Department of the Navy SBIR/STTR Transition Program

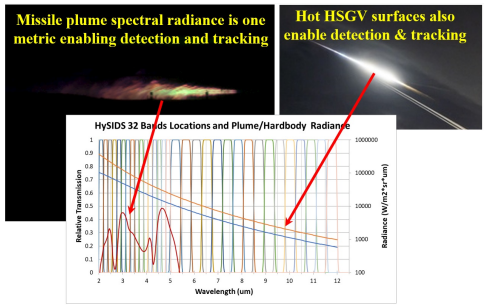
Topic # N231-020
Detection and Tracking of Hypersonic Missiles Using EO/IR Sensors
Surface Optics Corporation

WHO

SYSCOM: NAVAIR

Sponsoring Program: NAWC-AD

Transition Target: Transitioning Surface Optics Corporation (SOC) Multispectral/Hyperspectral Imaging (HSI) sensors to any land, sea, or air platform would enable enhanced protection of that platform and other DoD assets by reliably detecting hypersonic threats long before their arrival. Detection, identification, and tracking of these threats is vital to countering them before the adversary can inflict catastrophic damage and kill/injury US and Allied personnel.



Surface Optics Corporation; DVIDS

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Other Transition Opportunities: All DoD branches and their assets are at risk from hypersonic threats, so all branches provide transition opportunities. This system can be deployed at a base or on a vessel, but line-of-sight limitations associated with curvature of the earth limit ultimate detection range for sea-level or near-sea-level installations. Improved protection results from high-elevation operation. Hence, transition to a high-altitude platform, whether UAV or a long-term station-keeping balloon such as one identified in the Phase I effort, or transition to a space-based platform, provides dramatically improved detection ranges an, hence, force protection; transition to such platforms, then, is the ultimate goal of this effort.

Notes:

WHAT

Operational Need and Improvement: Hypersonic missiles, both cruise and boost/glide, pose an emerging and growing threat to US Naval assets. These missiles move and maneuver at speeds of Mach 5 or higher, leaving little time to detect, track, and deploy counter measures. Given their ability to maintain a relatively low altitude, fly fast, and maneuver, these threats are more difficult to detect than standard cruise or ballistic missiles and are likely to penetrate current anti-missile shield systems. Plasma sheaths from atmospheric ionization around the missile absorb radio waves, making these threats practically invisible to radar

Specifications Required: This program seeks to explore and develop UV, SWIR-MWIR, and LWIR spectral imaging technologies for the detection, identification, and tracking of hypersonic missiles that cannot otherwise be detected using more conventional imaging or radar. The goal is to perform an exploration and investigation of the spectral signatures of these threats resulting from their aero-heated surfaces and plasma sheaths. Investigations also include adaptation of Surface Optics' plenoptic LightShift spectral imaging technology to exploit these signature to enable reliable detection of hypersonic threats at significant ranges, yielding many minutes to track and then deploy countermeasures.

Technology Developed: Surface Optics' LightShift spectral imaging technology allows simultaneous acquisition of 32 spectral bands from 2 um to 12 um throughout a 320 x 180 image (640 x 360 with super resolution) at beyond video frame rates; 16 bands from 0.27 um to 0.55 um for imaging the plasma sheath are available as an option. An integrated, compact, spectral image processor executes spectral detection and tracking algorithms on the imagery to detect and track hypersonic missiles, both during boost/cruise phase and during glide phase; the high sensitivity and speed of this imager, together with the high spectral radiances of the threats, enable detection even when the missile / glide vehicle is deeply subresolved, resulting in many minutes to prosecute the threat. Metrics from the sensor enable definitive differentiation of hypersonic threats from non-threats, such as meteors and non-hypersonic objects.

Warfighter Value: Reliably detecting hypersonic threats at very long range allows the warfighter many minutes to track the threat to determine an approximate destination and then to deploy countermeasures to eliminate the threat. This capability improves both warfighter and targeted non-combatant safety.

WHEN

Contract Number: N68335-24-C-0374 **Ending on:** Jun 24, 2026

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Prove LightShift spectral imaging technology for moving target detection	Low	Detect moving targets in cluttered environment	5	3rd QTR FY16
Develop concept for long-range hypersonic missile detection using LightShift technology	Low	Completed conceptual design	2	4th QTR FY24
Design hypersonic missile detection system	Medium	Full design package for system prototype	3	1st QTR FY26
Manufacture prototype system	Medium	Manufacture & integrate all components, test in lab	4	3rd QTR FY26
Test/Demonstrate system during Costal Trident 2026	Medium	Detection of surrogate targets demonstrated	6	4th QTR FY26

HOW

Projected Business Model: Through this Phase I & II SBIR effort, Surface Optics will design, build, and test the prototype HySIDS (Hypersonic Spectral Imaging Detection Sensor). Follow-on efforts will refine the design, incorporated any required changes discovered during testing, and begin transition to a mil-qualified, field-ready system. We then intend to license the technology to a prime contractor better positioned than we to supply the system to DoD and other government agencies for deployment. We will continue to sell HySIDS and variants thereof both to low-volume government customers, e.g., government labs, and to commercial customers.

Company Objectives: Our intent is to finish building and testing HySIDS in preparation for full commercialization through a prime contractor. We then intend to use profits from that commercialization to fund additional system development first for high-value civilian target protection applications, and then to adapt the spectral imaging technology at the heart of HySIDS to non-hypersonic missile detection applications, thereby expanding our presence in the spectral imaging marketing and growing our business.

Potential Commercial Applications: With the growing proliferation of hypersonic threats that can be difficult to identify at extreme
range using current widely deployed techniques such as radar and panchromatic imaging, the threat to any high profile civilian and government targets such as research and development facilities, energy facilities, and government buildings is high. To counter this threat, we will adapt HySIDS for installation at such civilian sites to provide enhanced security. Further adaptation of the technology in HySIDS also enables detection of explosives, chemical and biological agents, drugs, and other threat materials. The chemical identification technology is also appropriate for medical diagnostics, agricultural monitoring and fertilizer/water control, online manufacturing control, and more.

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