

Topic: N141-010

White River Technologies

Development of Analysis Techniques for Predicting Magnetic Anomaly Detection (MAD) Equipped UAV Performance in Naval Anti-Submarine Warfare Environment.

Working with the lead P-8A contractor, this innovative airborne magnetic data analysis and processing organization is developing a software based Tactical Decision Aid (TDA) to enhance the Navy's Anti-Submarine Warfare (ASW) capability. The software predicts statistical metrics characterizing Magnetic Anomaly Detection (MAD) sensor performance based on probabilistic estimation of target and background magnetic fields and complex environmental and mission related factors. At the heart of the software are modeling and simulation modules that accurately account for the errors associated with numerous inputs in order to output predictive metrics on the probability of detection of a submarine threat. A simulation environment was designed to accurately predict the probability of a magnetic sensing of an ASW threat.

Technology Category Alignment:

Acoustic, Seismic and Magnetic

Fixed Wing Vehicles (includes UAS)

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SYSCOM: NAVAIR

Contract: N68335-15-C-0146

Department of the Navy SBIR/STTR Transition Program

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WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA 290, PMA 264

Transition Target: P8 ASW Squadrons.

TPOC:
(301)342-2552

Other transition opportunities:
National Oceanic and Atmospheric Administration (NOAA) tracking weather patterns.
Search and Rescue operations - specifically firefighters

Notes: Two large and powerful trends are shaping the market place for Tactical Decision Aids for Magnetic Anomaly Detection applications. The first trend is the rapid adoption of low cost, unmanned aerial vehicles across the Dept of Defense. The second is the miniaturization of magnetometers using MEM manufacturing techniques which should result in a 100 fold decrease in cost, size, and power of magnetometers. Combined, these two trends will drive increased adoption of UAV based magnetometer missions which in turn will drive demand for Tactical Decision Aids (defense market) and survey planning tools (commercial market).



Image Courtesy of U.S. Navy:
<http://www.navy.mil/management/photodb/photos/140410-N-VD564-008>

WHAT

Operational Need and Improvement:

- Tactical Decision Aid (TDA) for ASW Mission Commander using UAVs equipped with magnetometers
- Provides Real Time assessment of Probability of Mission success
- Computes Probability of Detection of target submarine from magnetometer equipped UAV
- Lowers costs by reducing unnecessary UAV deployments

Specifications Required:

- Magnetic signature/movement of target submarine
- Geomagnetic and environmental background noise
- UAV capabilities such as speed, endurance, maneuverability and altitude
- Magnetic sensor characteristics

Technology Developed:

- Highly accurate, physics based model
- Explicit probabilistic modeling of target and background magnetic field signals
- Multiple complex environmental and mission related factors
- Actionable GO / NO GO decision data for Mission Commander

Warfighter Value:

- Increased Probability of Detection of submarines using UAVs
- Reduced Mission Commander workload
- Reduced reliance on MAD Operational Effectiveness (MOE) charts

WHEN

Contract Number: N68335-15-C-0146 **Ending on:** May 30, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Validate Noise and Target Simulations	Low	Successful validation and verification of individual models	TRL 3	November 2015
Develop Software Architecture	Low	Successful test of Modular Code Components	TRL 4	March 2016
Develop P-8A Integration Plan	Med	Navy accepts Plan		August 2016
Demonstrate Integrated TDA at PAX SIL	Low	TDA meets all requirements	TRL 6	February 2017

HOW

Projected Business Model:

- License MAD TDA software to prime contractor or designated subcontractor
- Provide support and software upgrades as UAVs, magnetic sensors are upgraded
- Upgrade software to accommodate new threat data

Company Objectives:

- License software and systems designs to DOD Prime contractors and related Subcontractors.
- Focus on innovation and leverage existing capability infrastructure of Prime and Subcontractor
- Deliver world class MAD mission planning tools and associated analysis and processing software

Potential Commercial Applications:

- UAV based Infrastructure Inspection market (II)
- Inspection of bridges, building, pipelines and other metal containing infrastructure
- Likely to be the first large, non-military, industrial UAV magnetic analysis application.
- We intend to pursue the commercial mission planning software market for magnetometer equipped UAVs.

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