

High Payload & Long Endurance UAV Platform for Versatile Aerial Missions



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Search & Rescue

- Takeoff at constrained environment anytime
- 100+ km/h cruising speed, delivering essentials and reaching destination in a short time.



Surveillance & Survey

- 2hr flight cruising, covering huge area with wide lens camera.
- Waypoint missing, allowing autonomous flight.



Delivery

- Up to 160km range, sending packages across different regions.
- Swappable battery for continuous mission

System Overview

- 2hr endurance
- 2kg payload
- 7kg max weight
- Takeoff & Landing Vertically
- Return-to-home
- Waypoint Mission

Our VTOL: Fly Fast, Far & Anywhere

Fly 100+ km/h → faster than typical Quad-rotors drones

Up to 2hr endurance → cover wide areas in single flight.

2kg useful payload → DSLR camera, loudspeaker, or medical kits.

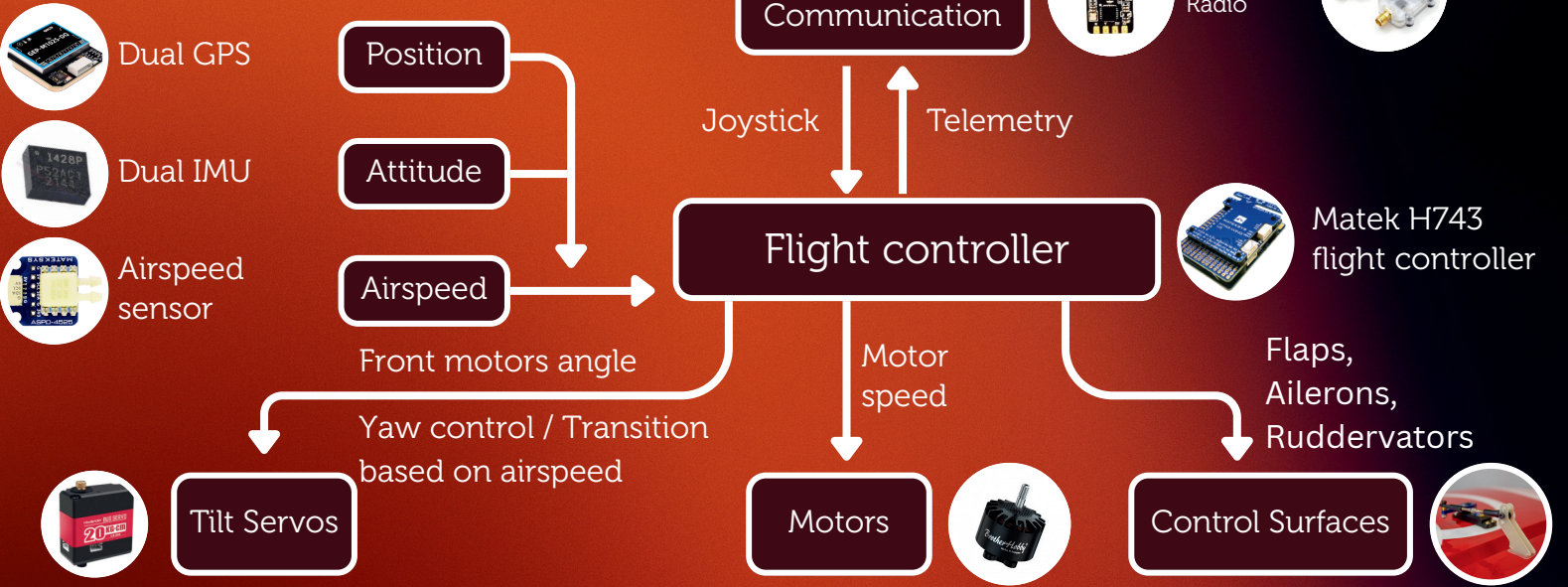
Vertical take-off & landing: launch and recover anywhere; no runway.



Propulsion Overview

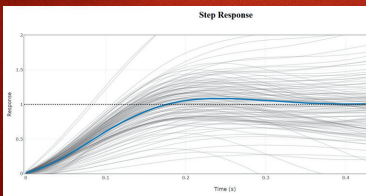
- 2 front-tilt motors
- 2 rear-static motors
- 4 x 14in. bi-blades
- 4-in-1 ESC
- 6s 20Ah Lithium Battery

Main Data Flow:



UAV Tuning Process & Result:

Filter Tuning → Test Flight → Quad PID Tuning
→ Test Flight → Fixed Wing PID Tuning



Tuning Result

Material & Prototype Comparison:

Prototype & Empty Weight:

Cochin (PLA+ @1.7kg) → Cornish (PLA+ @1.7kg) → Silkie (LW PLA @ 1kg)

Materials:

- **Reinforcement:** Carbon-fiber rods
- **Fuselage & Landing Gears:** 3D printed PETG because of it's toughness
- **Wing, Tail & Small Parts:** 3D printed PLA because of it lightweight

Result & Future Works:

Performance

- The final prototype successfully met the defined scope of 1hr flight with 1kg payload, and exceeded the expectation by achieving a **2hr flight @ 1kg payload**, and a **1hr flight @ 2kg payload**.

Improvements

- Extra modifications such as **VTOL wire covering** and **different sensor mounts** can be designed to **reduce total drag** during flight.
- The aircraft frame can be **manufactured with carbon fiber composite** to **reduce total weight** while improving **structural strength** and **surface finish**.