Department of the Navy SBIR/STTR Transition Program

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Topic # N212-123
External Payload Deployment System for Cylindrical UUVs
Arete Associates

WHO

SYSCOM: ONR

Sponsoring Program: Code 32

Transition Target: Small, Medium, and Large UUV Platforms including ISR and MCM

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Other Transition Opportunities: REMORA is adaptable and scalable to most UUV and ROV platforms due to its modular design and swappable system interface.

Notes: Arete's REMORA UUV External Payload Delivery System has been tested on a government-operated UUV platform to bring the technology to TRL 6 for littoral operations. Multiple REMORA Phase 2 prototype systems have been built and deployed in controlled environments for initial evaluation.

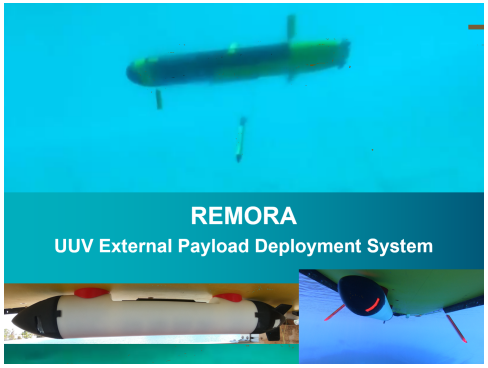


Image courtesy of Arete

WHAT

Operational Need and Improvement: The United States Navy needs an external payload deployment system for unmanned underwater vehicles (UUVs) to enable use of leave-behind technologies such as markers, beacons, or effectors. Arete's REMORA technology provides UUVs the capability to mount and deploy exterior payloads with limited to no impact to the vehicle's performance and minimal integration requirements to meet this need. REMORA provides this capability as a low-cost system that uses COTS hardware and can be built and assembled using additive manufacturing techniques.

Specifications Required: Buoyancy: REMORA is neutrally buoyant when attached to a UUV and negative when detached from UUV, and is adaptable to different water densities.
Communications: No through-hull modifications are required to use REMORA.
Detachment: REMORA releases on-command from its host UUV using a low-SWaP through-wall acoustic communications system.
Payload drop accuracy: REMORA follows a repeatable release trajectory when deployed from the vehicle.
Parasitic drag: REMORA adds less than 10% nominal vehicle drag and does not decrease UUV endurance by more than 25%
Carry load: REMORA is scalable to carry modules that weigh up to 5 kg in air.

Technology Developed: REMORA mounts to a vehicle without any hull modifications. The host UUV releases REMORA using Arete's custom contactless, through-wall acoustic communications system. When released, REMORA is negatively buoyant and sinks following a nose-down trajectory. REMORA is adaptable and scalable to different UUV shapes and sizes, as well as different payloads, and features a low drag design for negligible vehicle control impact. Arete has developed a through-wall acoustic communications system that allows a vehicle to send data through its hull structure without the need for a hard wired connection or penetrator.

Warfighter Value: REMORA provides the Warfighter a low-cost force multiplier by expanding the operational utility of UUV platforms and enabling them to perform new missions or deploy new payloads without significant vehicle integration.

WHEN

Contract Number: N68335-23-C-0012 **Ending on:** Nov 15, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase 1 Component Evaluation	High	Succesfully demonstrated prototype acoustic and mechanical systems.	4	3rd QTR FY22
Phase 2 Prototype CDR and Build	Medium	Succesfully built multiple system prototypes and tested in a lab environment.	5	3rd QTR FY23
Phase 2 Prototype Vehicle Test	High	Succesfully demonstrated system prototype use in a relevant environment on a UUV asset.	6	1st QTR FY24
If Option Exercised - Phase 2 Prototype Operational Test	High	TBD	7	2nd QTR FY25

HOW

Projected Business Model: Arete will manufacture REMORA systems for end users. Arete has brought several underwater and airborne products through development, testing and production and owns multiple facilities that operate to an AS9100D (2016) and ISO 9001:2015 certified Quality Management System (QMS) with over 35,000 sq. ft. of manufacturing space.

Company Objectives: Arete is seeking transition partners from both government UUV program offices and industry platform providers to develop REMORA towards field deployment and identify specific payloads and CONOPS in which REMORA can be used.

Potential Commercial Applications: REMORA is designed for compatibility with most commercial UUV platforms. With minimal modification, REMORA can mount to commercial UUVs to carry payloads for underwater survey and marking of points of interest, integration of novel UUV sensors, and other payloads for underwater activities.

Arete's through-wall acoustic communications technology developed for use with REMORA can be used in other applications. This technology provides a general capability of passing data through walls or hulls without the need for a hard wired connection or a bulkhead penetrator.

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