

Department of the Navy SBIR/STTR Transition Program

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ONR Approval #0543-904-23

Topic # N07-096

Autonomous, Cooperative Behavior Amongst Unmanned Surface Vehicles
Scientific Systems Company, Inc

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 33

Transition Target: PEO USC

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Other Transition Opportunities: USV Prime Contractors

Notes:

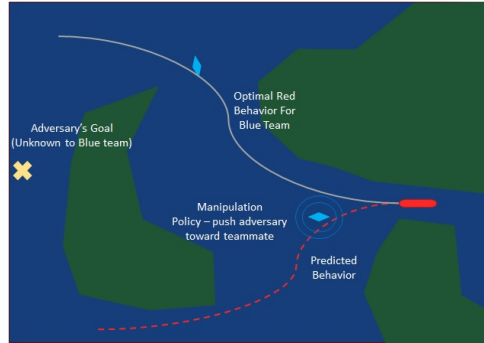


Image courtesy of Scientific Systems Company Inc.
2023

WHAT

Operational Need and Improvement: The Navy is seeking to improve their Anti-Submarine Warfare (ASW) capability and is looking to autonomous Unmanned Surface Vehicles (USVs) to complement manned ASW platforms. Adversary-predictive autonomy enables USVs to improve their capabilities in highly dynamic and communications-limited environments found in ASW operations.

Specifications Required: Our technology requires an autonomous (Navy USV) platform that has a basic autonomy system (e.g. waypoint following) and a sensor that is capable of detecting the adversary (e.g. passive towed array or active sonar). The platforms can also have heterogeneous capabilities, such as different sensor packages or different maneuvering capabilities. It is assumed a communication system exists between the platforms (e.g. satellite communication) to share their state information with their teammates, however the bandwidth and latency can be limited.

Technology Developed: This technology is an Adversarial Autonomy framework that allows a team of autonomous platforms to intelligently direct their collective actions based on the most likely behavior of the adversary and the most likely adversary's perception of our behavior. This allows for deceptive actions that cause the adversary to choose suboptimal actions resulting in a tactical advantage for the autonomous team.

Warfighter Value: If successful, this technology enables the use of collaborative autonomous USV teams to provide supporting functionality to manned platforms in a variety of ASW missions.

WHEN

Contract Number: N68335-22-C-0540

Ending on: Jan 15, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Developed Adversarial Autonomy Mathematical Framework	Medium	Concrete formulation that is computationally tractable	2	2nd QTR FY23
Proof of Concept Demonstration of Adversarial Autonomy in Simplified Simulation	Medium	Improvement in tracking performance compared to traditional autonomy	3	3rd QTR FY23
Demonstration of Adversarial Autonomy in Higher Fidelity Simulation	Low	Improvement in tracking metrics	4	2nd QTR FY24

HOW

Projected Business Model: Scientific Systems plans to partner with USV providers (e.g. Leidos) to integrate our technology with their USV platforms.

Company Objectives: SSCI's goal is to demonstrate the utility of the technology with a field demonstration involving multiple USVs and a target submarine.

Potential Commercial Applications: NASH has application to commercial UAVs and autonomous cars to predict an adversarial attack and improve the robustness of the counter action selection.

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