

WHO

SYSCOM: ONR
Sponsoring Program: Office of Naval Research (ONR)
Transition Target: Undersea Weapons
TPOC: Daniel Tam
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Other Transition Opportunities: Bathymetry, scattered media applications



Teledyne e2v Tetra CMOS line scan image sensor (placeholder until Alphacore's LIDAR receiver is available)

Notes: Teledyne e2v's Tetra CMOS line scan image sensor is shown as representative of the product and form factor that Alphacore is targeting.

WHAT

Operational Need and Improvement: Time resolved detection is needed in underwater imaging to distinguish between desired object returns and unwanted environmental clutter. Sufficient resolution (5cm) in both space and time is required to identify underwater threats. While techniques have been developed on the transmitter side to create high bandwidth optical interrogation signals, the receiver side has been limited to single element receivers that must be mechanically scanned to image a scene. Such a configuration is not compatible with moving platforms. While time of flight cameras have been developed for the automotive industry, these cameras do not have the time resolution necessary to operate in high clutter environments. A multi-element, wide bandwidth optical receiver is needed to achieve the benefits of high time resolution with a spatially resolved optical detector.

Specifications Required: Alphacore's is integrating advanced compact photo detectors with Alphacore's own innovative high-speed readout technology. The system is being optimized for optical sensitivity in the blue-green wavelengths (400nm to 560nm) with sufficient dynamic range to detect signals in high clutter environments. The initial prototypes are being designed, fabricated and tested as 750 x 1-pixel and 750 x 2-pixels monolithic underwater lidar receivers. The main parameters of the design are >2 gigahertz bandwidth, 10 gigasamples/second, >1,000 samples buffer length in every pixel, >60dB SNR and linearity and programmable sampling rate and bandwidth.

Technology Developed: Alphacore is developing a 2-chip approach for more performance and greater savings, one using X-FAB 180nm and the other using Tower 65nm. Advantages of this approach are smaller channel pitch, lower voltage and power, faster, and accelerated development time through intellectual property reuse from other Alphacore programs.

Warfighter Value: Greatly improve situational awareness at sea: excellent spectral sensitivity for object detection performance in water / horizon environments; good ability to detect different types of objects whose return signals span a wide spectrum; excellent resolution and rendering of detected objects; extended waveform digitization and processing for improved object detection and discrimination; and deployability and affordability across a wider range of platforms

WHEN

Contract Number: N68335-23-C-0314 **Ending on:** Jul 14, 2025

Milestone	Risk Level	Measure of Success	Ending TRL	Date
1. Final Image Sensor (Vulture-HD) Design	Medium	Passes design post-checks	5	1st QTR FY25
2. Final Image Sensor (Vulture-HD) Chip Layout Design Completed and Sent to Fabrication;	Low	Passes layout post-checks	5	3rd QTR FY25
3. Vulture-HD Image Sensors Fabricated, Packaged and Functionality Evaluated	Low	Passes functionality checks	5	4th QTR FY25
4. Vulture-HD Camera Control System, Completed and Evaluated	Medium	Passes functionality checks	5	4th QTR FY25
5. Vulture-HD Full Camera System Integrated and Evaluated	Medium	Passes functionality checks	5	1st QTR FY26
6. Vulture-HD Image Sensors radiation tested	Low	Passes radiation tests	5	2nd QTR FY26
7. Final Report written and submitted	Low	TPOC approval	5	2nd QTR FY26

HOW

Projected Business Model: Alphacore will sell packaged and tested LIDAR receivers to LIDAR system manufacturers. The companies will in turn sell to Navy system developers/integrators, who will then sell to the Navy.

Company Objectives: Become the leading vendor of the most cost-effective LIDAR receivers to the Navy, the DoD, and other Government agencies.

Potential Commercial Applications: Besides defense applications, the LIDAR receiver can be a great fit for commercial land, marine, and airborne autonomous/driver assisted vehicles and systems.