Algorithms for Structural Dynamics Based Fiber Optic Strain Gage Health Monitoring, Phase I Project

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

ABSTRACT

San Diego Composites Inc. (SDC) will develop techniques for the reduction and analysis of fiber optic data with a focus on developing associations between frequency domain behavior and structure aging and damage. The algorithms would relate changes in frequency domain behavior to changes in material energy interaction due to quantified material property change. The algorithms will also be coupled with visualization techniques which can help show changes in structural behavior compared to the baseline. In addition, the proposed algorithms would couple with fiber optic strain gage research that SDC is performing on other SBIR programs with a focus on the development of an integrated fiber optic SHM system. SDC believes that maintaining a focus on the full-scale system helps to better shape and direct the work on each component part of the system.

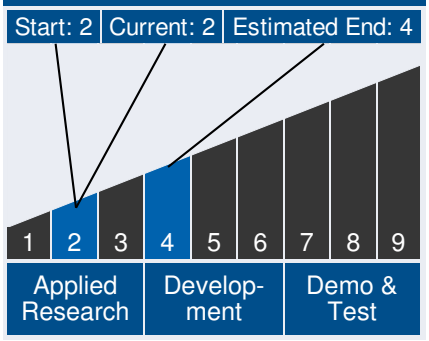
ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: SDC has developed this proposal to closely align with NASA's future mission roadmap, and to be an enabling technology for additional missions. SDC has specifically targeted the Asteroid Redirect Mission (ARM), a mission where NASA aims to redirect a near-earth asteroid into a stable orbit around the moon by removing a mass from the asteroid, as the selected technology insertion point based on NASA's developmental timeline for the mission. There are a number of critical structures associated with the ARM spacecraft and its mission objectives, including the lifting hardware, solar array support structures, and COPVs. SDC is also aware of NASA's interest in the integration of FOSGs with composite overwrapped pressure vessels (COPVs). SDC has a number of contracts geared toward COPV development, and has been working toward FOSG integration through these contracts. SDC believes that the combination of technologies developed

Table of Contents

Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

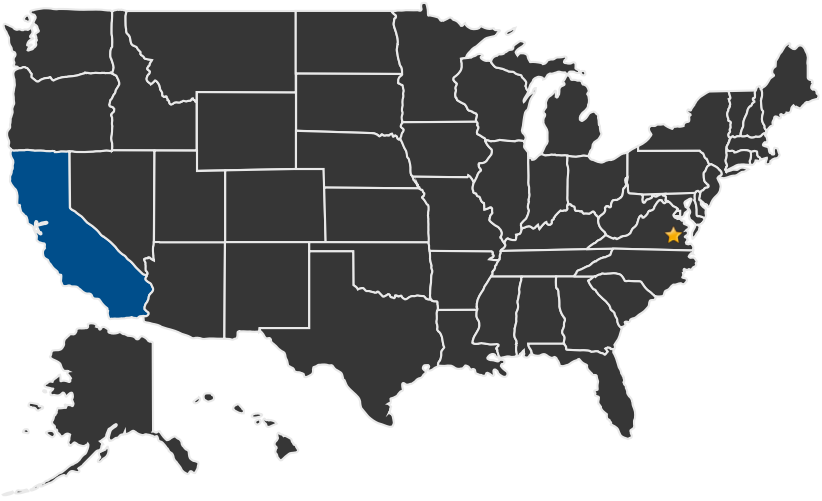
Algorithms for Structural Dynamics Based Fiber Optic Strain Gage Health Monitoring, Phase I Project

through the COPV contracts with the proposed algorithm development effort could yield NASA an integrated FOSG for COPV monitoring.

To the commercial space industry:

Potential Non-NASA Commercial Applications: In addition to the listed NASA applications, this technology could be used on any structure or vehicle of interest. Any aircraft, especially those with a focus on composite structures, such as the 787, could benefit from this technology.

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Langley Research Center

Other Organizations Performing Work:

- San Diego Composites, Inc. (San Diego, CA)

PROJECT LIBRARY

Management Team *(cont.)*

Principal Investigator:

- Jeremy Senne

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23523)

IMAGE GALLERY

Algorithms for Structural Dynamics Based Fiber Optic Strain Gage Health Monitoring, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

Algorithms for Structural Dynamics Based Fiber Optic Strain Gage Health Monitoring, Phase I

Potential Applications

SDC has developed this proposal to closely align with NASA's future mission roadmap, and to be an enabling technology for additional missions. SDC has specifically targeted the Asteroid Redirect Mission (ARM), a mission where NASA aims to redirect a near-earth asteroid into a stable orbit around the moon by removing a mass from the asteroid, as the selected technology insertion point based on NASA's developmental timeline for the mission. There are a number of critical structures associated with the ARM spacecraft and its mission objectives, including the lifting hardware, solar array support structures, and COPVs. SDC is also aware of NASA's interest in the integration of FOSGs with composite overwrapped pressure vessels (COPVs). SDC has a number of contracts geared toward COPV development, and has been working toward FOSG integration through these contracts. SDC believes that the combination of technologies developed through the COPV contracts with the proposed algorithm development effort could yield NASA an integrated FOSG for COPV monitoring.