

Topic: N142-101

FIRST RF Corporation

Atmospheric Ice Detection and Avoidance System for Fixed and Rotary Wing Aircraft

The Integrated System for Avoidance of Ice-producing Airborne Hazards (ISAIAH) is a low-SWaP, passive, aircraft ice detection system. FIRST RF is a technologies company specializing in antennas and radio frequency (RF) systems. FIRST RF's partner, Radiometrics, manufactures radiometric weather profiling systems. ISAIAH enables detection and avoidance of airborne icing hazards, reducing aircraft loss risk – thereby increasing the probability of mission success. FIRST RF's partner Radiometrics Corporation has world-exclusive capability in supercooled liquid water (SLW) detection. FIRST RF and Radiometrics will transition this capability to airborne platforms. Upward-looking and horizontal SLW detection has been demonstrated in Phase I. Airborne SLW detection is about to be demonstrated in Phase II. FIRST RF seeks an air-platform partner for the integration of the ISAIAH system onto airborne systems.

Technology Category Alignment:

RF Components for sensing, transmission and communication

Fixed Wing Vehicles (includes UAS)

Rotary Wing Vehicles

Fixed Wing Vehicles (includes UAS)

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SYSCOM: NAVAIR

Contract: N68335-16-C-0092

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-16-C-0092

Department of the Navy SBIR/STTR Transition Program

Distribution Statement A: Approved for public release, distribution is unlimited.

NAVAIR 2016-749

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Atmospheric Ice Detection and Avoidance System for Fixed and Rotary Wing Aircraft

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WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-266

Transition Target: Fire Scout C, Triton

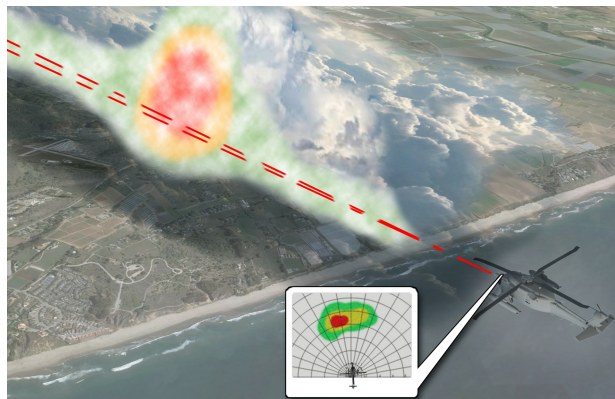
TPOC:

(301)757-1116

Other transition opportunities:

The Integrated System for Avoidance of Ice-Producing Airborne Hazards (ISAIHA) System can provide game-changing, realtime icing hazard detection to all airborne platforms where inflight icing is a problem.

Notes: Low system SWaP enables potential integration on UAS Groups 3 and above.



Artist's conception of the ISAIHA system mounted on a tactical aircraft providing real-time, 3D icing hazard situational awareness. Copyright 2016 FIRST RF Corporation.

WHAT

Operational Need and Improvement: Current ice detection systems can only detect ice accumulation on the aircraft itself, and/or detect temperature conditions that may result in potential icing—they do not have the ability to analyze the water composition at a safe stand-off distance from the aircraft, thus preventing the ice build-up in the first place.

FIRST RF's Ice Detection/Avoidance system is capable of detecting and distinguishing between ordinary cloud droplets (that can cause only rime icing) and drizzle droplets, which cause dangerous clear icing, along the aircraft route of flight up to 20 miles ahead of the aircraft, allowing sufficient time to maneuver to avoid potential icing conditions.

Specifications Required: Power Consumption: Less than 100 Watts. System Weight: Less than 15 lbs. – including antennas.

Size: Antenna – Flush mounted, less than 12 inches in diameter. Avionics – Less than 120 cubic inches.

Operating Environment Capability: Capable of sustained operations at 120 degrees Fahrenheit without external air cooling.

Ice Detection Capability: Up to 20 nautical mile range with bearing information.

Technology Developed: Aided by a high gain, broadband antenna system, a passive microwave radiometer detects potential icing hazards and provides the range, bearing, density, temperature, and phase state (solid, liquid, or gas) of water in the atmosphere up to a distance of 20 nautical miles.

Warfighter Value: ISAIHA's 3D, real-time detection of icing hazards from a safe distance increases the ability to conduct inclement weather operations and allows time to initiate action to maneuver away from the hazard - greatly increasing the probability of mission success while reducing the risk of aircraft loss. The system's low SWaP-C characteristics make it ideally suited for integration on fixed and rotary wing aircraft - manned or unmanned – and when installed, will contribute greatly to total-force effectiveness.

WHEN

Contract Number: N68335-16-C-0092 **Ending on:** October 1, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Ground Based Icing Hazard Detection	Low	Confirmed Detection of airborne supercooled liquid water (SLW) from ground-based measurements	3	December 2014
Airborne Icing Hazard Detection	Med	Confirmed Detection of airborne supercooled liquid water (SLW) from airborne measurements	5	November 2016
Low-SWaP Prototype Demonstration	Med	Confirmed Detection of airborne supercooled liquid water (SLW) with a low-SWaP instrument suitable for integration onto target platform	6	November 2017

HOW

Projected Business Model: FIRST RF will produce the ISAIHA system using licensed analysis technology from Radiometrics Corporation. FIRST RF will work with Northrup Grumman and other airframe platform integrators and prime contractors, for integration and maintenance of the ISAIHA Icing Hazard Detection System.

Company Objectives: FIRST RF's and Radiometrics' intention is to develop and transition a low cost high performance ice detection system for manned and unmanned aircraft systems. FIRST RF and Radiometrics are production companies with significant heritage in building cost-effective, reliable systems for government customers. We are excited to attend the Navy FST as an opportunity to showcase the ISAIHA's capabilities to new partners and customers within the US Navy ecosystem.

Potential Commercial Applications: The ISAIHA system's capabilities for remote detection (and consequent evasion) of airborne icing hazards will have a dramatic impact on military, commercial, and private aviation. The ability to detect and avoid airborne icing hazards will dramatically increase the usability of all types of aircraft in environments where there is a potential for icing. Additionally, emerging commercial and personal small UAV have even greater vulnerability to icing than do traditional aircraft. The ISAIHA system will be of great benefit to these future industries.

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