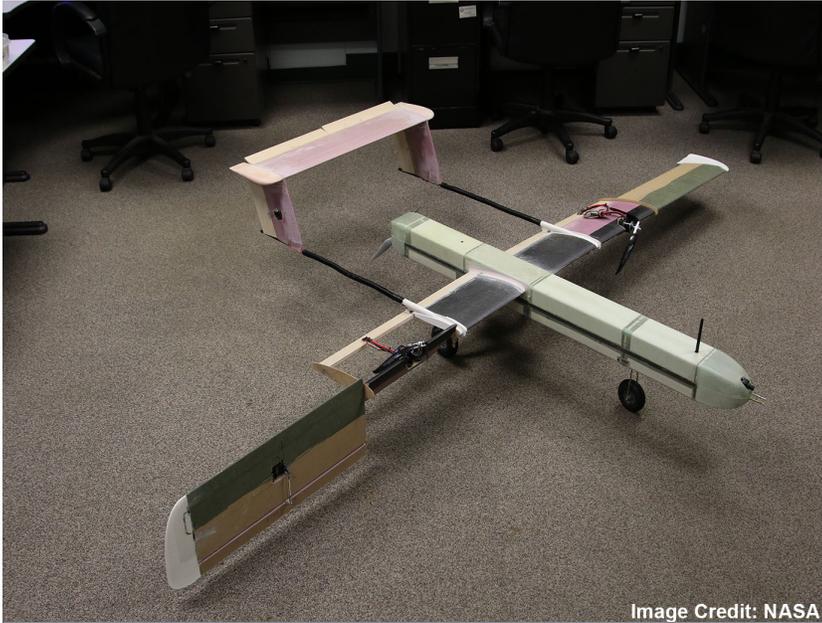




TECHNOLOGY SOLUTION

Aerospace



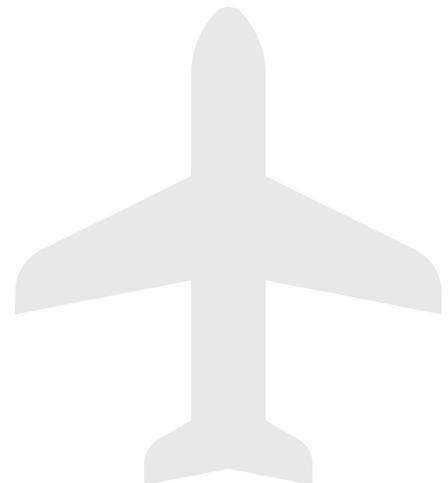
Small Compound-Wing VTOL UAS

Combining small VTOL maneuverability with fixed-wing endurance, range and stability

Typically small UAS, because of their light weight and small size, have difficulty flying in adverse environmental conditions, especially gusty winds. In some cases, small UAS such as multi-copters can handle somewhat higher gust conditions, but have limited endurance. Fixed-wing configurations have good endurance but need large open areas for launch and recovery and are typically not very wind-robust. This vehicle combines VTOL convenience with fixed-wing endurance while enhancing operations in adverse environments.

BENEFITS

- Performance advantages compared to other VTOL designs include longer endurance (time on station), better stability, higher forward speeds, and lower cost
- Useful for any application that needs compact VTOL capability combined with extended station keeping or larger operational radii



THE TECHNOLOGY

This UAS technology defines a part-time VTOL system that transitions to efficient fixed-wing operation to obtain desired endurance and range. A novel three-segment wing design includes: a fixed Inner segment mounted to the fuselage, a controlled, articulating intermediate segment to which lift engines are attached, and a free-to-rotate outer segment to alleviate gust impacts on the airframe in both modes. The aft propulsor is articulated and configured such that the thrust being generated is always in a proverse direction. Also, the controlled-articulation wing segments are operated in both tandem and differential modes to allow for direct control while in the various modes of operation. Also incorporated is a novel control architecture that encompasses both the different system operating modes as well as the considerable number of individual control options and combinations.



VTOL compound wings include integral lift engines, articulating outboard wing sections, and a rotatable aft propulsor. First flight: August 22, 2013. Image Credit: NASA

APPLICATIONS

The technology has several potential applications:

- Various defense missions
- Law enforcement
- First responders
- Precision aerial mapping
- Agriculture, pipeline and utility monitoring and inspection
- Entertainment-related functions

PUBLICATIONS

Patent No: 9,708,059

National Aeronautics and Space Administration

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