

A Morphing Wing Sailplane-multicopter UAV

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ABSTRACT

Researchers at the University of California, Davis have developed an unmanned aerial vehicle (UVA) with foldable wings enabling vertical takeoff and landing (VTOL) combined with efficient motorless forward flight.

FULL DESCRIPTION

This UAV technology features a foldable wing comprising stationary and multiple folding segments, controlled by an onboard system to transition between folded and unfolded configurations during flight. The folded state allows compactness for vertical takeoff and landing in constrained spaces, while the unfolded state extends the wings for efficient gliding and extended motorless flight. A rib-hinge assembly with resilient members facilitates smooth wing folding and unfolding, optimizing flight performance and conserving power.

APPLICATIONS

- ▶ Urban delivery drones requiring VTOL with extended range capabilities.
- ▶ Military reconnaissance and surveillance UAVs needing stealthy, long-endurance flight.
- ▶ Environmental monitoring and data collection in remote or constrained areas.
- ▶ Emergency response UAVs deployed in disaster zones with limited landing infrastructure.
- ▶ Aerial photography and mapping platforms requiring versatile flight modes.

FEATURES/BENEFITS

- ▶ Enables VTOL operation with a compact wing configuration for urban and space-constrained environments.
- ▶ Extends efficient motorless forward flight by unfolding wings to improve aerodynamics.
- ▶ Automates in-flight wing-state changes via a controller-driven wing modification subsystem.
- ▶ Improves transition reliability by using a rib-hinge assembly for smooth wing deployment/retraction.
- ▶ Reduces power consumption by minimizing rotor use during forward flight, increasing endurance.
- ▶ Extends VTOL UAV range by reducing rotor-dependent power draw.
- ▶ Enables long-wing aerodynamic performance without runways by combining compact VTOL takeoff/landing with in-flight wing extension.
- ▶ Consolidates VTOL and long-distance/glide capabilities into a single platform, reducing the need for multiple UAV types.
- ▶ Overcomes mobility constraints in dense, space-restricted operating areas.

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OTHER INFORMATION

KEYWORDS

aerospace, foldable wing, rotorcraft, uncrewed aerial vehicle, unmanned aerial vehicle, vertical takeoff and landing, wing modification subsystem, wing folding mechanism, wing hinge assembly, wing transition control

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