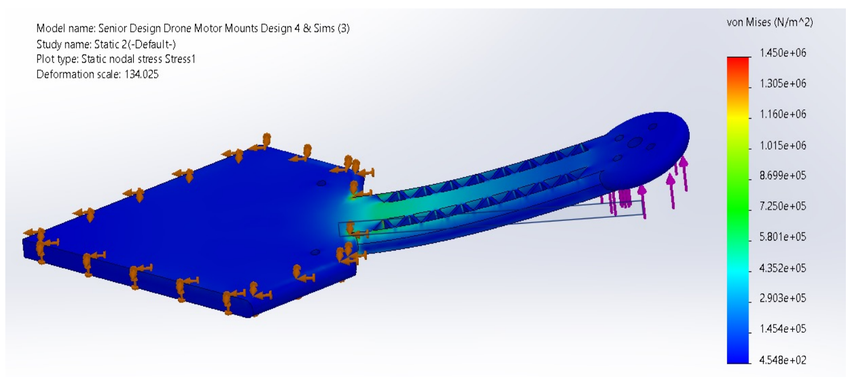
System Level Requirements

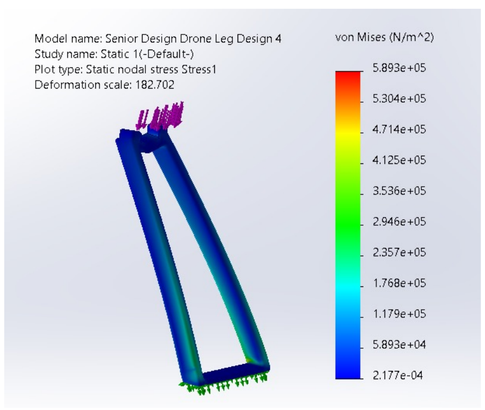


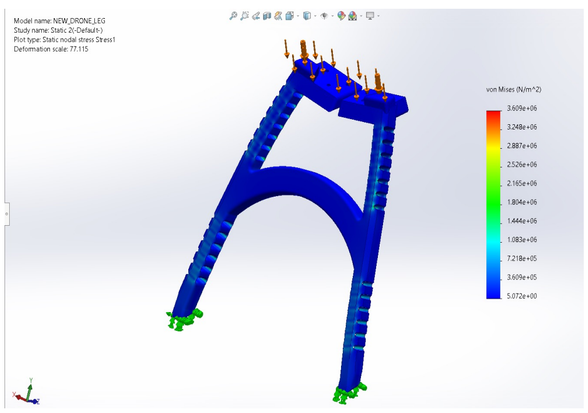
Design and Simulation











Initial Design **Final Design**

Testing

When testing the design choices and components of the drone, flight tests and evaluations were performed. To test the strength of manufactured components and responsiveness of electrical components, flight tests were done to test for failure. Some components like the camera and the servo motors that operated the tilt mechanism were able to be tested on the side.





Conclusion

Our senior design project involved the design, fabrication, and testing of a custom built hexacopter drone for the CSU Uncrewed Aerial Systems Competition. The mechanical engineering team focused on optimizing the drone's frame using CAD modeling and lightweight structural design to improve the power-to-weight ratio while maintaining durability. We also integrated a telemetry system for real-time flight data monitoring. In addition, the electrical engineering team developed the power distribution system, wired the flight controller, and implemented ESC calibration to ensure stable motor control and system reliability. Together, our interdisciplinary collaboration resulted in a functional and competition ready drone capable of stable and responsive flight performance.

Meet the Team

