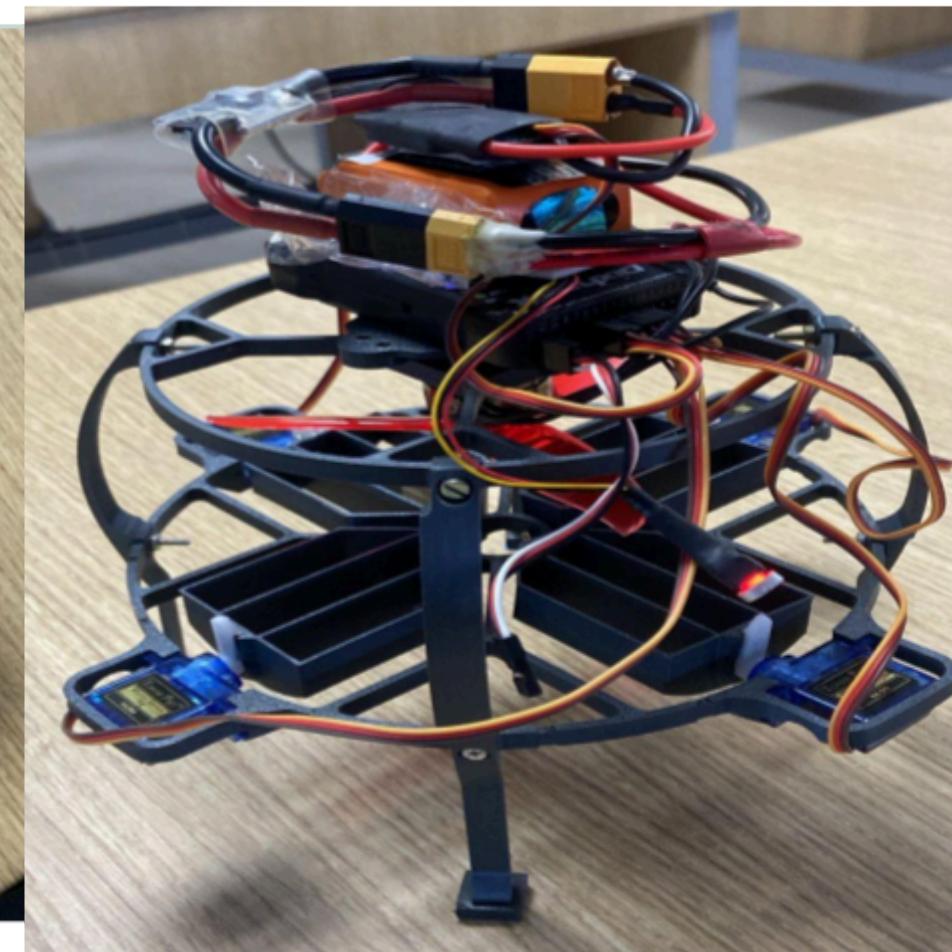
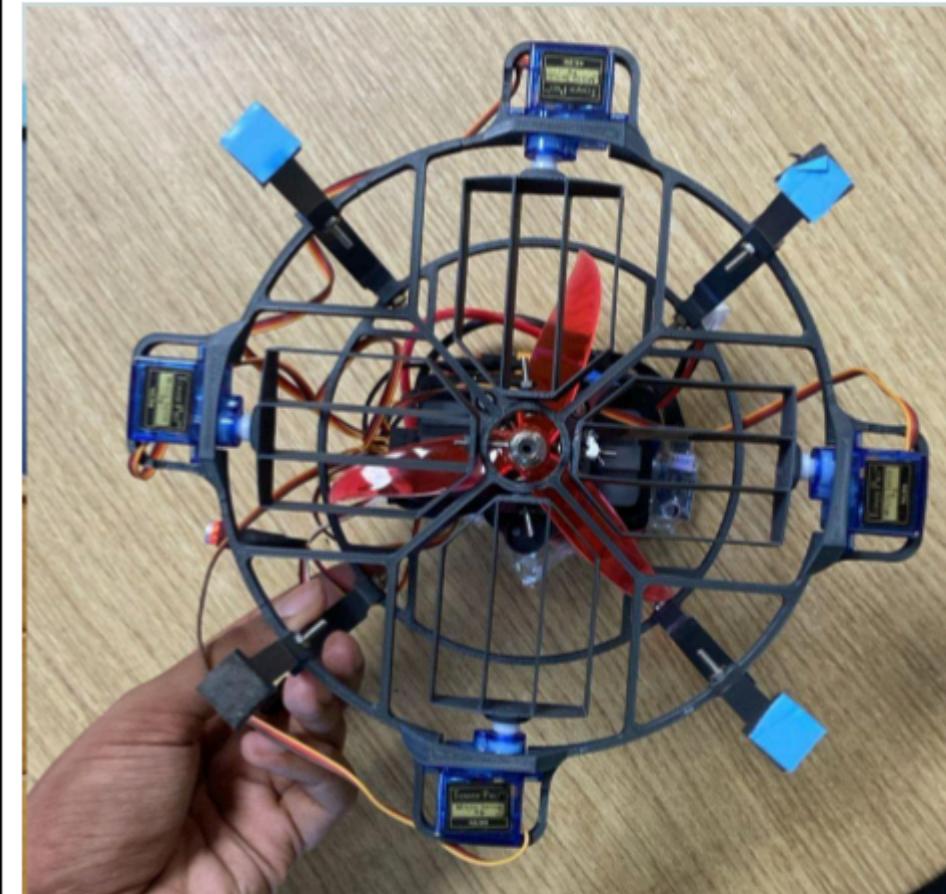


