SDSU College of Engineering

(C-UASC) California Unmanned Aerial Systems Competition

QUETZAL

Meet the Team

Electrical and Computer Engineering (ECE)

Rojin Osman
(ECE Lead)

Riley McGregor
(Avionics Integration Engineer)

Ismael Villavicencio
(Electrical Integration Engineer)

Burak Ozhan
(Control Systems Engineer)

Jack Slaten
(Power Systems Engineer)

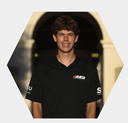
Mechanical Engineering (ME)

Utku Solmaz
(ME Lead)

Laith Abouhasoun
(Design & Manufacturing Engineer)

Gavin Rask
(Structures Engineer)

Christian Mandigma
(Mechanical Design Engineer)



Jonah Olsen
(Mechanical Design Engineer)

Aerospace Engineering (AE)

Maxwell Weaver
(AE Lead)

Christian Rosete
(Avionics Integration Engineer)

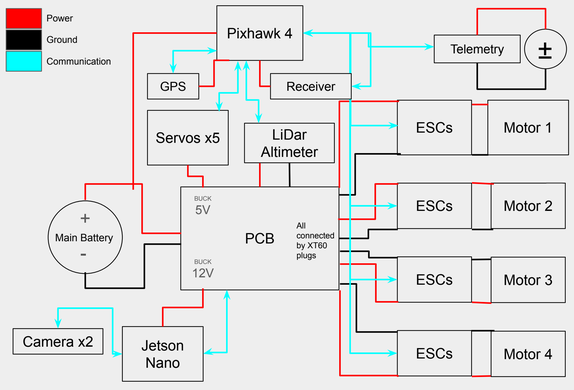
Kyle Loutzenhiser
(Aerodynamics Engineer)

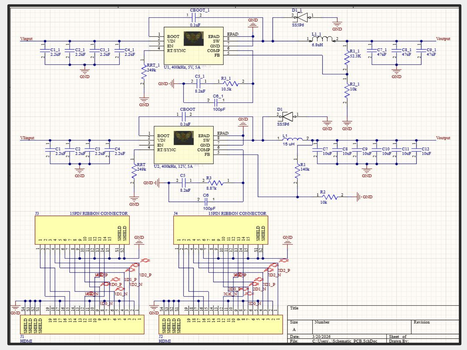
Peter Husch
(Performance Engineer)

Project Overview

Team Quetzal is developing a hybrid VTOL unmanned aerial system for the California Unmanned Aerial Systems Competition (C-UASC), combining vertical takeoff and landing with efficient forward flight. The system is designed to complete autonomous missions including waypoint navigation, package delivery, target identification, localization, and recovery tasks. The Quetzal drone is a hybrid aircraft that combines fixed-wing forward-flight efficiency with multirotor vertical lift. It uses onboard sensor fusion and GPU-accelerated vision to perform autonomous missions. The overall goal is a flight-worthy UAV capable of completing key C-UASC missions safely and autonomously.

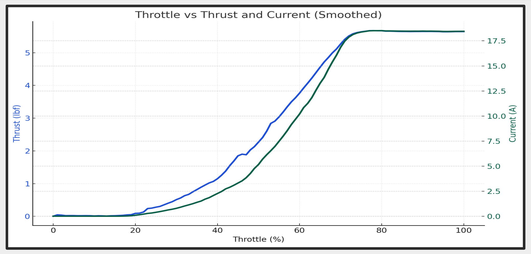
System-level Diagram





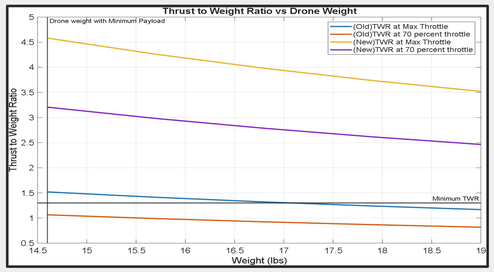
PDB (Power Distribution Board) Schematic

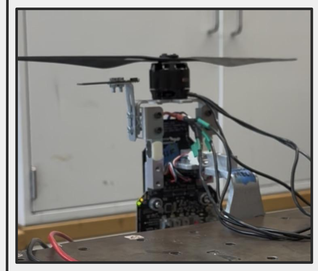
Testing and Verification



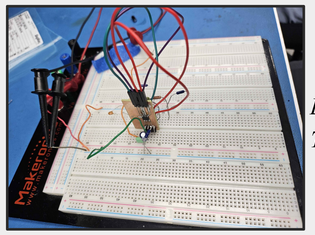
Thrust Stand Test Results for T-Motor KV400

