



AeroVironment Develops World's First Fully Operational Life-Size Hummingbird-Like Unmanned Aircraft for DARPA

- Two-wing, Flapping Aircraft Hovers and Flies in Any Direction
- Total Weight of Two-thirds of an Ounce Includes Batteries and Video Camera

WASHINGTON--(BUSINESS WIRE)-- [AeroVironment, Inc.](#) (AV)(NASDAQ: AVAV) today announced it has accomplished a technical milestone never before achieved -- controlled precision hovering and fast-forward flight of a two-wing, flapping wing aircraft that carries its own energy source, and uses only the flapping wings for propulsion and control.



The milestone was part of the Phase II contract awarded by the Defense Advanced Research Projects Agency (DARPA) to AV to design and build a flying prototype "hummingbird-like" aircraft for the [Nano Air Vehicle](#) (NAV) program.

"The success of the NAV program paves the way for a new generation of aircraft with the agility and appearance of small birds," said DARPA NAV program manager, Dr. Todd Hylton.

The final concept demonstrator is called the 'Nano Hummingbird' and is capable of climbing and descending vertically, flying sideways left and right, flying forward and backward, as well as rotating clockwise and counter-clockwise, under remote control and carrying a video camera payload. During the demonstration the Nano Hummingbird flew in and out of a building through a normal-size doorway.

"The historic achievement made by the Nano Hummingbird is an example of the leading-edge innovations introduced and deployed almost routinely by the AeroVironment UAS team," said Tom Herring, AV senior vice president and general manager of Unmanned Aircraft Systems. "From the battle-proven Raven, Wasp and Puma small UAS to the tiny Nano Hummingbird to Global Observer, the largest, highest and longest flying UAS,

AeroVironment Develops World's First Fully Operational Life-Size Hummingbird-Like Unmanned Aircraft for DARPA (Photo: Business Wire)

AeroVironment continues to define the future of unmanned aircraft systems. Our mission in doing so is to provide our customers with advanced tools that help them succeed."

The hand-made prototype aircraft has a wingspan of 16 centimeters (6.5 inches) tip-to-tip and has a total flying weight of 19 grams (2/3 ounce), which is less than the weight of a common AA battery. This includes all the systems required for flight; batteries, motors, communications systems and video camera. The aircraft can be fitted with a removable body fairing, which is shaped to have the appearance of a real hummingbird. The aircraft is larger and heavier than an average hummingbird, but is smaller and lighter than the largest hummingbird currently found in nature.

"The success of the Nano Hummingbird was highly dependent on the intense combination of creative, scientific, and artistic problem-solving skills from the many AV team members, aided by a philosophy of continuous learning, which we feel was only possible due to the unique R&D environment here at AV," said Matt Keennon, AV's project manager and principal investigator on the NAV project.

The technical goals for the Phase II effort were set out by DARPA as flight test milestones for the aircraft to achieve by the end of the contract effort. The Nano Hummingbird met all, and exceeded many, of the milestones:

1. Demonstrate precision hover flight within a virtual two-meter diameter sphere for one minute.
2. Demonstrate hover stability in a wind gust flight which required the aircraft to hover and tolerate a two-meter per second (five miles per hour) wind gust from the side, without drifting downwind more than one meter.

3. Demonstrate a continuous hover endurance of eight minutes with no external power source.
4. Fly and demonstrate controlled, transition flight from hover to 11 miles per hour fast forward flight and back to hover flight.
5. Demonstrate flying from outdoors to indoors, and back outdoors through a normal-size doorway.
6. Demonstrate flying indoors 'heads-down' where the pilot operates the aircraft only looking at the live video image stream from the aircraft, without looking at or hearing the aircraft directly.
7. Fly the aircraft in hover and fast forward flight with bird-shaped body and bird-shaped wings.

About AeroVironment, Inc. (AV)

AV is a technology solutions provider that designs, develops, produces and supports an advanced portfolio of [Unmanned Aircraft Systems](#) (UAS) and electric transportation solutions. Agencies of the U.S. Department of Defense and allied military services use the company's battery-powered, [hand-launched unmanned aircraft systems](#) extensively to provide situational awareness to tactical operating units through real-time, airborne reconnaissance, surveillance and communication. Switchblade is a small UAS designed to provide a rapid, lethal, pinpoint precision strike capability with minimal collateral damage. AV's electric transportation solutions include a comprehensive suite of [electric vehicle \(EV\) charging systems and installation services](#) for consumers, automakers, utilities and government agencies, [power cycling and test systems](#) for EV developers and [industrial electric vehicle charging systems](#) for commercial fleets. More information about AV is available at www.avinc.com.

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