Autonomous Towed Array Straightening System

Triton is developing a capability for the Surveillance Towed Array Sensor System (SURTASS) that will straighten the array and improve its acoustic performance. Towed arrays are idealized as straight lines in the water, but the ocean environment disturbs the system and makes it difficult to maximize the arrays’ capability. Triton is developing breakthrough technologies and products for US Navy Ocean Systems. Triton’s competitive advantage is provided by software and control algorithms underlying this technology. In Phase II, modeling and simulation has been conducted and prototype testing is ongoing. Our goal is to integrate and transition this technology into Navy towed array systems.

Technology Category Alignment:
- Satellite Communications (SATCOM)
- Robotics/Automated Material Handling Equipment
- Shipyards/Shipbuilding
- Supply; Storage
- Satellite Communications (SATCOM)
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- Satellite Communications (SATCOM)
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- Shipyards/Shipbuilding
- Robotics/Automated Material Handling Equipment
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- Robotics/Automated Material Handling Equipment
- Protection, Sustainment, and Warfighter Performance
- Medical Chem-Bio Defense
- Military Infectious Diseases
- Propulsion and Extreme Environments
- Fixed Wing Vehicles (includes UAS)
- Survivability
- Maintainability/Sustainability
- Unmanned Ground and Sea Vehicles
- Corrosion
- Advanced Computing/Software Development
- Networks and Communications
- Modular/Open/Reconfigurable Architectures
- RF Components for sensing, transmission and communication
- Electronics Integration
- Broadband/Multispectral Components and Systems
- Sensors, Electronics and Photonics
- Radio Frequency (RF) (non-EW)
- Survivability
- Broadband/Multispectral Components and Systems
- RF Components for sensing, transmission and communication
- Radio Frequency (RF) (non-EW)
- Networks and Communications
- Guidance, Navigation & Control (GN&C) and Data Links
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Networks and Communications
Cognitive/Adaptive Capabilities
Preemptive/Proactive Effects
Broadband/Multispectral Components and Systems
Advanced Computing/Software Development
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Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Aircraft Propulsion, Power and Thermal
Modeling, Simulation & Test Infrastructure
Rotary Wing Vehicles
Fixed Wing Vehicles (includes UAS)
Fixed Wing Vehicles (includes UAS)
Acoustic, Seismic and Magnetic
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Protection, Sustainment, and Warfighter Performance
Clinical & Rehabilitative Medicine
Combat Casualty Care
Medical Chem-Bio Defense
Energy storage
Protection, Sustainment, and Warfighter Performance
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
Undersea Weapons
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management
Synthesis/Analytics/Decision Tools
Power and Energy
Propulsion and Extreme Environments
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Broadband/Multispectral Components and Systems
Preemptive/Proactive Effects
Radio Frequency (RF) (non-EW)
Energy storage
Manufacturing Technology for Affordability
Power and Energy
Structures and Protection
Synthesis/Analytics/Decision Tools
Fixed Wing Vehicles (includes UAS)
Advanced Computing/Software Development
Trust Foundations
Integrating Architecture and Capability Demonstrations
Unmanned Ground and Sea Vehicles
Aircraft Propulsion, Power and Thermal
Synthesis/Analytics/Decision Tools
EO/IR Components for sensing, transmission and communication
Networks and Communications
Preemptive/Proactive Effects
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Scalable Teaming of Autonomous Systems
Networks and Communications
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
Test, Evaluation, Validation, and Verification
Propulsion and Extreme Environments
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Mobility
Unmanned Ground and Sea Vehicles
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Manufacturing Technology for Affordability
Readiness
Lower Atmosphere Battlespace Environments
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Human Computer Interfaces (HCI) for Decision Making
Survivability
Unmanned Ground and Sea Vehicles
Aircraft Propulsion, Power and Thermal
Propulsion
Protection, Sustainment, and Warfighter Performance

