

NASA SBIR/STTR Technologies

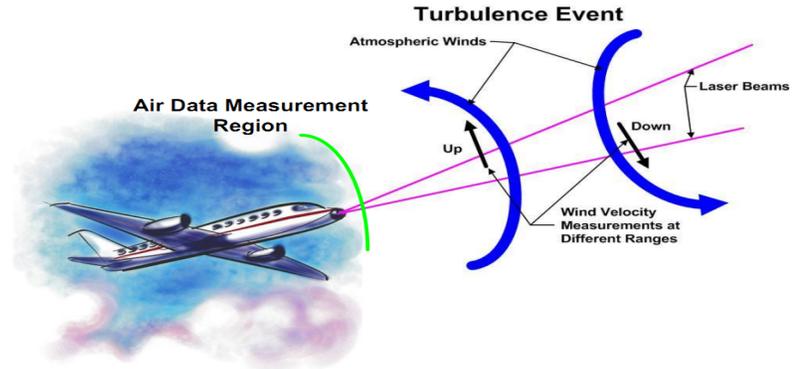
A1.04-9528 - Multifunction Lidar for Air Data and Kinetic Air Hazard Measurement



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Identification and Significance of Innovation

The significance of this proposed work is the capability to provide a single sensor that has multiple use functionality including air data measurement, turbulence and wind hazard detection and ride comfort enhancement, all in a lightweight, low cost lidar. Conventional air data systems provide critical information to the aircraft for safe flight. However, there are vulnerabilities to the conventional Pitot-static systems, as evidenced by the recent Air France catastrophe. A more robust air data system for flight controls on aircraft is needed, particularly to measure airspeed in icing and hazardous weather conditions. The proposed lidar system also measures airspeed ahead of the aircraft in order to measure kinetic wind hazards such as turbulence and wind shear. Range-resolved wind measurements provided by the lidar hardware can be used to enhance aircraft ride stability, improving passenger comfort and reducing stresses on the airframe.



Estimated TRL at beginning and end of contract: (Begin: 3 End: 5)

Technical Objectives and Work Plan

The Technical Objectives of this proposed project include: to design, assemble and test a multifunction lidar capable of providing atmospheric measurement of temperature, pressure and velocity, and the 3D wind fields ahead of the aircraft; to complete a Proof-of-Capability test to demonstrate lidar air data measurement capabilities in a controlled environment; and to perform Proof-of-Functionality testing of a multifunction lidar from a flight test platform.

The Work Plan consists of the following tasks:

- Task 1: Finalize the Phase II prototype multifunction lidar design.
- Task 2: Assemble, laboratory test and calibrate the prototype lidar.
- Task 3: Proof-of-Capability lab testing.
- Task 4: Algorithm development for velocity retrievals.
- Task 5: Phase II prototype flight packaging.
- Task 6: TRL 5 multifunction lidar prototype flight demonstration.
- Task 7: Final report and data analysis.

NASA Applications

Airspace transformation to NextGen may be significantly safer by providing additional information for supplemental air data measurement and kinetic air hazard detection. NASA has pioneered many innovations and improvements for wind hazard detection, warning and forecasting (TPAWS, AWIN). This innovation provides wind hazard measurement resulting in real-time information for air traffic operations and a redundant air data capability for increased, in-flight safety.

Non-NASA Applications

The markets addressed by this multifunction sensor development are the unmanned and manned military and commercial aircraft markets. This sensor may also be used by the regional jet market and by the Air Force for new aircraft flight testing and calibration.

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NON-PROPRIETARY DATA