

Innovation

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Ordnance Research

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SBIR Company Name:
Mustang Technology
Group, L.P., Allen, TX

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.



Precision height of burst (HOB) in an urban environment: from concept (left) to reality (right).

Urban Fuze Air-to-Surface Technology

- Fuze requirements have evolved to the point of demanding precision programmable height of burst (HOB) capability over terrain obscured by combinations of foliage, structures, changes in ground contour, battlefield obscurants, and electromagnetic interference
- Urban FAST has a defense market application in providing precise HOB accuracy in urban environments and thereby increasing lethality and reducing collateral damage
- Mustang's Fuze Air-to-Surface Technology (FAST) offers many key system benefits, including programmable height of burst; ground profiling, even with heavy foliage; HOB, near surface burst, and penetrator operating modes; affordable design based on low cost commercial off-the-shelf (COTS) components; and nose mount and tail mount configurations that meet production cost goals
- A commercial non-defense application exists in using the system as a low-cost altimeter to aid unplanned landings in urban environments

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Air Force Requirement

Fuze requirements have evolved to the point of demanding programmable height of burst (HOB) capability over terrain obscured by combinations of foliage, structures, changes in ground contour, battlefield obscurants, and electromagnetic interference. Twentieth Century fuze sensor technology cannot reliably discriminate between the ground and buildings or other discrete structures in the scene. Hence, the Air Force needs an affordable next-generation HOB fuze sensor.

SBIR Technology

Mustang Technology Group, L.P., successfully demonstrated a new type of proximity sensor technology. This Fuze Air-to-Surface Technology (FAST) offers many key system benefits, including programmable height of burst; ground profiling, even with heavy foliage; HOB, near surface burst, and penetrator operating modes; affordable design based on low cost commercial off-the-shelf (COTS) components; and nose mount and tail mount configurations that meet production cost goals.

Mustang developed algorithm upgrades to maintain FAST's HOB performance even in urban canyon environments. These upgrades were implemented with only a software change, which leaves intact FAST's other features, such as the following: low cost; wide bandwidth; active radio frequency (RF) proximity sensor capable of providing accurate, selectable HOB in the presence of foliage, weather and battlefield obscurants; and support for near surface burst and penetrator operational modes.

Mustang's integrated simulation test approach combines the development of a high-fidelity simulation with a series of parallel progressive test activities. The test activities included local captive flight tests (CFTs), local instrumented parachute drop tests (with Urban FAST activated parachute release), and local free-fall drop tests.

Additionally, successful testing was completed at Eglin Air Force Base using the Urban FAST sensor and the Mk-80 Series Joint Direct Attack Munitions (JDAM) against a simulated urban environment. Urban FAST has clearly demonstrated the capability to provide reliable and consistent HOB performance in this environment.

Potential Application

Urban FAST has a high-value traditional defense application. The primary commercialization opportunity for Urban FAST in the defense market is to provide precise HOB accuracy in urban environments and thereby reduce collateral damage. Urban FAST is a software modification of the baseline FAST system that was demonstrated to be at a high technology readiness level (TRL) during the execution of the FAST Advanced Development (Budget Activity 6.3) program.



Mustang's Urban Test Range: HOB radar used to deploy equipment saving parachutes after flight.

A commercial non-defense application exists in using the Urban FAST system as a low-cost altimeter to aid unplanned landings in urban environments. In addition to operating as an altimeter, which estimates the height directly beneath the aircraft, the Urban FAST system will estimate the profile of the ground in front of the aircraft, directly along its velocity vector.

Company Impact

"This SBIR project has been a springboard for several following efforts which include Mustang's work on Mini-FAST, a miniaturized version of FAST for smaller munitions and a Phase III effort to integrate and demonstrate a FAST HOB sensor with a laser seeker on a low-collateral damage selectable effects weapon system," states Keith Goolsbee, Mustang's program manager. "Mustang has demonstrated the clear advantages of precision selectable HOB in difficult environments and we are maturing the technology to get this advanced capability into the hands of the warfighter."

Mustang Technology Group, L.P., is a defense systems company with expertise in radar, radio frequency (RF) sensors, aircraft and missile integrated systems, guidance and control systems, active protection systems, algorithms, simulation, software, and signal and image processing.



SBIR/STTR

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