

Handheld Electronics EHM Sensor Probe for Determination of Remaining Useful Life, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

National Aeronautical and Space Administration's (NASA) Aviation Safety Program "seeks capabilities furthering the practice of proactive safety management." One area of particular interest is the prognostication of Remaining Useful Life (RUL) of avionic systems. In response, Nokomis is proposing to develop an Electronic Health Monitoring (EHM) Sensor Unit which would be able provide accurate estimates of the RUL of avionic systems. This sensor module would identify changes in the unintended Radio Frequency (RF) emissions of various flight-system electronic components to determine the current health state and predict the future reliability of the scanned system. Designed as a handheld unit which would allow for system scans of components while installed in the aircraft, the EHM Sensor Unit would be capable of scanning and returning real-time RUL prediction results. This real-time capability would allow for frequent maintenance monitoring, including during the brief turnaround periods experienced at the gate. This technology would allow NASA, as well as flight-system and aviation maintenance providers, to better monitor the electronic health of these critical avionic components, as well as better predict their future lifespan, allowing for systems to be repaired or replaced prior to an unanticipated failure.



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ANTICIPATED BENEFITS

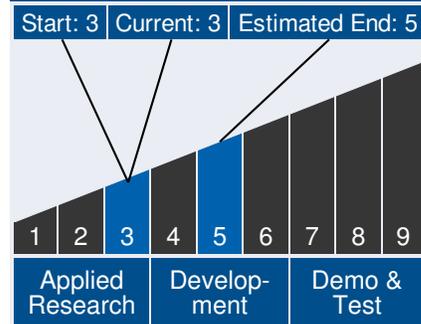
To NASA funded missions:

Potential NASA Commercial Applications: The intended application is to augment the Aviation Safety Program's (AvSP) ability to improve upon overall aviation safety throughout the industry. These sensor systems would meet the AvSP goal of seeking capabilities furthering the practice of proactive safety management. This technology would provide the AvSP with a powerful useful tool for the determination of Electronic Health and prediction of Remaining Useful Life of avionics. Additional applications within NASA extend to the Integrated Vehicle Health

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Technology Maturity



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Management (IVHM) and Exploration Systems Mission Directorate (ESMD). Both the IVHM and ESMD applications for this technology would extend to the monitoring of Electronic Health of systems in both manned and unmanned space vehicles. For unmanned vehicles, the proposed technology can be adapted as an integrated sensor, while manned vehicles could support both an integrated and the handheld systems.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Other potential applications outside of NASA and the aviation industry include any industry where premature detection of potential electronic failure would be of benefit. Specifically, high-reliability industries, such as the defense, space, medical, and automotive electronics industries would be able to immediately apply this technology. Defense applications extend to the periodic monitoring of long-term storage weapon systems, as well as maintenance monitoring of avionic systems. For medical applications, monitoring of the electronic health of implantable electronics would be possible with this technology. Commercial Space and automotive applications would be similar to those of the general aviation industry, allowing for monitoring and maintenance of key electronic systems prior to complete failure.

Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Principal Investigator:

- William Davis

Technology Areas

Primary Technology Area:

Space Power and Energy Storage (TA 3)

- └ Power Management and Distribution (TA 3.3)
 - └ Fault Detection, Isolation, and Recovery (TA 3.3.1)
 - └ Remaining Useful Life Prediction After Fault Detection (TA 3.3.1.2)

Secondary Technology Area:

Modeling, Simulation, Information Technology and Processing (TA 11)

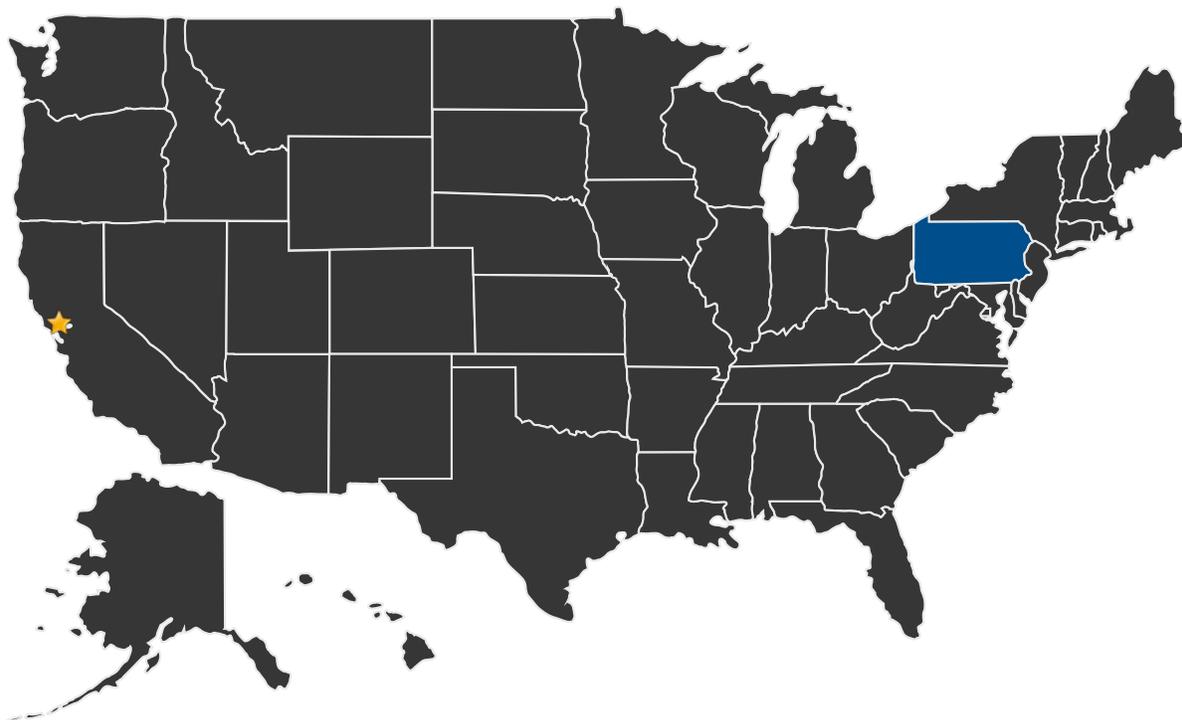
- └ Modeling (TA 11.2)
 - └ Analysis Tools for Mission Design (TA 11.2.6)

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U.S. WORK LOCATIONS AND KEY PARTNERS



- U.S. States With Work ★ **Lead Center:**
Ames Research Center

Other Organizations Performing Work:

- Nokomis, Inc. (Charleroi, PA)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/18069>)

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DETAILS FOR TECHNOLOGY 1

Technology Title

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