

Topic: N17A-T015

White River Technologies, Inc.

Development of Explosive Non-Acoustic Sensing on Remotely Operated Vehicles for Littoral Threat Characterization in Complex Seabed Environments

WRT developed an advanced, efficient and integrated technology for detection and characterization of obscured seabed targets. Deployed on inspection-class remotely operated vehicles (ROV), the system integrates high-sensitivity miniaturized-magnetometers (MAG) for standoff target detection and 3D electromagnetics (EM) for target identification. This technology addresses obscured sub-bottom targets in cluttered seabed environments, where acoustics technologies have limited capabilities, and fills mine countermeasures (MCM), unexploded ordnance (UXO) and improvised explosive device (IED) detection performance gaps. The combined MAG and 3D-EM system is tightly integrated on an inspection-class ROV, deployed from multiple vessels, including rigid-hulled inflatable boats (RHIB)s. This provides the warfighter a flexible and low-cost solution to various detection challenges. WRT is a small business with advanced capabilities for integration of advanced miniaturized geophysical sensors and realtime processing on unmanned platform.

Technology Category Alignment:

None

None

None

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SYSCOM: NAVSEA

Contract: N68335-19-C-0049

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0049

Department of the Navy SBIR/STTR Transition Program

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WHO

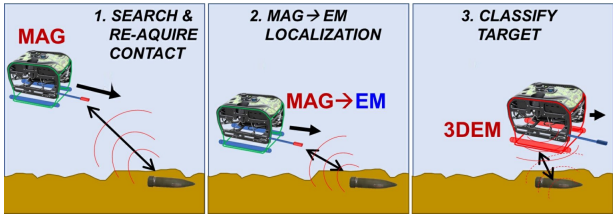
SYSCOM: NAVSEA
Sponsoring Program: PMS 408 Expeditionary Warfare Program Office
Transition Target: Future Navy Expeditionary Unmanned Systems Program of Record

TPOC:
(850)230-7135

Other transition opportunities: Seabed target detection is needed for mine countermeasures (MCM), improvised explosive device (IED), explosive ordnance disposal (EOD) and unexploded ordnance (UXO) applications. Additionally, detection of seabed infrastructures such as pipes, power lines, and telecommunication cables is addressed with White River Technologies' (WRT) MAG/3DEM approach.

Notes: Magnetic (MAG) and 3D Electromagnetic (3D-EM) sensors are integrated on an inspection-class Remotely Operated Vehicle (ROV). These MiniMags detect obscured targets at offset distances, and the 3D-EM sensor classifies targets at closer range.

White River Technologies' (WRT) new MAD and 3D-EM technologies are low size, weight, power, and cost (SWaP-C) and can be configured to enable new mine countermeasures (MCM)) and various other target detection applications. WRT provides a "plug-and-play" interface for various state-of-the-art miniaturized magnetometer and 3D-EM technologies through a universal data interface module.



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WHAT

Operational Need and Improvement: The Navy needs non-acoustic and non-optical sensing methods to detect and characterize littoral environment objects of interest relevant to expeditionary mine warfare and UXO remediation. Current threats require the Navy to adapt to potential hazards from a variety of sources, to include terrorism, and to operate in difficult environments. Objects of interest may be hidden or obscured by seabed features such as vegetation, corals, rocks, biologics, man-made debris, and scouring/burial. Multi-axis/multi-sensor methods deployed from unmanned systems, small inspection-class ROVs, may provide advanced classification and target identification capability to fill these gaps.

Specifications Required: Non-acoustic techniques must significantly improve target detection, localization, and classification, and provide clutter rejection, improved probability of detection/classification (Pd/Pc), and reduced false acceptance rates (FAR) for concealed seabed targets. The human-portable platform must be a suitable size, weight and mechanical design for human launch, recovery, and operate, from small boats. Integration must enable plug-and-play sensors into a portable, inspection class ROV allowing a two-person lift (74 - 88 lbs). The solution must integrate with topside mission planning, monitoring, processing, display and user-supervised control console from the ROV, to limit the topside logistics footprint burden on the space-constrained small boat teams. Power requirements must conform to existing ROV platform specifications, and battery endurance should not decrease by more than 20%.

Technology Developed: WRT has completed Preliminary Design & Feasibility Simulations Assessment Review. The Seabotix LBV was selected for initial integration of MAG and 3D-EM sensors. Mechanical and hydrodynamic designs are complete, and configuration of the miniaturized magnetometer and 3D-EM sensor has been successfully simulated. Data have been collected, processed and exploited for target detection and classification using various sensor configurations. An initial mag "stinger" has been designed, constructed, and tested. Realtime detection and localization procedures have been accomplished using WRT's test gantry. Top-side graphical user interface (GUI) integration has been completed employing industry-standard platforms from GreenSea and SeeByte.

Warfighter Value: The completed system will be small, easy to deploy, and easy to use. It will provide the warfighter with robust capability to detect and classify various threat items in cluttered and obscured environments where acoustics and optics-based technology have severely degraded performance.

WHEN

Contract Number: N68335-19-C-0049

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Kickoff Meeting	N/A	Concurrence with NAVY staff on program plan	N/A	December 2018
Preliminary Design & Feasibility Simulations Assessment Review	Low	Concurrence with NAVY staff	2	June 2019
Laboratory Component testing	Med	Repeatable capability against test targets	3	July 2019
Critical Design Review	Med	Concurrence with NAVY staf	3	August 2019
Initial Testing of full integrated System	Med	Measurable Pd and FAR withing specifications	4/5	October 2019

HOW

Projected Business Model: WRT's business model involves licensing the MAD-UNIT, and preserving 3D-EM manufacturing rights. Prior to licensing, WRT will provide specialized services to mitigate risk and deliver confidence to our target customers. The specific manufacturing license depends on the program, the market, and the primes and subcontractors involved. WRT's team is capable of manufacturing low-rate initial production (LRIP) and can provide critical support to our target customer. At the same time, WRT's manufacturing license-based business model will serve to clearly signal a willingness to partner with a favored manufacturer or vendor at the appropriate time.

Company Objectives: WRT's objective is to license hardware, software, and systems designs to DoD Prime contractors and related subcontractors. These hardware, software and system design products are based on WRT's world-class, innovative, high barrier-to-entry, core technologies in the field of applied magnetics and electromagnetics. By successfully executing a licensing model in the DoD market, WRT maximizes its focus on innovation and technology development and while eliminating the development of redundant skill sets provided by large established companies.

Potential Commercial Applications: Beyond NAVY MCM missions, MAD-UNIT and 3D-EM technologies have numerous commercial applications. The final technology will be a configurable, low-noise, high-performance MAG / 3D-EM payload for various unmanned platforms integrated with positioning systems and ancillary sensors. In-water, terrestrial and in-air implementations will significantly reduce SWaP and enable new deployment tactics. Commercial applications include mineral and oil and gas exploration, pipeline/infrastructure mapping, UXO detection, and many other uses for detection, mapping, and surveillance. As a defense applications expert, WRT focuses on the commercialization of integrated sensor systems on military platforms, while large integration partners may be interested in licensing technology for integration into other defense product solutions. WRT also anticipates US-allied Foreign Military Sales (FMS) supporting MCM missions and expects sales in this arena.

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