Department of the Navy SBIR/STTR Transition Program

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NAVSEA ##2023-0781

Topic # N211-058
Automated Unmanned Systems (UxS) Boundary Protection Capability
AVIRTEK, INC

WHO

SYSCOM: NAVSEA

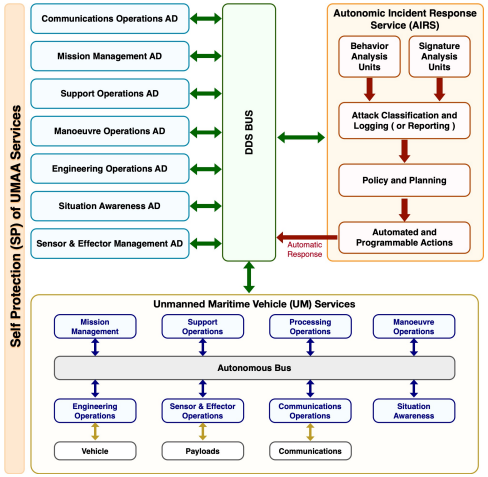
Sponsoring Program: PEO USC, PMS 406

Transition Target: NAVSEA

TPOC: (360) 979-7902

Other Transition Opportunities: OPNAV N-9, SPAWAR Systems Center Pacific, Army Material Command (AMC)

Notes: The bottom part of the architecture represents the main services of UMVs. To improve the performance of our anomaly Behavior Analysis Units (BAUs), we have developed one BAU for each UMV service. The UMV services and our BAUs communicate through the DDS bus as shown in the middle module. Our development approach of BAU is based on using advanced machine learning techniques to characterize the normal behavior of each service. Our approach is also adaptive and learns new normal patterns once they occured so it can adopt its BAU to accurately model the new changes in normal operations. Once an alert is generated, we first classify the alert type and then based on adopted policies on how to respond to the detected attack pattern type, and automated respond is generated in order to promptly stop the detected attack and/or mitigate its impact on the mission.



Self-Protection (SP) for UMAA Services

WHAT

Operational Need and Improvement: The SP for UMAA Services will provide anomaly behavior analysis to detected malicious attacks such as Denial of Service, Man-in-The-Middle (MITM), and unauthorized data exfiltration from both internal and external actors. Once an alert is generated, SP system will generate automated response to promptly stop the detected attack.

Specifications Required: - The solution must interoperate with PMC 406 portfolio and comply with the UMAA standard for common interfaces and software reuse among the mission autonomy and the various vehicle controllers, payloads, and Command and Control (C3) services in the PMS 406 portfolio of UxS vehicles
- Allow open architecture (OA) modularity of autonomy solutions, control systems, C3, and payloads
- Should be quantitative values

Technology Developed: Self-protection capabilities for Navy UMVs with a focus on UMV protocols, devices, sensors, & actuators
- Behavior Analysis Units (BAUs)
- Automated Incident Response System
- Detailed User Interface (UI)

Warfighter Value: - Eliminate the manually intensive and reactive responses to cyber attacks by using AVIRTEK Self-Protection Technology

- Anomaly Behavior Analysis of UMV sensors and effectors that can detect any anomalous events triggered by malicious actions regardless of location (insider or outsider), type (known or unknown), accidents or failures that might be caused by malicious actors or natural causes

- Ensure Zero-Trust Operations of UMAA ServicesAny operation must be authenticated, authorized, and validated that it will not lead to severe consequences

WHEN

Contract Number: N68335-22-C-0536 **Ending on:** Aug 15, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Behavior Analysis Units (BAUs) for Sensors and Actuators, DDS Protocol, and EdgeDevices	Low	Successful detection of anomalous operations	4	4th QTR FY23
Machine Learning (ML) based Attack Pattern Classification	Low	successful classification of attacks in real-time	4	4th QTR FY24
Attack Pattern Ontology	Low	successful generation of attack attributes and recommended mitigation responses	4	4th QTR FY24
Self-Protection System (SPS) for UMAA Services	Low	successful detection and response	4	4th QTR FY24

HOW

Projected Business Model: License the Self-protection system (SPS) developed to detect and respond to malicious attacks against cyber systems and their applications. In particular work with a partner to integrate SPS with the partner solution to manage, and protect UMV services. In addition, we are looking for a partner in Operational Technology (OT), Industrial Control Systems (ICS), and Critical Infrastructure Management to license our SPS technology to self-protect the services and applications provided by these infrastructures.

Company Objectives: AVIRTEK is a small company looking for a prime or a partner to help in transition the developed SPS technology into DoD and commercial cyber-physical systems and applications.

Potential Commercial Applications: Self-protection of OT and ICS applications, Critical Infrastructures, Self Protection of Intelligent Transportation Systems, Utility services, Smart Power Grids, Autonomous Connected Systems and Smart City Services. In addition, the SPS technology can self-protect IT systems, cloud systems and services, and Internet of Things (IoT) devices and their applications

Contact: Salim Hariri, CEO and Founder
salim.hariri@avirtek.com (520) 977-7954