

A Low-Cost, Multi-Functional Sensor Network System for Intelligent Vehicle Health Assessments, Phase I Project

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



ABSTRACT

NASA is seeking innovative, multifunctional and lightweight approach to integrate long-duration structural health monitoring (SHM) capabilities for space habitat long-duration mission concepts. The enabling sensing technology and integration approach should not compromise the load-carrying capability or other structural design requirement. Sensing capabilities by fusing multiple sensors to predict and locate critical damage areas and probable failure zones are highly demanded. To address this critical need, X-wave Innovations, Inc. (XII) proposes to develop a low-cost, multi-functional sensor network system (MFSNS) for intelligent monitoring of critical aero- and space vehicle structures. For the Phase I program, we will prototype a MFSNS system and demonstrate the feasibility of the proposed technique for precursor/damage detection and long-duration structural health monitoring. For the Phase II program, XII will focus on refining the prototype system design and development with improved hardware and software. For the Phase III program, XII will focus on optimizing the MFSNS performance and packing the MFSNS technology into a turnkey commercially-available system.

ANTICIPATED BENEFITS

To NASA funded missions:

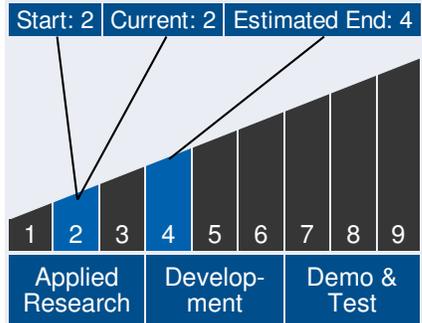
Potential NASA Commercial Applications: Structural health monitoring for critical aircraft structures posts significant challenge and interest to most military and commercial applications. We anticipate that by the end of our Phase II effort we should have developed a working prototype of the proposed MFSNS technology for damage and precursor characterization in complex aircraft structures. This NDE/SHM technology should have many applications in NASA, other government agency and industries. For NASA, this technology is especially critical to protect the platforms' and crews' safety.



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

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To the commercial space industry:

Potential Non-NASA Commercial Applications: For military applications, the enabling technology will increase an aircraft's readiness and allow the cost-saving Condition Based Maintenance (CBM) of aircrafts, ships, ground vehicles and infrastructures to be implemented. In commercial sectors, this advanced SHM technology will benefit the maintenance decision for air and space vehicles, civil structures and power plants. This new NDE/SHM technology could significantly extend an aircraft's service life, reduce maintenance costs, and protect the safety of critical assets.

Management Team (cont.)

Principal Investigator:

- Dan Xiang

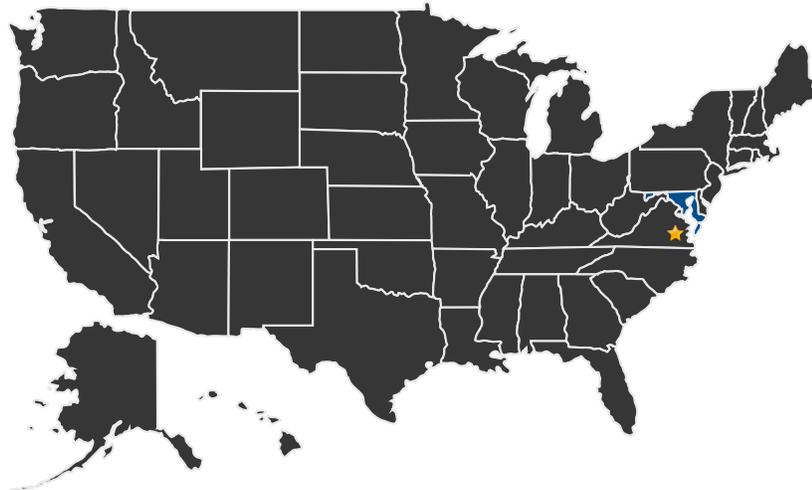
Technology Areas

Primary Technology Area:

Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

- └ Structures (TA 12.2)
 - └ Reliability and Sustainment (TA 12.2.3)

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ Lead Center:
Langley Research Center

Other Organizations Performing Work:

- X-wave Innovations, Inc. (Gaithersburg, MD)

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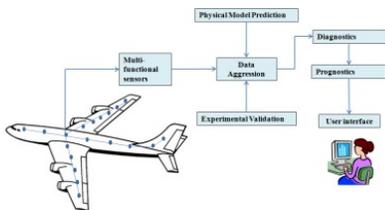


PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23168>)

IMAGE GALLERY



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DETAILS FOR TECHNOLOGY 1

Technology Title

A Low-Cost, Multi-Functional Sensor Network System for Intelligent Vehicle Health Assessments, Phase I

Potential Applications

Structural health monitoring for critical aircraft structures posts significant challenge and interest to most military and commercial applications. We anticipate that by the end of our Phase II effort we should have developed a working prototype of the proposed MFSNS technology for damage and precursor characterization in complex aircraft structures. This NDE/SHM technology should have many applications in NASA, other government agency and industries. For NASA, this technology is especially critical to protect the platforms' and crews' safety.