

Topic: N171-005

## Signal Systems Corporation

### Deep Learning for Clutter Reduction in Multi-static Coherent Active Sonar Systems

Deep learning can exploit high dimensional data in tracking systems to improve snippet screening and reduce latency of contact follower creation and classification. A robust machine learning capability will improve the performance of the active off board sensors deployed from on the P-8A aircraft; increasing the speed of its search mission. Signal Systems Corporation (SSC) is a small business specializing in signal processing for distributed acoustic sensors able to provide machine learning capabilities to platforms that are informed by deep domain knowledge of underwater acoustics, multistatic sonar, and tracking. The risk of performance degradation in operation is being mitigated by segregating representative flights from the normal process of training and evaluation. SSC seeks to integrate this technology into existing field level detection and tracking systems as either a primary or a sub-contractor.

### Technology Category Alignment:

Human/Autonomous System Interaction and Collaboration

Machine Perception, Reasoning and Intelligence

Synthesis/Analytics/Decision Tools

Sensors

Acoustic, Seismic and Magnetic

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**SYSKOM:** NAVAIR

**Contract:** N68335-18-C-0722

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-18-C-0722](https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0722)

Department of the Navy SBIR/STTR Transition Program

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WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-264

**Transition Target:** Active off-board acoustics

**TPOC:**  
(301)757-4443

**Other transition opportunities:**  
Advanced signal processing aids

**Notes:** Signal Systems Corporation (SSC) has an impressive history of both successful commercialization of our SBIR programs and collaboration with major DOD contractors. Since 1998, SSC has executed 30 Phase I SBIR projects with 18 continuing to Phase II ; secured 5 Phase II.5 awards or Phase II enhancements plus 2 Rapid Innovation Fund (RIF) programs; and transitioned 9 programs to Phase III.

Signal Systems Corporation excels at transitioning our research and development to valued field capabilities, exemplified by the successful integration of our software into Navy platforms. SSC has transitioned sensor processing, environmental analysis and multi-sensor fusion algorithms to the fleet.

SSC also has completed numerous software integrations with industry partners like Lockheed Martin, Northrop Grumman, Raytheon, General Dynamics and Boeing on major projects. In 2014, Northrop Grumman formally recognized SSC as a valued team member with a World Class Team Award.



Source: US Navy

WHAT

**Operational Need and Improvement:** The Navy is seeking reductions in the clutter that is viewed by an operator. Solutions utilizing recent advances in deep learning are sought as innovative approaches to solving these problems.

**Specifications Required:** The goal is significant clutter reduction.

**Technology Developed:** SSC is developing neural networks which analyze a small portion of a sonar field and return information specific to that particular sub-region.

**Warfighter Value:** SSC's machine learning capabilities will reduce sonar operator workload.

WHEN

**Contract Number:** N68335-18-C-0722 **Ending on:** September 15, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Clutter reduction demonstrated on simulated data	N/A	Performance metrics on simulated active off-board acoustic missions	TRL-4	December 2017
Develop at-sea training dataset	N/A	Minimize performance dropoff between training and testing data	TRL-4	March 2019
Demonstrate clutter reduction on at-sea data, APB step 1	Med	Detector performance, classification latency	TRL-5	September 2020
Build flight prototype software	Low	Performance improvements match performance goals	TRL-6	September 2021
Support NAVAIR test flight	Med	Prototype software out-performs existing software in real-time test	TRL-7	January 2022
Complete APB step 3	Low	Performance of flight software matches prototype	TRL-8	January 2023

HOW

**Projected Business Model:** SSC intends to license this software to the Government.

**Company Objectives:** SSC expects this technology to be the starting point for future development of machine learning technology for applications in acoustic systems. SSC seeks to revolutionize signal processing, information processing, tracking, and automation capabilities of existing acoustic systems through the use of machine learning techniques. SSC sees this technology as the beginning of a set of innovations which will lead to automated acoustic systems which out-perform human operators.

**Potential Commercial Applications:** Applications of this technology include: radar, ultrasound, satellite remote sensing, thermal imaging

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