Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2016-741

Topic # N141-004
A Fully Integrated Compact Scalar Atomic Magnetometer
QuSpin

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-290

Transition Target: Tier-1 UAVs

TPOC:
(301)342-2552

Other transition opportunities:
PMA-264, PMA-266, PMA-299, High altitude ASW (HAASW), UTAS, MH-60R, Firescout, UUVs

Photo courtesy of Northrop Grumman.
(http://www.northropgrumman.com/Capabilities/FireScout_8C_Fire_Scout_Data_Sheet.pdf)

WHAT

Operational Need and Improvement: Magnetic anomaly detection (MAD) with small platforms like Tier-1 UAVs and UUVs requires magnetometers with low SWaP+C beyond what is available with the current state-of-the-art.

Specifications Required: Volume less than 500 cc, Weight less than 5 lbs, Power less than 5 W, Sensitivity better than 10 pT/rt Hz, Heading error less than 300 pT

Technology Developed: QuSpin has harnessed advances in the fields of atomic physics, miniature electronics, and signal processing to create a magnetometer with drastically reduced SWaP and increased sensitivity. Our QMAG magnetometer prototypes presently surpass the threshold SWaP and sensitivity metrics for the program. The miniaturization and performance that we have achieved allows for a more versatile product with broader deployment opportunities.

Warfighter Value: The size and power consumption of a payload directly impacts the platform maneuverability and its mission endurance. This is especially true when dealing with very small platforms like Tier-1 UAVs and UUVs.

Our small, high-performance magnetometers will provide the Navy with an avenue for implementing magnetic detection capabilities on a wide variety of existing and future platforms - from very large to very small.

WHEN

Contract Number: N68335-16-C-0126 **Ending on:** January 2, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Magnetometer concept	Med	Demonstrate principle of operation with early prototype	3	August 2015
Design and build for reduced SWaP	High	Demonstrate SWaP below program thresholds	5	April 2016
Test, characterization, optimization	Med	Perform tests of magnetometer performance	6	May 2016
Fully automated operation, flight testing	Low	Glitch free operation on mission plattform	7	December 2016
Tests and qualifications for ruggedness	Low	Operate under extreme conditions	8	August 2017

HOW

Projected Business Model: QuSpin's business model is to be a manufacture of atomic devices. We are currently building atomic mags in-house and have begun shipping for commercial and biomedical use. For military use, QuSpin will team with primes to integrate of our mags into full systems. Our manufacturing process allows us to ramp up production in a very short time to meet the Navy's high-volume requirements. Additionally, we are open to licensing our technology directly to larger defense contractors and helping them set up their own manufacturing locations.

Company Objectives: Our company goal is to offer the highest performing commercial magnetometers in the world at the lowest price, and with the smallest size. Since magnetism is one of the few fundamental and measurable quantities in nature, is our belief that small, cheap, and high-performance magnetometers like ours will open up new applications that were previously not feasible. We are looking for partners who can harness the capabilities or our magnetometers in new or existing applications in both small and large quantities. As an atomic devices company we are also interested in developing atomic timing solutions as well as atom based IMUs. We are seeking interested parties who can help us further our developments in these areas.

Potential Commercial Applications: -Geophysics
-Space weather monitoring
-Mineral and energy prospecting
-Magnetic anomaly detection
-Scientific measurements
-Biomedical diagnostics

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