Hawk Wing: A New Way to Improve Aircraft Efficiency Through Biomimicry

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Modern aircraft consume a lot of fuel. This provides high environmental and financial strain on society, and is a field where constant improvement and innovation is targeted. Hawk Wing is a project that focuses on implementing innovative biomimicry solutions in modern aviation to improve the overall performance of fixed wing aircraft. It addresses solutions such as morphing surfaces, or alternative stabilization methods. Formally, we consider the ways of integrating the following into the aircraft of the future: The effects of multiple, variable winglets. Wing designs which are based on a morphing surface, instead of fixed point airflow change, which current attitude control systems use. Multiple variable winglets can be used to increase stability and control authority on any plane. They could also be the basis of a plane with high-efficiency modes at both high-altitude, and as a ground effect vehicle. They could be used to improve yaw control of wing-like planes in cross wind conditions. Morphing wings would improve the airflow over the wing, providing a smooth angle transition instead of the harsh one currently presented by elevons. CFD software suggests significant increases in overall speed and lift would be attainable. The work presents the evaluations performed by CFD software and empirical tests based on a drone emulating a multiple, variable winglet airplane. Leveraging the customizability of the aircraft, greater stability was found at all stages of flight. The experiments that were conducted indicate that it is indeed possible to replicate the aforementioned methods to different developing scales.

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