

## Unmanned Air Vehicles (UAV)

**Track Code:** 2014-DENG-66873

**Categories:**

- Mechanical Engineering

**Keywords:**

- Actuators
- Mechanical Engineering
- Micro & Nanoelectronics
- Motors

Micro Air Vehicles (MAV) are size restricted, autonomous vehicles classified as Unmanned Air Vehicles (UAV). MAVs can be divided into two categories, motor-driven linkage and piezoelectric cantilever mechanisms. Linkage mechanisms are successful in larger scale applications, operating at high efficiency. However, they are subject to limitations such as fixed output kinematics without additional mechanisms, asymmetry in the kinematics without additional variable speed control, parasite structural vibration due to asymmetric acceleration and the linkage system operating at high frequency, and no elastic component in the system to preserve wing kinetic energy, which lowers efficiency.

Researchers at Purdue University have developed a resonant direct-drive flapping wing/fin voice coil flapper. This technology is a synergetic integration of a novel voice coil motor, spring energy storage element, and wing/fin system. For energy efficiency and to achieve a resonant system, the flapping wing/fin is directly driven by a spring element. It is designed for versatile use in both Flapping Wing Micro Air Vehicles and Flapping Fin Autonomous Underwater Vehicles. The flapper is optimized to generate reciprocating flapping motion at different scales for various applications such as environmental monitoring, conducting reconnaissance, surveillance, and search and rescue in confined or limited spaces. This technology offers less noise, higher efficiency, and superior maneuverability and response over traditional fixed wing or rotorcraft air vehicles and rotary propeller under water vehicles. This is vital for reducing the environmental impact during environmental monitoring and increasing the stealth during reconnaissance.

**Advantages:**

- Less noise
- Higher efficiency
- Superior maneuverability and response
- Reduced environmental impact
- Increased stealth

Potential Applications:

- Environmental monitoring
- Reconnaissance, surveillance, and search and rescue in confined or limited spaces

**People:**

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**Intellectual Property:**

**Application Date:** December 15, 2015

**Type:** Utility Patent

**Country of Filing:** United States

**Patent Number:** 10,897,180

**Issue Date:** January 19, 2021

**Application Date:** January 11, 2021

**Type:** CON-Gov. Funding

**Country of Filing:** United States

**Patent Number:** (None)

**Issue Date:** (None)

**Application Date:** December 15, 2014

**Type:** Provisional-Patent

**Country of Filing:** United States

**Patent Number:** (None)

**Issue Date:** (None)

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