

# NASA SBIR/STTR Technologies



## Multifunction Lidar for Air Data and Air Hazard Measurement

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### Identification and Significance of Innovation

- A single sensor that has dual use functionality – air data measurement and air hazard detection in a single, lightweight, low cost laser radar (lidar)
- Provide more robust air data measurements to commercial aircraft addressing current vulnerabilities of Pitot-tube (i.e. Air France accident)
- Enhance transportation safety and efficiency
- Increase safety with detection of kinetic air hazards prior to flight encounter
- Increase efficiency with early alert of potential weather delays and air hazard information
- Automatic sensor reports could augment the NASA Aviation Weather Information Network

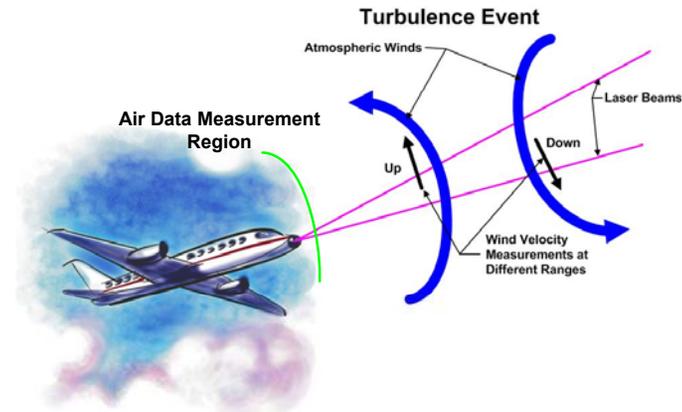
**Estimated TRL:** TRL 2 at contract initiation; TRL 3 at contract completion

### Technical Objectives

- Complete a thorough requirements analysis for the multifunction lidar in conjunction with commercial aircraft manufacturers such as The Boeing Company.
- Determine optimal lidar system design capable of range-resolved, long range air hazard detection and dual-use, shorter range air data for enhanced aviation safety.
- Design and evaluate the performance of the Phase II prototype sensor concept.
- Establish a Phase II program test plan, enabling demonstration of the Phase II prototype under desired operational conditions.

### Work Plan

- Task 1: Complete a thorough requirements analysis for the multifunction lidar.
- Task 2: Determine the optimal system design to achieve dual-use sensor performance through Trade Study analyses of incoherent lidar sensor designs.
- Task 3: Design a preliminary laser radar sensor for a Phase II demonstration.
- Task 4: Estimate the Phase II sensor performance using a lidar signal and noise model.
- Task 5: Establish a Phase II program test plan, enabling the Phase II prototype to be demonstrated under the desired operational conditions.
- Task 6: Present a final report of these research efforts summarizing all research performed.



### NASA and Non-NASA Applications

#### NASA Applications:

- Enabling technology for increased aviation safety – more robust air data system and detection of kinetic air hazards
- Ability to integrate lidar sensor onto commercial aircraft – reasonable size, weight and power consumption
- Enabling sensor for airspace transformation to NextGen
- Complement to TPAWS system
- Enhance NASA AWINS system

#### Non-NASA Applications:

- Validation of multifunction lidar for commercial aircraft use as air hazard detection and as a redundant air data system
- Validation of optical air data system for use by regional aircraft manufacturers for new vehicle calibration

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**NON-PROPRIETARY DATA**