Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF05-164

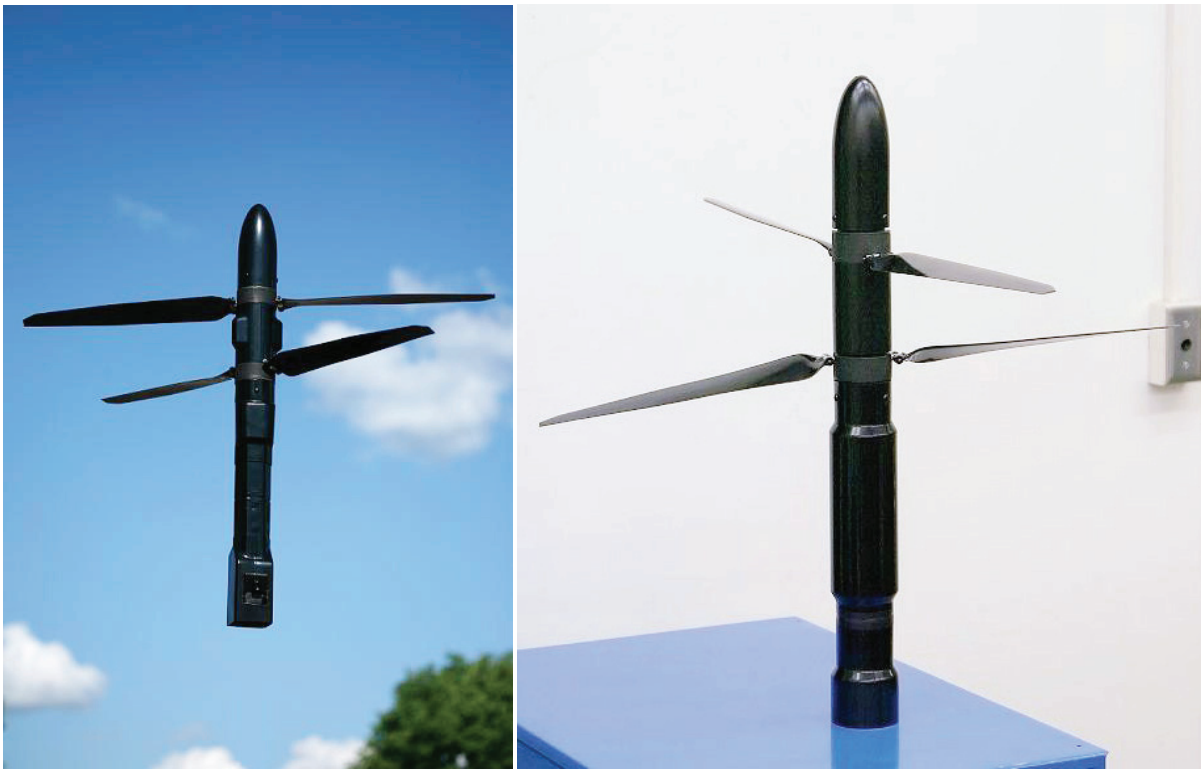
SBIR Title:
Micro Air Deployed Munition for Cluttered Urban Environment

Contract Number:
FA8651-06-C-0114

SBIR Company Name:
Lite Machines Corporation, West Lafayette, IN

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

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Voyeur unmanned aerial vehicle proof-of-concept platform

Micro Air Platform for Bomb Impact Assessment

- The Air Force needs enabling technologies to develop and design a micro air platform for Bomb Impact Assessment (BIA) and reconnaissance in a cluttered urban environment
- Lite Machines Corporation developed the electric powered Voyeur unmanned aerial vehicle (UAV) for BIA use
- Voyeur's coaxial rotor system allows the UAV to hover and maneuver in the same way as a helicopter
- The system is designed to be an expendable asset, and its low price allows for cost effective utilization

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Air Force Requirement

The Air Force needs enabling technologies to develop and design a micro air platform for Bomb Impact Assessment (BIA) and reconnaissance in a cluttered urban environment.

The Air Force is continually seeking methods to improve the accuracy of air strikes. Strikes made with surgical precision have become the expectation and the norm to reduce collateral damage and loss of life among non-combatants. Warfare within a city, however, is a difficult business not only because of the abundance of man-made obstacles, but because the effects of strikes are difficult to measure. This difficulty arises because strike zones are typically controlled by hostile forces and are not available for close examination.

SBIR Technology

A small, unobtrusive unmanned aerial vehicle (UAV) capable of transporting sensors such as a video camera to the impact site would greatly assist in determining the efficacy of the strike without exposing the operator to danger. UAVs have two main advantages over manned aircraft: they are more cost-effective and they minimize the risk to a pilot's life.

To provide effective reconnaissance within urban areas however, a UAV must be able to operate in confined spaces and tolerate air turbulence characteristic of windy cities and blast zones. To be practical, it should be stored in a folded configuration in a tube or other suitable container onboard an existing munitions platform until needed and deployed at the same time as a strike munition. It should also be able to loiter in the target area for some time afterward to monitor the strike results (with video, chemical and/or other sensors).

Under this SBIR project, Lite Machines Corporation developed the electric powered Voyeur UAV for use in the Air Force's BIA program. Voyeur has a cylindrical body with a counter-rotating, coaxial, rotor system located at the front (or top) end. A booster module having auxiliary wings can be provided at the back (or bottom) end for high-speed flight and extended range. The coaxial rotor system allows Voyeur to hover and maneuver in the same way as a helicopter. The auxiliary wings help lift the booster module when Voyeur flies forward horizontally at high speed.

When configured for hovering flight, Voyeur flies in a nearly vertical orientation. A lower payload module holds sensors including, for instance, infrared or visible-light charge-coupled device (CCD) video cameras, a telemetry system for transmitting digital data back to a command center, and possibly a warhead to disable persons or light vehicles. With several forms of active stabilization and high-velocity rotor blades to combat wind gusts, Voyeur provides a stable platform for video imaging in confined urban areas.

Potential Air Force Application

The Voyeur UAV is intended to be used by the Air Force as a tool for real time BIA. The system is designed to be an expendable asset, and its low price allows for cost effective utilization.

Low-cost, real time BIA would ultimately reduce costs associated with airstrikes, as it would curtail the need for restrikes that may have later proved unnecessary. Further, it would protect more expensive manned assets and troops from hostile fire near bomb impact sites.

Company Impact

This SBIR contract opened the door to Lite Machines Corporation to develop its business potential in the defense marketplace. Building on its years of experience in making top-of-the-line micro sized radio-controlled model helicopters, the Voyeur effort offered an opportunity for the company to broaden the company's R&D expertise.

The Voyeur proof-of-concept platform has undergone extensive testing and analysis, and has engendered detailed specifications for the next version of the platform that will be used for the Air Force's bomb damage information program.

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Air Force SBIR Program
AFRL/XP
1864 4th Street
Wright-Patterson AFB OH 45433

AF SBIR/STTR Program Manager: Augustine Vu
Website: www.sbirsttrmall.com
Comm: (800) 222-0336
Fax: (937) 255-2219
e-mail: afrl.xppn.dl.sbir.hq@wpafb.af.mil

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