Department of the Navy SBIR/STTR Transition Program
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NAVSEA #2022-0337

Topic # N141-053
Compact High Speed Signal Processor
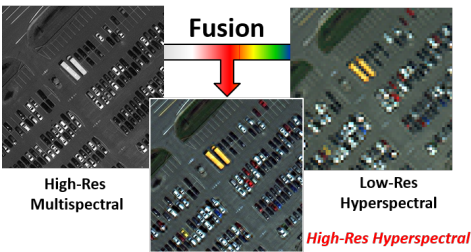Physical Sciences Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495

Transition Target: Coastal Battlefield Reconnaissance and Analysis (COBRA)

Other Transition Opportunities: The COBRA program has been the focus to date. One of our objectives in participating in the STP program is to identify other transition opportunities within the Navy.

Notes: Current program focus is algorithm development and definition of data processing pipeline. Follow-on program to implement on real-time processor. Prior related work: Contract no. W911NF-09-C-0099, High-Throughput Processing for Hyperspectral Imaging Sensors, Period of performance: 9/18/2009-12/18/2011.

Fusion

High-Res Multispectral

Low-Res Hyperspectral

High-Res Hyperspectral

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WHAT

Operational Need and Improvement: Need to detect and localize minefields and obstacles in the surf zone and beach zone prior to amphibious assault. Solution must support operationally-relevant speeds of advance, e.g., reconnaissance from unmanned aerial vehicle (UAV). Optically-based sensors are well-suited for deployment on UAVs but difficult to detect mines with at operationally-relevant false positive rates: High-spatial resolution conventional imagery has insufficient spectral content, Spectral sensors have insufficient spatial resolution. Methods are needed to enhance the effectiveness of optically-based sensing.

Specifications Required: Compatible with integration into sensor pod on MQ-8C Fire Scout UAV. Supports operationally-relevant speed of advance.

Technology Developed: Image fusion and analysis algorithms to support small target detection. Algorithms compatible with implementation on real-time processor.

Warfighter Value: High quality detection maps of mines and minefields. Eliminate post-mission analysis. Support operationally-relevant speed of advance during amphibious landing/assault.

WHEN

Contract Number: N68335-21-C-0302   **Ending on:** Mar 20, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Image fusion algorithms implemented	Low	Create resolution-enhance imagery	4	4th QTR FY21
Fusion of field data to create resolution-enhanced imagery	Medium	Image quality assessment of resolution-enhanced products, compare with ground truth	4	1st QTR FY22
Object detection algorithm implemented	Low	ROC curves	5	4th QTR FY22
Image fusion algorithm and processing chain complete	Medium	Image quality assessment of resolution-enhanced products, compare with ground truth	5	2nd QTR FY23
Integrated image fusion and target detection processing chain complete	Medium	ROC curves	5	2nd QTR FY23

HOW

Projected Business Model: We envision two business development paths: 1) The developed image fusion and target detection algorithms will be licensed to prime contractors for integration into UAV platforms and/or remotely operated vehicles and 2) PSI develops a signal processor incorporating the image fusion and target detection algorithms and sells the processor to prime contractors.

Company Objectives: The image fusion and spatial-spectral target detection capabilities developed in the current program are a specific application, i.e., i.e., detection of mines and minefields in beach and surf zones, of a more general reconnaissance capability. PSI is using the Forum for SBIR/STTR Transition (FST) event to explore new transition opportunities and to assess potential applicability of the image fusion and target detection algorithms in other markets.

Potential Commercial Applications: Primary commercial market is satellite remote sensing, where the market is project to grow >11% per year through 2026 to reach a value $5.25 billion. The envisioned commercial product is software/software plug-in. Our approach to market entry is to engage providers of imagery products. We anticipate that the image fusion capability will need to be integrated with existing imagery exploitation tools, e.g., ENVI, PCI Geomatics.

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