College of Engineering and Physical Sciences

Unmanned Aircraft System

Client: REDD LLC

Team: Thomas Sullivan, Alexander Nichols, Braxton Rosner, Broden Mathes, Ashtynn Jervis, Payson Webb, Jake Nelson, Justin Van Kirk

Problem

Modern drones often lack durability, rapid deployment, modularity, repairability, and compact storage, limiting real-world effectiveness. These gaps highlight the need for a more robust, deployable, modular, and space-efficient design.

Project Objectives & Requirements

This prototype improves performance in search and rescue, recreation, and reconnaissance applications.

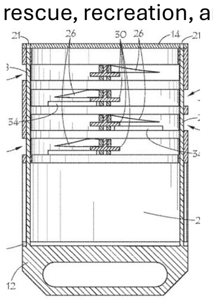

Fig 1. Stored Design From Patent

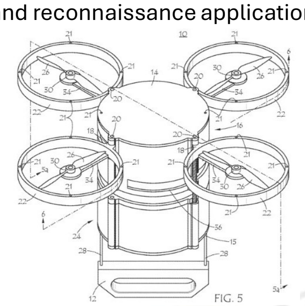

Fig 2. Deployed Design From Patent

- Protected under US Patent #10,549,850 B1
- Deploys within 10 sec, while wearing gloves
- Holds a 3 ft diameter hover with a 500g payload
- Fully FAA Remote ID compliant
- 3 minute flight time in temperatures as low as 20°F
- Diameter between 2.6 in and 12 in
- Designed to fit easily within a standard backpack
- Operational between 8,000–12,000 ft ASL
- Keeps position within 10ft in winds up to 20mph
- Performs in all-weather (rain/snow)
- Withstands a 3ft drop and 3 sec water submersion
- Includes a swappable payload compartment

Design

Dual Configuration: The UAS operates in two states

Stowed State:

- A durable sheath encloses the UAS, protecting it from environmental exposure

Flight-Ready State:

- Coplanar rotors for stable flight
- Modular payload compartment for cameras, beacons, or cellular boosters
- Quadcopter with four brushless motors, lithium polymer battery, electronic speed controllers, flight controller, and radio receiver

Fig 6. Manufactured Prototype Drone

Testing

Materials

As the airframe will be 3D printed, this test determined the tolerances and printability of varied materials (PLA, ASA, ASA-AERO, TPU, and PETG-CF).

Thrust

This test compared thrust from different shroud designs to find the most efficient at constant battery power

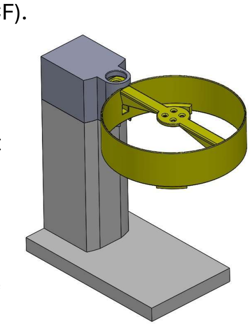

Fig 3. Thrust Testing Stand

Durability

Durability will be tested with multiple drops in the stowed state per MIL-STD-810G, and dust and water resistance will be evaluated to IP-67 standards.

Flight Data

An air-ground transmitter will collect GPS and battery data during high-altitude flight tests.

Fig 4. Stored State With Sheath

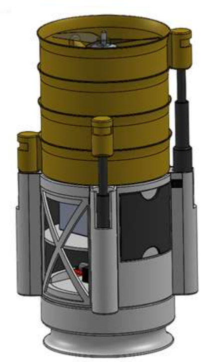

Fig 5. Stored State Without Sheath

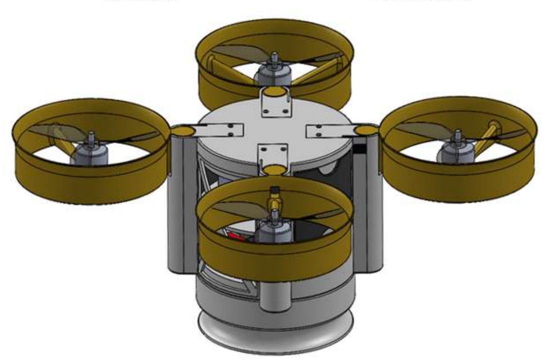

Fig 7. Flight-Ready State