

NAVY Transition Assistance Program

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NEED & CUSTOMER REQUIREMENT

Need: The Navy has a need for a multi-channel, distributed fiber optic (FO) acoustic emissions (AE) monitoring system for the detection of impact damage and cracks in advanced structural components. Systems using fiber optic Bragg gratings allowing all sensors to be interrogated using a single light source beam, eliminating the need for electromagnetic interference (EMI) shielding.

Value to the Warfighter: A real time AE monitoring system will lead to increased reliability of the Navy's critical infrastructures found in ships, submarines, aircraft, and weapon systems. An in-situ AE monitoring system will lower periodic inspection costs, increase system reliability and performance, and free up personnel and critical funds for other military purposes.

Operational Gap: The Navy conducts routine periodic inspections of key platforms to ensure the lack of cracks and stress corrosion in key structural components, resulting in a costly, elaborate, and time consuming efforts, achieved only through a considerable drain of man power hours. Current AE systems require large, bulky sensors with wire leads and amplifiers that require shielding to reduce EMI. This creates intrusive, heavy, EMI susceptible systems, with numerous potential failure points.

Customer Specifications: The sensor system should be capable of detecting AE events from growing cracks even in the presence of a quasi-static background strain field (produced by quasi-static loads and/or a background temperature field). The system should have a small footprint, be able to operate unattended and should be able to triangulate the location of cracks or the impact location.

Technology Description: The FAESense system is a multi-channel, fully integrated, dynamically reconfigurable, adaptive fiber optic AE sensor system suitable for the in-situ unattended detection and localization of shock events, impact damage, cracks, voids, and delaminations in new and aging DoD critical infrastructures found in ships, submarines, aircraft, and in next generation weapon systems.

TECHNOLOGY DEVELOPMENT MILESTONES (SBIR/STTR)

Milestone	TRL	Risk	Measure of Success	TRL Date
Phase I - Final Demonstration	3	High	Demonstration of TWMI PIC Microchip	10/31/09
Phase I Option	3	High	Modeling Design of Phase II TWMI PIC Microchip	05/31/10
Phase II - Final Demonstration	5	High	Demonstrate Multichannel FAESense System for Crack Detection	10/28/11
Phase II - Option I Milestone - De	6	Moderate	Deliver fully integrated FAESense system	04/30/12
Phase II - Option II Milestone	7	Moderate	Install and Qualify FAESense system on Navy platform	10/30/13

Open contract: N00114-10-C-0327 ending 04/25/12

N091-077 - Redondo Optics, Inc.

Adaptive Fiber Optic Acoustic Emission Sensor (FAESense) System for Condition Based Maintenance

SPONSORSHIP of original SBIR/STTR Topic

SYSCOM: ONR - SBIR

Transition Target: TBD

Original Sponsoring Program: NAVSEA, NAVAIR

TPOC Phone Number: 703-696-0688



TECHNOLOGY TRANSITION OPPORTUNITIES (PHASE III)

Other Potential Applications: The FAESense system will find use in the Navy's structural health monitoring (SHM), condition based maintenance (CBM), and/or integrated system health management (ISHM) of critical infrastructures in destroyers, cruisers, amphibious ships, submarines, aircraft, and weapon systems. Examples of groups that could benefit from the FAESense technology include any sea, air, or ground platform, fixed wing aircraft and rotorcraft such as: PMS 312 - Aircraft Carrier Programs, and NAVSEA 07W Hull, mechanical and electrical engineering programs, PMA 280 Tactical Missiles, PMA 209 Air Combat Electronics, rotorcrafts utilizing Health and Usage Monitoring/Management Systems (HUMS) such as the CH-53E Super Stallion under PMA 261 and the V-22 Osprey under PMA 275.

Business Model: The strategy for commercialization of the FAESense technology is: 1) establish strategic alliances with prime contractor manufacturing partners, 2) technology transfer to the Department of Defense (DoD) approved manufacturers and prime contractors, and 3) venture investment partnerships for the manufacturing and sales of FAESense systems.

Objective: We are seeking to further establish relationships with DoD personnel in advanced structural health monitoring and prognostics programs and to establish strategic alliances with prime contractors such as Raytheon, Northrop Grumman, Boeing, BAE Systems, and Lockheed-Martin.

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