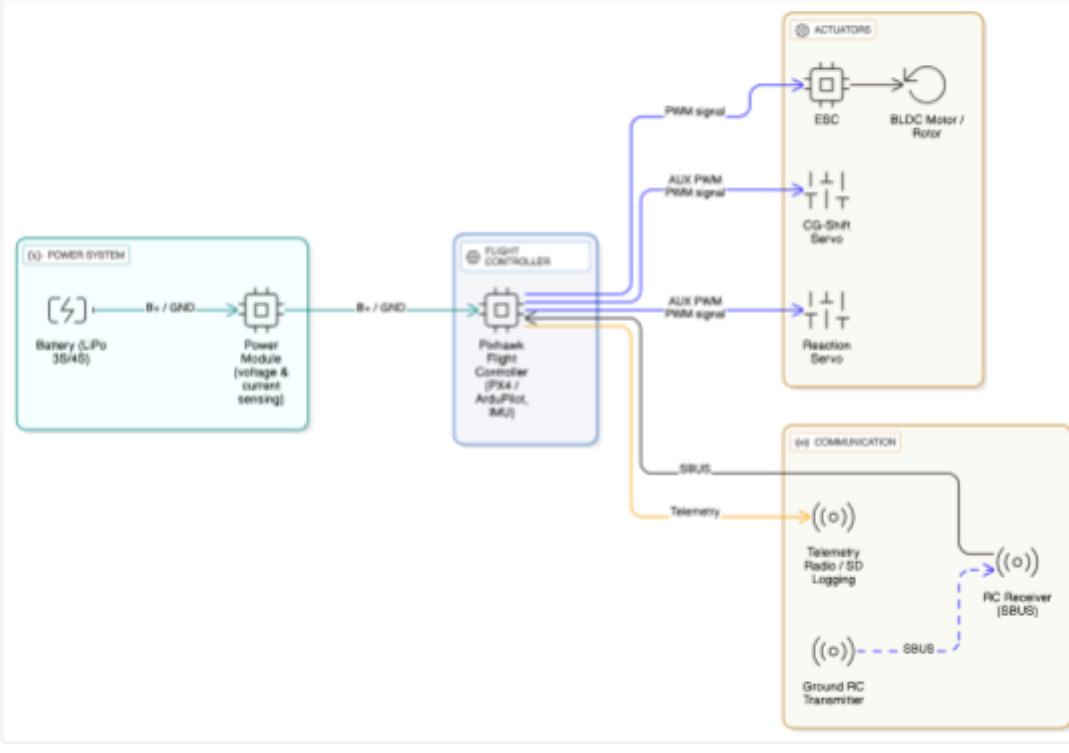
Abstract:

