

Topic: N141-070

VIP Sensors

Multimode Distributed Optical Sensor for Target Detection Classification and Tracking

VIP Sensors Inc. has developed a Multimode Optical Sensor that can be integrated into a single node of the Autonomous Undersea Weapon System for target detection, classification, localization and tracking. The sensor can be packaged as an optical vector sensor, which measures the amplitude and direction of acoustic waves, or as an optical pressure sensor that reads the hydrostatic pressure as well as the dynamic pressure produced by gravity waves. The optical sensor is enclosed in a cylindrical canister with a polyurethane dome containing miniature MOMS (micro-optical-mechanical-systems) Silicon chips, and a printed circuit board with the electronics needed to process the sensor signals and to communicate with the upstream system. We are looking for a DoD sponsor to transfer this novel sensors to the fleet.

Technology Category Alignment:

Preemptive/Proactive Effects

Acoustic, Seismic and Magnetic

Undersea Weapons

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SYSCOM: ONR

Contract: N68335-16-C-0051

Department of the Navy SBIR/STTR Transition Program

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WHO

SYSCOM: ONR

Sponsoring Program: Autonomous Undersea Weapon System (AUWS)

Transition Target: PMS 495 Mine Warfare Program Office,

TPOC:

Dr. Emily Medina
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Other transition opportunities: •

PMA 264 Air Anti-Submarine Warfare Systems Program Office: Next Generation Airborne Passive System (NGAPS)

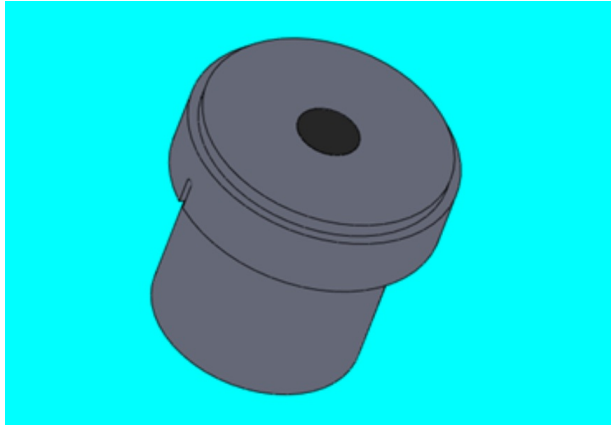
• PMS 485 Maritime Surveillance Systems Program Office: The Shallow Water Surveillance System (SWSS) project

• TB-29X for the PMS 485 Surveillance Towed Array Sensor System (SURTASS)

• PMS 401 Submarine Acoustic Systems Program Office

• PMS 406 Unmanned Maritime Vehicles Program Office Large Displacement Unmanned Undersea Vehicle

Notes: Image Graphic generated by VIP Sensors from drawings provided by U.S. Navy



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WHAT

Operational Need and Improvement: Emerging technologies and the proliferation of threats in the undersea environment, provide adversaries greater opportunities to significantly, and asymmetrically, harm our warfighters, especially in littoral waters. To counter these threats, the Navy desires to develop small, sea floor based low power sensors with in-node processing capabilities to autonomously detect, classify, and localize very quiet target vessels in high ambient noise environments sufficiently to facilitate a fire control solution for autonomous weapons.

Specifications Required: Small Size: 1.95" OD x 1.7"H

Large Dynamic Range: 132dB Pressure measurements from 70 μ PSI to 265PSI

Static Pressure: Sensitivity: 7.55 mV/PSI Resolution: 0.265PSI

Dynamic Pressure: Sensitivity: 7.55 mV/PSI Resolution: 70uPSI

Low power consumption: <4mW

Reduce Cost: micromachining (MOMS) technology provides by far the best potential for high volume low cost manufacturing.

Technology Developed: VIP Sensors has developed a Multimode Optical Sensor that can be integrated into a single node of the Autonomous Undersea Weapon System (AUWS) for target detection, classification, localization and tracking. These sensors may be packaged as self-contained vector sensors (triaxial accelerometer and hydrophone), that measure amplitude and direction of acoustic waves or as a pressure sensor that measure very small dynamic pressures and very large hydrostatic pressures produced by gravity waves. Built-in electronics provides analog voltage outputs.

Warfighter Value: VIP Sensors' Multimode Optical Sensors improve the ability to tactically exploit the environment to autonomously detect, classify, localize and track sea-born vessels in such a way as to facilitate a fire control/targeting solution for autonomous weapon engagements.

WHEN

Contract Number: N68335-16-C-0051 **Ending on:** November 18, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
End of Phase II Base	Med	Build and Test Optical Pressure Sensor	TRL 6	September 2017
End of Phase II Option 1	Med	Build and Test Optical Vector Sensor	TRL6	May 2018
End of Phase II Option 2	High	Build and Test a MultiMode optical Sensor	TRL6	November 2019

HOW

Projected Business Model: VIP Sensors prefers to sell its optical sensors intellectual property to a prime supplier, however VIP Sensors is willing to implement a low rate initial production to proof manufacturing processes and meet transition requirements.

A top assembly and test stations can be set up without major difficulty; the sensor chips are batch (typical 60 sensors/ 6"wafer) fabricated using micromachining technology; and there are multiple suppliers to provide the few additional mechanical and electronic components.

Company Objectives: VIP Sensors short term objective is to capture programs to transition this novel sensor technology to Navy fleet and other applications. To this end we would like to team up with a prime who would be interested to manufacture and market this technology for DoD and commercial applications

Potential Commercial Applications: The proposed Optical Sensors with or without built in signal processing electronics have multiple applications in the test and measurement community inside and outside the NAVY. This enabling new sensor technology has the potential to significantly improve the measurement systems across many industries that use large numbers of sensors, such as aircraft testing, structural testing, structure monitoring, airplane and satellite monitoring and industrial monitoring

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