Department of the Navy SBIR/STTR Transition Program

Topic # N193-A02

Multisensor Fusion and Analytics for Detection and Correction of Sensor Degradation
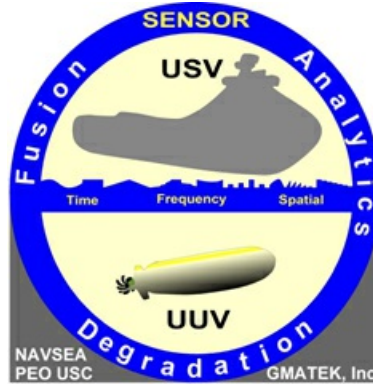GMATEK, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO-USC

Transition Target: unmanned Surface and underwater vehicles (UxV), medium USV (MUSV)

TPOC:

Other transition opportunities: This technology also applies to unmanned air vehicles (UAV) as well as conventional ships and vessels to supplement human watchstander senses and capabilities.

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WHAT

Operational Need and Improvement: Develop autonomous behaviors so that an Unmanned Surface Vehicle (USV) and/or an Unmanned Undersea Vehicle (UUV) can respond to a given situation like a manned surface ship or submarine. During a mission, sensor inputs may degrade over time. Novel approaches are sought to detect such degradation and adjust accordingly. Detection of degradation requires determining if changes in environmental conditions or target behavior/type may be the cause. If the degradation is determined to be within the sensor, possible approaches include adjustment or re-calibration techniques, re-initialization of the sensor, or adjusted tactics to compensate for the degraded sensor. The USV/UUV might also have an option to send a snippet of raw sensor data back to a controlling platform for confirmation of a problem by a human operator. Approaches could also include a method for computing the value of continuing the mission with the degraded sensor and comparing it to the value of returning immediately to the host platform or maintenance location for repairs.

Specifications Required:

Technology Developed: Our Sensor Degradation Reasoning System (SDRS) product technology uses artificial intelligence to gain insight into sensor behavior and to detect performance degradation. We do this by examining sensor data in real time and determining whether it appears to be degraded and possibly unreliable for use by unmanned and autonomous surface and underwater vehicles (UxV) as well as seafarers on vessels in decision-making and mission performance. Sensors supported include visual and FLIR imaging, radar, sonar, lidar, inertial navigation, GPS and GNSS, AIS, audio, weather and engineering sensor suites through direct connection as well as NMEA and other bus connectivity.

Warfighter Value: SDRS technology can help determine when naval vehicles and vessels guided by various sensors are likely to become disoriented due to degraded sensor data caused by natural conditions or the nefarious actions of adversaries. Without the ability to discern whether your sensors are degraded or providing information correctly, automated reasoning systems and trained watchstanders are effectively blinded. We can help fix that.

WHEN

Contract Number: N68335-20-F-0465   **Ending on:** October 29, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Concept Feasibility	Low	Characteristic proof of concept	TRL-3	April 2020
Prototype Demonstration	Med	Demonstration in a relevant environment	TRL-6	October 2021

HOW

Projected Business Model: GMATEK, Inc. will perform production system development and integration of COTS components with SDRS software for use within naval and commercial vehicles and vessels, including installation and integration with vehicle sensor systems and any required upgrades needed for specialized vehicle system compatibility.

Company Objectives: Our immediate goal is to integrate SDRS technology into new and existing naval vehicle and vessel platforms.

Potential Commercial Applications: Potential commercial applications include extending into commercial vessels and large yachts to supplement onboard watchstander capabilities in maintaining situational awareness.

Contact: R. Glenn Wright, President
glenn@gmatek.com   443-951-8001