This project presents a lightweight monocopter prototype controlled by a Pixhawk flight controller that combines autorotative lift with active attitude control. The platform uses a single BLDC rotor for lift, a movable CG sled and a reaction servo for pitch/yaw trimming, and a Pixhawk (PX4/Ardupilot) stack for state estimation and closed-loop PID control. The system demonstrates stable short-duration hover, precise attitude set-point tracking, and repeatable small translations while logging IMU, motor, and servo telemetry for tuning. Designed as a low-cost research testbed, the monocopter enables experiments in novel single-rotor control strategies, compact payload delivery, and sensorized inspections in confined environments.

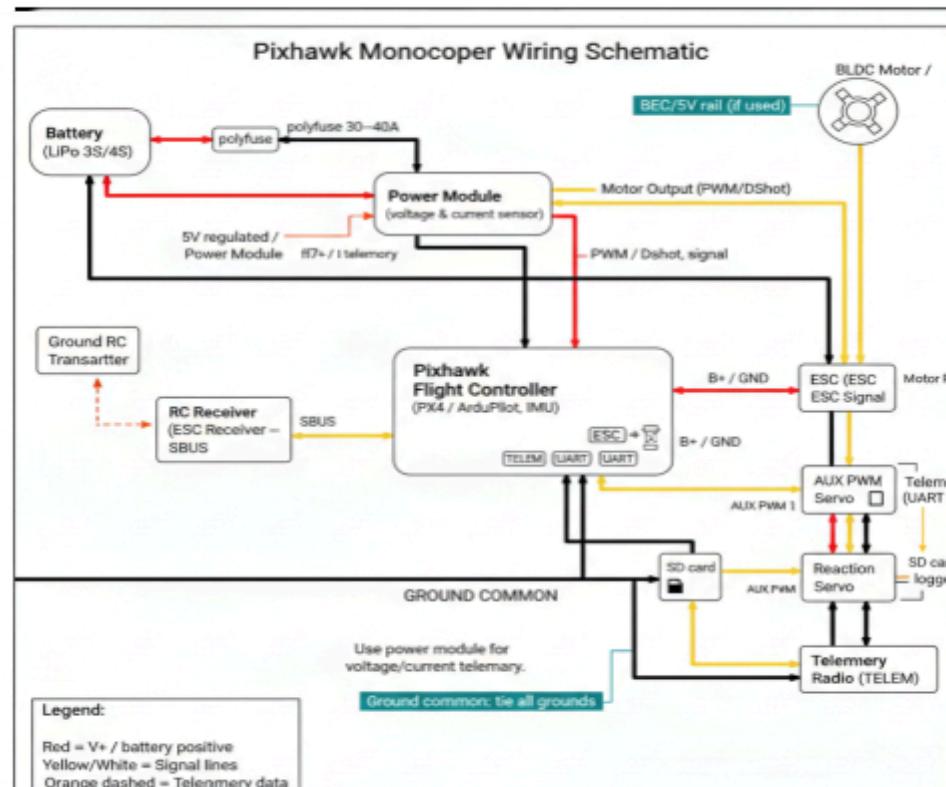
Model:



Block Diagram:



Circuit Diagram:



Applications:

Research & Control Experiments: a compact platform for testing novel single-rotor control laws (MPC, adaptive control, torsion-coupled dynamics).

Indoor Inspection & Sensing: reach confined spaces (ducts, under-decks) where multirotors are too large; carry mini-sensors (gas, thermal, mini-camera).

Swarm & Distributed Robotics Research: use many inexpensive monocopters to study decentralized coordination with minimal hardware.

Search & Rescue Micro-Recon: deployable sensor probe to inspect collapsed/claustrophobic voids where larger UAVs cannot enter.

Entertainment & Art Installations: kinetic sculpture or staged performances using controlled autorotative motion.