Department of the Navy SBIR/STTR Transition Program

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Topic # N121-096
Persistent Easy-to-Deploy Stationkeeping Sonar Powerbuoy
Ocean Power Technologies, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: TBD

Transition Target: PEO IWS Undersea Systems

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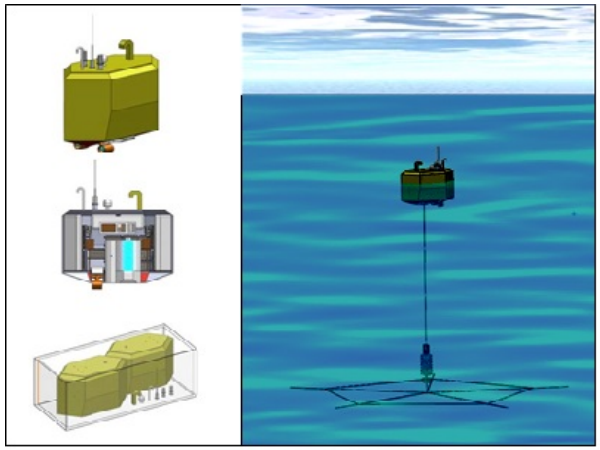
Other transition opportunities: Navy, Department of Defense (DoD), Department of Homeland Security (DHS), and National Oceanic and Atmospheric Administration (NOAA) programs requiring autonomous, long-duration, sea-based surveillance, monitoring, surveying, communications, and/or met-ocean sensing.



Notes: Image depicts the persistent (i.e. long duration), easy-to-deploy (ETD) energy harvesting (EH) station-keeping (SK) sonar power buoy in transport and operational configurations. Image on right shows buoy supporting anti-submarine warfare (ASW) active sonar, but payload could be other type of sea-based system (e.g. radar, communications relay).

WHAT

Operational Need and Improvement: The US Navy needs a deployable field of active sonar systems that can be used in all depths of water and achieve tactical anti-submarine control of an area for several weeks. The US Navy has identified the need for a persistent, easy to deploy, anchorless active sonar system that contains a float or small craft for suspension of the sonar arrays, a low-frequency source and receive array, and on-board processing and communications.

Specifications Required: US Navy requirements for the buoy/vessel are as follows: 1) buoy or small craft for suspension of a low-frequency sonar source and receive array, and on-board processing and communications systems, 2) two entire buoy systems fit in a 20' ISO shipping container, 3) anchorless SK in excess of two weeks, 4) workable ASW active sonar design, and 5) workable deployment/ retrieval schemes.

Technology Developed: Technology consists of a compact, self-propelled, autonomous buoy, featuring an "inertia-based" wave EH system to provide long-duration operation (3-yr stretch goal) of an ASW sonar system. Buoy utilizes a combination of wave EH devices, diesel genset, and high-density batteries to power electric thrusters to effect buoy transit or station keeping. Technology provides reliable, persistent power for SK and payload, in a compact ETD design. Inertia-based wave EH device(s) could also be fitted to new or existing vessels, providing them with persistent, reliable power. Testing has verified the performance and reliability of critical components. Ocean demo of prototype buoy is anticipated early 2019.

Warfighter Value: Persistent ETD EH SK buoy can operate in many EH and energy usage modes to assure high mission capability and availability. EH SK buoy is more compact than wave-only, solar-only, or diesel-only powered approaches for long-term operation, significantly improving deployment/ recovery logistics and maximizing number of buoys per deployment ship. SK buoy could be deployed hundreds of miles from operational area and transit autonomously, reducing logistical costs and hazard to personnel. It could also be deployed in advance and loiter covertly until needed. In shallow water, buoy could be moored so all wave energy could be used for high-power payloads.

WHEN

Contract Number: N00014-16-C-3047 **Ending on:** December 15, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Power generation and station keeping performance simulations.	Med	Simulations show wave-generated power sustains station keeping.	4	August 2017
Risk reduction testing of inertial wave-energy capture system components.	Med	Satisfactory power conversion efficiency and cycle life.	4	November 2017
Design of prototype version of persistent ETD EH SK buoy/vessel.	Med	Full set of drawings and bills of material for prototype buoy/vessel.	5	TBD
Build and ocean test of persistent ETD EH SK buoy/vessel.	Med	Successful one-month ocean deployment or prototype buoy with expected wave-generating and SK capabilities	6	TBD

HOW

Projected Business Model: The primary business model of Ocean Power Technologies, Inc. (OPT) is to supply the persistent, ETD, EH, SK buoy/vessel systems to integration prime contractors. Alternatively, OPT could supply the inertia-based wave energy conversion modules to integration prime contractor for installation in their systems.

Company Objectives: OPT anticipates the NAVY SBIR/STTR Transition Program (STP) Forum will facilitate connections with Government and industry decision makers that have needs for autonomous, long-duration, sea-based applications that require substantial electric power/energy and/or self-station keeping capability. Our short term objective is to secure a Phase 2.5 or Phase 3 contract for the further development of the autonomous, persistent, ETD, EH, SK buoy. The main objective would be to increase the technical readiness of the technology through design refinement and further ocean demonstration(s).

Potential Commercial Applications: Many commercial applications exist including meteorological-oceanographic sensing, seafloor surveying, offshore pipe-line monitoring, offshore oil & gas well-head powering, and sea-based communications networks/relays. The persistent ETD, EH, SK buoy also has a number of opportunities with DoD and DHS for transition in programs requiring persistent instrumentation, especially where a deep water mooring system is not feasible. Non-Navy programs that OPT has identified thus far are DARPA's Distributed Agile Submarine Hunting (DASH) Program and DHS's Coastal Surveillance System. In addition, USCG buoys need additional power in order to add Automatic Identification System (AIS) functionality to support modern electronic navigation. The USCG has expressed interest in testing OPT's wave energy devices on their buoys with the possibility of implementing AIS.

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