

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2021-0461

Topic # AF08-T008

Shallow Water and Surf Zone Minehunting (MAD SWARM)

Physical Sciences Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495 Barracuda Program

Transition Target:

TPOC:

(202)781-1406

Other transition opportunities:

Notes: This image shows one MAD SWARM search member in flight. The on-board sensor processing and control payload is integrated with the PSI InstantEye™ small unmanned aerial system. The magnetic sensor is suspended below the vehicle to reduce magnetic noise interference from the vehicle motors. The payload communicates with other search member vehicles to plan and coordinate a fully-autonomous search of a designated region to map out metallic objects to detect and locate mines.



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WHAT

Operational Need and Improvement: Decrease search time for naval mine-hunting activities in surf and beach zones, while keeping sailors remote from the contested territory. Aids the single sortie detect to engage mission.

Specifications Required: Detect and localize ferrous mine-like objects in very shallow water, surf zone, and beach zone. Deploy from an autonomous surface vessel, perform region search, and recover to launch craft without operator intervention or oversight.

Technology Developed: PSI has developed a magnetic anomaly detection (MAD) payload for use on its InstantEye™ small unmanned aerial system. Onboard search planning and multi-vehicle coordination software allow small teams of vehicles to search a defined region for ferrous objects, in shallow water and buried beneath sand. Real-time signal processing algorithms provide immediate indication of detected objects and allow search vehicles to coordinate and optimize the search and localization process.

Warfighter Value: Autonomous operation of the MAD SWARM capability from an unmanned surface vehicle would provide a safe and efficient stand-off mine search function for challenging surf and beach zone regions.

WHEN

Contract Number: N68335-18-C-0278 **Ending on:** November 30, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Select small, sensitive COTS magnetometer sensor	N/A	Size, weight, power, noise level	3	October 2020
Coordinated multi-vehicle control	N/A	Reliable radio communications, robust control	3	May 2021
Integrate payload and sensor with InstantEye™ UAV	N/A	Stable flight, low magnetic interference	4	June 2021
Single-vehicle autonomous search and mapping	Med	Sensitivity, Detection range	4	September 2021
Multi-vehicle autonomous search and mapping	Med	Sensitivity, Detection range, Team efficiency	5	October 2021

HOW

Projected Business Model: PSI currently manufactures the InstantEye™ unmanned air vehicle and numerous associated payload designs for military customers. The MAD SWARM capability will be introduced to this PSI product line as an additional payload option.

Company Objectives: PSI is seeking advocates and opportunities to fund further formal testing, demonstration, and validation of the MAD SWARM performance and end-user data products, as well as the development of additional capabilities including autonomous launch and recovery, collision avoidance, and host platform command & control integration.

Potential Commercial Applications:

Contact: James Glynn, Vice President, Corporate Initiatives
glynn@psicorp.com (978) 738-8237