Individual Warfighter
Synthesis/Analytics/Decision Tools
Collaborative Analysis and Decision-making
Survivability
Modeling, Simulation & Test Infrastructure
Fixed Wing Vehicles (includes UAS)
Human/Autonomous System Interaction and Collaboration
Scalable Teaming of Autonomous Systems
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Undersea Weapons
Frameworks for Interoperability
Information Collection/Management
Synthesis/Analytics/Decision Tools
Maintainability/Sustainability
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Protection, Sustainment, and Warfighter Performance
RF Components for sensing, transmission and communication
Networks and Communications
Advanced Electronic Protection Techniques and Technology
Survivability
Sensors, Electronics and Photonics
Information Collection/Management
Synthesis/Analytics/Decision Tools
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
High-Speed/Hypersonics
Synthesis/Analytics/Decision Tools
Electromechanical conversion
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Electronics Integration
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Survivability
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Energy storage
Power Generation/Energy Conversion
Unmanned Ground and Sea Vehicles
Electromechanical conversion
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Thermal Transport and Control
Thermal Transport and Control
Protection, Sustainment, and Warfighter Performance
Modeling, Simulation & Test Infrastructure
Microelectronics and Nanoelectronics
RF Components for sensing, transmission and communication
Modularity
Acoustic, Seismic and Magnetic
EO/IR Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
Guidance, Navigation & Control (GN&C) and Data Links
Sensors, Electronics and Photonics
Maintainability/Sustainability
Manufacturing Technology for Affordability
Corrosion
Readiness
Test, Evaluation, Validation, and Verification
Advanced Computing/Software Development
Synthesis/Analytics/Decision Tools
Distributed/Coordinated/Net-Enabled Systems
Aircraft Propulsion, Power and Thermal
Energy storage
Thermal Transport and Control
High Energy Lasers (HEL)
Power and Energy
Mobility
Modularity
Electronic Materials
RF Components for sensing, transmission and communication
Manufacturing Technology for Affordability
Personalized Assessment, Education, and Training
Protection, Sustainment, and Warfighter Performance
System Interfaces & Cognitive Processes
Propulsion and Extreme Environments
Structures and Protection
Test, Evaluation, Validation, and Verification
Electronics Integration
RF Components for sensing, transmission and communication
Acoustic, Seismic and Magnetic
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Electronics Integration
Information Collection/Management
Maintainability/Sustainability
Acoustic, Seismic and Magnetic
Structures and Protection
Protection, Sustainment, and Warfighter Performance
Manufacturing Technology for Affordability
Readiness
Electronics Integration
Rotary Wing Vehicles
Test, Evaluation, Validation, and Verification
Maintainability/Sustainability
Acoustic, Seismic and Magnetic
EO/IR Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
Guidance, Navigation & Control (GN&C) and Data Links
Sensors, Electronics and Photonics
Fixed Wing Vehicles (includes UAS)
Human/Autonomous System Interaction and Collaboration
Personalized Assessment, Education, and Training
EO/IR Components for sensing, transmission and communication
Electro-Optical/Infrared (EO/IR)
Radio Frequency Weapons (RFW)
Sensors, Electronics and Photonics
RF Components for sensing, transmission and communication
EO/IR Components for sensing, transmission and communication
Scalable Teaming of Autonomous Systems
Test, Evaluation, Validation, and Verification
Biomedical Informatics / Health Information Systems & Technology
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Protection, Sustainment, and Warfighter Performance
Individual Warfighter
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Acoustic, Seismic and Magnetic
Fixed Wing Vehicles (includes UAS)
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Corrosion
Readiness
Structures and Protection
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Networks and Communications
Maintainability/Sustainability
Test, Evaluation, Validation, and Verification
Maintainability/Sustainability
Modularity
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Cognitive/Adaptive Capabilities
Unmanned Ground and Sea Vehicles
System Interfaces & Cognitive Processes
Human/Autonomous System Interaction and Collaboration
EO/IR Components for sensing, transmission and communication
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Electro-Optical/Infrared (EO/IR)
Guidance, Navigation & Control (GN&C) and Data Links
Fixed Wing Vehicles (includes UAS)
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Unmanned Ground and Sea Vehicles
Advanced Computing/Software Development
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Guidance, Navigation & Control (GN&C) and Data Links
High-Speed/Hypersonics
Collaborative Analysis and Decision-making
Integrating Architecture and Capability Demonstrations
Corrosion
Propulsion and Extreme Environments
Guidance, Navigation & Control (GN&C) and Data Links
Machine Perception, Reasoning and Intelligence
Test, Evaluation, Validation, and Verification
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Undersea Weapons
Networks and Communications
Assuring Effective Missions
Resilient Infrastructure
Trust Foundations
Advanced Computing/Software Development
Trust Foundations
Advanced Electronic Protection Techniques and Technology
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Fixed Wing Vehicles (includes UAS)
Networks and Communications
Radio Frequency (RF) (non-EW)