Thrust to Weight Ratios of Old vs New Propulsion System

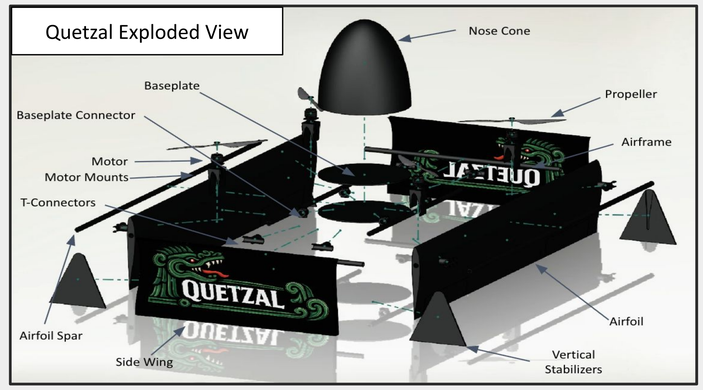




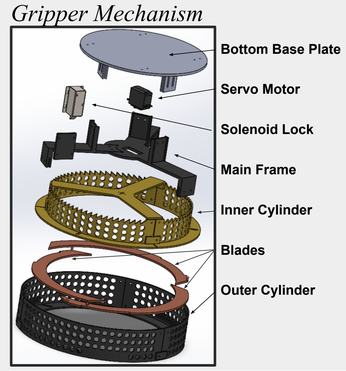
Thrust Stand Testing



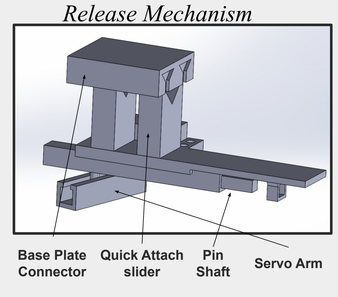
Breakout Board Testing

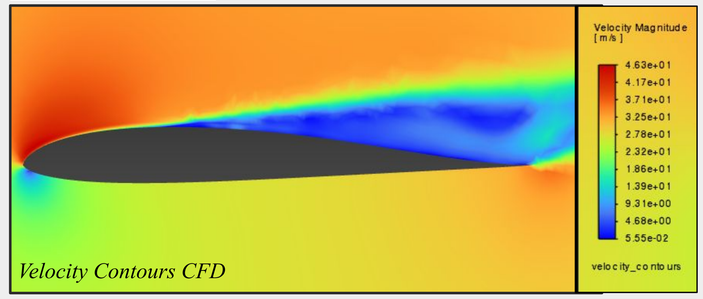


Gripper Mechanism



Release Mechanism





Velocity Contours CFD

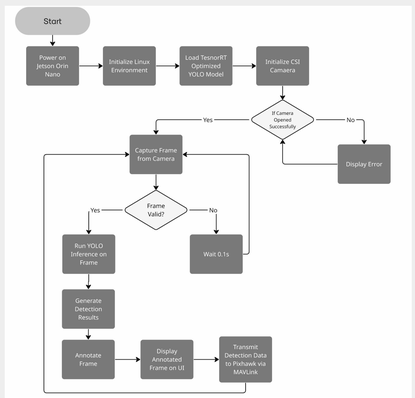
Conclusion

Quetzal demonstrates a strong multidisciplinary UAV design that integrates mechanical, electrical, avionics, and autonomy subsystems into a competition-focused VTOL platform. The team has validated major subsystem functionality, identified failure modes through testing, and used those findings to guide an improved second design iteration. With propulsion upgrades, continued PID refinement, and autonomy integration, the project is advancing toward full mission-capable operation.

Motivation

The project was motivated by the need for a flexible UAV platform that can perform complex real-world tasks such as package delivery, target localization, and autonomous navigation. VTOL aircraft are useful because they combine the benefits of vertical takeoff in constrained spaces with the speed and efficiency of fixed-wing cruise. The competition setting also pushes the teams to solve practical challenges in autonomy, power electronics, mechanical design, and mission reliability.

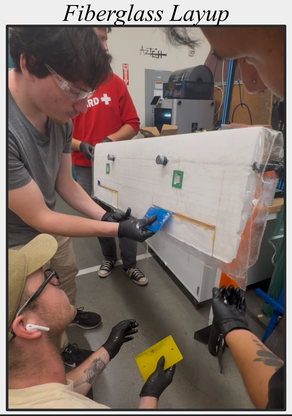
Jetson Orin Nano Flowchart



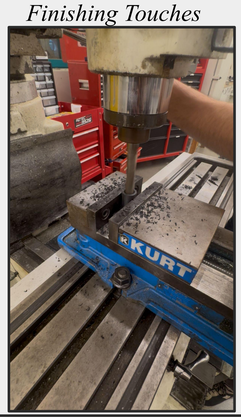
Fabrication

Spar Installation

Fiberglass Layup



Finishing Touches



Acknowledgement

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