

Transition

SBIR Topic Number:
AF05-164

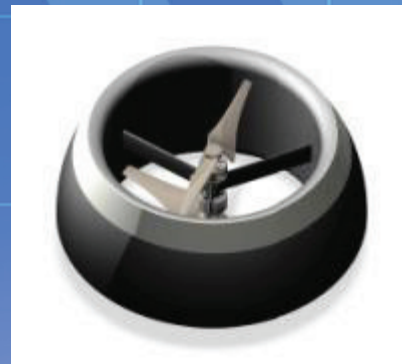
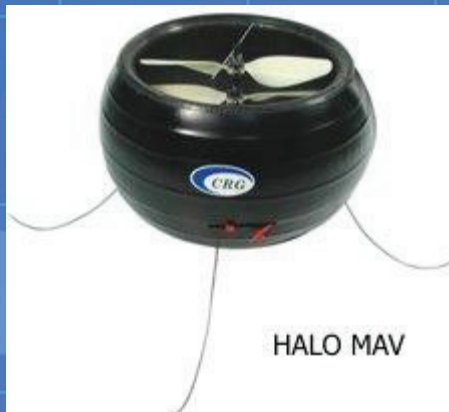
SBIR Title:
Micro Air Deployed
Vehicle for Cluttered
Urban Environments

Contract Number:
FA8651-06-C-0122

SBIR Company Name:
Cornerstone Research
Group, Inc., Dayton, OH

Technical Project Office:
AFRL Munitions
Directorate, Eglin AFB, FL

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Hovering Autonomous Low-profile Observer (HALO™) Micro Air Vehicle (MAV)

Vectored-Thrust Micro Air Vehicle for Bomb Impact Assessment Operations in Urban Environments

- The Air Force needs enabling technologies which can be used to develop a micro air platform for reconnaissance in cluttered urban environments
- Cornerstone Research Group, Inc. (CRG) developed the Hovering Autonomous Low-profile Observer (HALO™), a vertical takeoff and landing (VTOL) micro air vehicle (MAV)
- HALO is designed specifically for performing operations in cluttered urban environments and is also applicable to soldier or police-fielded intelligence, surveillance, and reconnaissance (ISR) missions
- HALO will provide real-time video surveillance and intelligence gathering capabilities for the Department of Defense (DoD), law enforcement agencies, the border patrol, and search and rescue teams
- CRG's ability to tailor the HALO platform gives its customers the flexibility to customize vehicles for their specific applications and payload requirements

Commercialization Pilot
Program Series

96ABW-2010-0596

A

DISTRIBUTION A:
Approved for public
release; distribution
unlimited.

SBIR Requirement

The Air Force needs enabling technologies which can be used to develop a micro air platform for reconnaissance in cluttered urban environments. Micro air vehicles (MAVs) have the potential to revolutionize intelligence and information gathering capabilities.

SBIR Technology

Cornerstone Research Group, Inc. (CRG) developed the Hovering Autonomous Low-profile Observer (HALO™), a vertical takeoff and landing (VTOL) MAV for the Air Force. HALO is designed specifically for performing operations in cluttered environments and is also applicable to soldier or police-fielded intelligence, surveillance, and reconnaissance (ISR) missions.

The vehicle configuration consists of a ducted propulsion system with coaxial, contra-rotating rotors. The propulsion system incorporates cyclic control of the lower rotor, which provides a stability response to gust loads and also the ability to translate laterally at higher velocities.

CRG's integrated design approach to its HALO MAV has focused on optimizing the system for minimal weight and maximum endurance. HALO has a unique ducted fan design that provides VTOL and hovering capabilities crucial for safe and agile maneuvering in confined spaces. The miniature autopilot linked to a lightweight, ground-control station gives novice operators full control of HALO at the touch of a finger.

HALO has an integrated design approach focusing on careful balance of aerodynamic performance, rotor blade design, drive systems selections, battery selections, and structural configuration.

Transition Impact

HALO provides rapidly deployed, real-time video surveillance and intelligence gathering capabilities. The small size and low acoustic signature make the vehicle difficult to detect, and the lightweight system can be easily carried by soldiers or deployed by small unmanned systems.

CRG sold two radio-controlled vehicles during the Phase II project, and a third, larger scale, fully computer-controlled unit is currently being manufactured for delivery. Potential future HALO customer applications include the following:

- Intelligence, surveillance, and reconnaissance
- Environmental surveying
- Search and rescue
- Police and law enforcement
- Embedded sensing
- Homeland security
- Border patrol
- Perimeter security

CRG's ability to tailor the HALO platform gives its customers the flexibility to customize vehicles for their specific applications and payload requirements.

Company Impact

This SBIR project helped to advance CRG's expertise in the unmanned vehicle technology area. HALO is the first aeronautical system to be sold commercially by CRG. Current efforts include the integration of an autonomous flight control system, and future developments include obstacle avoidance capabilities, video processing, speech control, and wireless recharging.

CRG conducts research and development, from molecule to manufacturing, in an array of markets. The company's core competencies are systems design, non-metallic materials, and manufacturing process development.



SBIR/STTR

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