Guidance, Navigation & Control (GN&C) and Data Links
EO/IR Components for sensing, transmission and communication
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RF Components for sensing, transmission and communication
Sensors, Electronics and Photonics
RF Components for sensing, transmission and communication
Information Collection/Management
Preemptive/Proactive Effects
Radio Frequency (RF) (non-EW)
Sensors, Electronics and Photonics
Microelectronic and Nanoelectronics
RF Components for sensing, transmission and communication
Radio Frequency (RF) (non-EW)
Radio Frequency Weapons (RFW)
Machine Perception, Reasoning and Intelligence
Advanced Computing/Software Development
Human Computer Interfaces (HCI) for Decision Making
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Assuring Effective Missions
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Synthesis/Analytics/Decision Tools
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Electronics Integration
Survivability
Acoustic, Seismic and Magnetic
Sensors, Electronics and Photonics
Electronics Integration
Test, Evaluation, Validation, and Verification
Advanced Computing/Software Development
Conceptual, Computational, and World-Wide Environmental Representation
Simulation Information Technology
Aircraft Propulsion, Power and Thermal
Fixed Wing Vehicles (includes UAS)
Information Collection/Management
Survivability
Guidance, Navigation & Control (GN&C) and Data Links
Space and Terrestrial Environmental Monitoring
EO/IR Components for sensing, transmission and communication
Advanced Electronic Protection Techniques and Technology
Unmanned Ground and Sea Vehicles
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Sensors, Electronics and Photonics
Energy storage
Unmanned Ground and Sea Vehicles
Aircraft Propulsion, Power and Thermal
High-Speed/Hypersonics
Power Generation/Energy Conversion
Manufacturing Technology for Affordability
Radio Frequency Weapons (RFW)
Energy storage
High Energy Lasers (HEL)
Radio Frequency Weapons (RFW)
Power and Energy
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Corrosion
Readiness
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Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
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Readiness
Maintainability/Sustainability
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Readiness
Maintainability/Sustainability
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EO/IR Components for sensing, transmission and communication
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EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
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Aircraft Propulsion, Power and Thermal
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Protection, Sustainment, and Warfighter Performance
Sensors, Electronics and Photonics
Protection, Sustainment, and Warfighter Performance
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Maintainability/Sustainability
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Synthesis/Analytics/Decision Tools
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Personalized Assessment, Education, and Training
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Acoustic, Seismic and Magnetic
Undersea Weapons
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Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Synthesis/Analytics/Decision Tools
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
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Cognitive/Adaptive Capabilities
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Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Modeling, Simulation & Test Infrastructure
Undersea Weapons
Computational Research Engineering Acquisition Tools and Environment
Design and Integration
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Structures and Protection
Energy storage
Power Generation/Energy Conversion
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Advanced Electronic Protection Techniques and Technology
Electro-Optical/Infrared (EO/IR)
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
Synthesis/Analytics/Decision Tools
Maintainability/Sustainability
Biomedical Informatics / Health Information Systems & Technology
Combat Casualty Care
Military Operational Medicine
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Propulsion
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Microelectronics and Nanoelectronics
Electro-Optical/Infrared (EO/IR)
Test, Evaluation, Validation, and Verification
EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
Networks and Communications
Networks and Communications
Aircraft Propulsion, Power and Thermal
Electro-Optical/Infrared (EO/IR)
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Unmanned Ground and Sea Vehicles
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Broadband/Multispectral Components and Systems
Cognitive/Adaptive Capabilities
Electro-Optical/Infrared (EO/IR)
Biomedical Informatics / Health Information Systems & Technology
Advanced Computing/Software Development
Synthesis/Analytics/Decision Tools
Biomedical Informatics / Health Information Systems & Technology
Personalized Assessment, Education, and Training
Protection, Sustainment, and Warfighter Performance
Modeling, Simulation & Test Infrastructure
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Human Computer Interfaces (HCI) for Decision Making
System Interfaces & Cognitive Processes
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management
Synthesis/Analytics/Decision Tools
Human Aspects of Operations in Military Environments
System Interfaces & Cognitive Processes
Rotary Wing Vehicles
Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Unmanned Ground and Sea Vehicles
Fixed Wing Vehicles (includes UAS)
Machine Perception, Reasoning and Intelligence
Scalable Teaming of Autonomous Systems
Unmanned Ground and Sea Vehicles
Personalized Assessment, Education, and Training
Electronics Integration
Power Control and Distribution
Design and Integration
Maintainability/Sustainability
Modularity
Biomedical Informatics / Health Information Systems & Technology
Survivability
Protection, Sustainment, and Warfighter Performance
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Design and Integration
Mobility
Human Computer Interfaces (HCI) for Decision Making
Design and Integration
Modularity
Unmanned Ground and Sea Vehicles
System Interfaces & Cognitive Processes
Fixed Wing Vehicles (includes UAS)
Information Collection/Management
Electro-Optical/Infrared (EO/IR)
Broadband/Multispectral Components and Systems
Power Control and Distribution
Power Generation/Energy Conversion
Modeling, Simulation & Test Infrastructure
Radio Frequency Weapons (RFW)
EO/IR Components for sensing, transmission and communication
Networks and Communications
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
EO/IR Components for sensing, transmission and communication
Survivability
Unmanned Ground and Sea Vehicles
Electro-Optical/Infrared (EO/IR)
Undersea Weapons
Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Acoustic, Seismic and Magnetic
Undersea Weapons
RF Components for sensing, transmission and communication
Networks and Communications
Networks and Communications
Electronic Materials
RF Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
Energy storage
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Networks and Communications
Broadband/Multispectral Components and Systems
RF Components for sensing, transmission and communication
Power Control and Distribution
Assuring Effective Missions
Resilient Infrastructure
EO/IR Components for sensing, transmission and communication
Preemptive/Proactive Effects
Electro-Optical/Infrared (EO/IR)
Guidance, Navigation & Control (GN&C) and Data Links
Scalable Teaming of Autonomous Systems
Networks and Communications
Trust Foundations
Guidance, Navigation & Control (GN&C) and Data Links
Electronics Integration
EO/IR Components for sensing, transmission and communication
Design and Integration
Mobility
Sensors, Electronics and Photonics
Machine Perception, Reasoning and Intelligence
Information Collection/Management
Synthesis/Analytics/Decision Tools
Collaborative Analysis and Decision-making
RF Components for sensing, transmission and communication
Information Collection/Management
Networks and Communications
Broadband/Multispectral Components and Systems
Radio Frequency (RF) (non-EW)
Microelectronics and Nanoelectronics
Broadband/Multispectral Components and Systems
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Machine Perception, Reasoning and Intelligence
Collaborative Analysis and Decision-making
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Advanced Computing/Software Development
Information Collection/Management
Maintainability/Sustainability
Aircraft Propulsion, Power and Thermal
Combat Casualty Care
Military Infectious Diseases
Power Generation/Energy Conversion
Acoustic, Seismic and Magnetic
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Assuring Effective Missions
Survivability
Maintainability/Sustainability
EO/IR Components for sensing, transmission and communication
Machine Perception, Reasoning and Intelligence
Unmanned Ground and Sea Vehicles
Electro-Optical/Infrared (EO/IR)
Propulsion
Power and Energy
Propulsion and Extreme Environments
Machine Perception, Reasoning and Intelligence
Networks and Communications
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
Protection, Sustainment, and Warfighter Performance
Networks and Communications
Distributed/Coordinated/Net-Enabled Systems
Survivability
Electronics Integration
Collaborative Analysis and Decision-making
Computational Research Engineering Acquisition Tools and Environment
Design and Integration
Modeling, Simulation & Test Infrastructure
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Electro-Optical/Infrared (EO/IR)
Fixed Wing Vehicles (includes UAS)
Maintainability/Sustainability
Readiness
Microelectronics and Nanoelectronics
Machine Perception, Reasoning and Intelligence
Information Collection/Management
Electro-Optical/Infrared (EO/IR)
Protection, Sustainment, and Warfighter Performance
Sensors, Electronics and Photonics
Protection, Sustainment, and Warfighter Performance
System Interfaces & Cognitive Processes
Advanced Computing/Software Development
Computational Research Engineering Acquisition Tools and Environment
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Acoustic, Seismic and Magnetic
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Acoustic, Seismic and Magnetic
Radio Frequency (RF) (non-EW)
Protection, Sustainment, and Warfighter Performance
Aircraft Propulsion, Power and Thermal
Fixed Wing Vehicles (includes UAS)
Power Generation/Energy Conversion
Rotary Wing Vehicles
Protection, Sustainment, and Warfighter Performance
Energy storage
Power Control and Distribution
Power and Energy
Propulsion and Extreme Environments
Ordnance
Energy storage
Power and Energy
Test, Evaluation, Validation, and Verification
Synthesis/Analytics/Decision Tools
Modular/Open/Reconfigurable Architectures
Collaborative Analysis and Decision-making
Readiness
Structures and Protection
Aircraft Propulsion, Power and Thermal
Corrosion
Propulsion and Extreme Environments
Readiness
Sensors, Electronics and Photonics
Structures and Protection
Electronics Integration
Networks and Communications
None
None
None
None
Aircraft Propulsion, Power and Thermal
Fixed Wing Vehicles (includes UAS)
None
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Contact:
Rafael Mandujano
rmandujano@tritonsys.com
(978) 856-4193
http://tritonsys.com/

SYSCOM: NAVSEA
Contract: N68335-19-C-0199
WHO

SYSCOM: NAVSEA
Sponsoring Program: NAVSEA
Transition Target: PMS 485, Maritime Surveillance Systems Program Office
TPOC: (401)832-5184
Other transition opportunities:

WHAT

Operational Need and Improvement:
The SURTASS array is subject to drooping on the far end as ship velocities decrease and to bending and turning due to currents. Consequently, the array’s acoustic performance is degraded, since array sensors are not in a perfectly straight line. Additionally, it is possible for the array to be inadvertently dragged on the ocean bottom when being towed at slow speeds (or halted completely), which can cause physical damage. A persistent performance shortfall is caused by the fact that a purely passively operated towed array that is thousands of feet long and deployed in the open ocean is not going to be as linear as is required to achieve the expected performance from beamforming and acoustic data processing.

Specifications Required:
Autonomously straighten the array to within +/- two feet of center on each axis and protect itself from bottom damage (due to an unplanned stoppage in tow operations or ship navigation into shallow water) without intervention from an operator.

Technology Developed:
Towed arrays are idealized as straight lines in the water, but the ocean environment disturbs the system and makes it difficult to measure. We are developing a capability for the SURTASS towed array that will straighten the array to improve acoustic performance.

Warfighter Value:
Improved acoustic performance leads to improved ability to detect threats in a wider variety of operating environments.

HOW

Projected Business Model:
Triton plans to work with towed array prime contractors to license and include our technology with the array system.

Company Objectives:
Triton is seeking contacts with potential towed array primes and customers that have an interest in array straightness and bottom avoidance.

Potential Commercial Applications:
Including other Navy platforms (ships and submarines), the oil exploration industry, and ocean scientists using similar acoustic arrays. All of these commercial applications would benefit for the reasons listed above.

Contract Number: N68335-19-C-0199  Ending on: December 19, 2019

**Milestone** | **Risk Level** | **Measure of Success** | **Ending TRL** | **Date**
---|---|---|---|---
Model Validation Data Collection | Med | Correlated hydrodynamic model | 3/4 | December 2019
Initial Prototype Testing | Med | Pass functional testing | 5 | December 2020
Engineering Prototype Validation | Med | Meet straightening requirements | 6 | December 2021
Acoustic Performance Validation | Med | Meet acoustic performance requirements | 6 | December 2022

Contact: Rafael Mandujano, Director, Ocean Systems
rmandujano@tritonsys.com  978-856-4193