The DON's Open for Business!

Small Business Showcase

Instructions for participation:

1. Fill out the form in its entirety. Any submissions that aren't fully complete will not be reviewed.
2. A challenge must be selected. Please use the description box to elaborate on how your company/idea can help the DON overcome the chosen challenge.
3. Form name must read:
    a. **[Your Company Name] - [Challenge #] (Example: Cyber Group – Challenge 2)**
4. When submitting the form be sure to use the following email subject line:
    a. **2024 Small Business Showcase - [Your Company Name]**
5. Email form to osbp.pao@navy.mil, destiny.n.white7.civ@us.navy.mil, amber.n.donnelly2.ctr@us.navy.mil, jsimpson@navyleague.org
6. Please send one submission form at a time; Companies may submit for multiple challenges; however, forms must be submitted in separate emails.

Challenges Are:

1. **Obsolescence Management.** (**NAVSUP)** Weapon System Obsolescence Management and Resolution Support. NAVSUP Weapon Systems Support (NAVSUP WSS) provides program and supply support for the weapon systems that keep our naval forces mission ready by exercising centralized control of more than 430,000 different line items of repair parts, components, and assemblies and providing global logistics support to our Navy's ships, aircraft, submarines, and weapon systems. As part of supporting legacy platforms NAVSUP frequently needs to address diminishing manufacturing sources and material shortages. In support of this challenge, NAVSUP is interested in understanding small business capabilities for reverse engineering/ technical data package development and weapon system obsolescence management.
2. **Advanced Autonomy for Unmanned Maritime Vehicles (UMVs).** (**ONR)** The DoN -- through ONR -- is seeking innovative solutions from domestic small businesses that address critical Naval needs in next-generation autonomy for unmanned

maritime vehicles. This should involve developing software that enables these UMVs to operate effectively in complex and challenging maritime environments with minimal human input, especially in situations with limited communication. Your solution should aim to improve the UMVs' ability to handle tasks independently, focusing on technological advancements in autonomous control. For more details, you can refer to the full description here.

3. **Unmanned Air Vehicles (UAV) Data Collection & Processing. (NAVAIR)** An Unmanned Air Vehicles (UAV) needs onboard, real-time data collection and processing abilities that adapt based on dynamic mission, situational, and environmental parameters. UAV design needs to be able to scale with the addition of new assets without impacting its own UAV security, availability, throughput, or reliability. UAVs conducting missions involving sensitive data, such as ISR-T, will require secure operational architecture design for operation and data storage. The use of additional information assurance (IA) and cybersecurity solutions are needed to ensure the confidentiality and integrity of sensitive data.

Please note: Participation in this event is not a solicitation for any business opportunity, guarantee or promise of any award, contract, commitment, or endorsement from the Department of the Navy.

This event is open to the public. Do not include or disclose any confidential or proprietary information during presentation.

Challenge 2: Advanced Autonomy for Unmanned Maritime Vehicles (ONR)

OBJECTIVE: Develop next-generation autonomy that will increase the capability and scope of utility of Unmanned Maritime Vehicles (UMVs), while decreasing the level of remote human operator involvement.

Description: The Navy SBIR Topic N244-D04 aims to enhance the autonomy of Unmanned Maritime Vehicles (UMVs), including both surface and underwater vehicles. The goal is to enable these UMVs to operate in more varied situations and perform a wider range of tasks autonomously, even in low

bandwidth or no communication scenarios. This requires developing advanced autonomous control software capable of making decisions in uncertain, dynamic, and unstructured maritime environments. The focus is on elevating technologies to higher levels of readiness (TRL 1-4) to achieve more complex task handling, such as maneuvering around uncooperative vessels and optimizing distributed sensor networks. The Department of the Navy SBIR/STTR 24.4 Broad Agency Announcement (BAA) is in pre-release, will open for proposal submissions on Feb 1, and close on March 5.

Next-generation autonomous control for UMVs will increase the capability and scope of utility of UMVs by enabling the UMV autonomy to be used in a much greater number of situations than it can be today, with high degrees of resilience and reliability. The desired future autonomy for UMVs will have the following four capabilities:

1. ability to perform complex tasks with little to no human intervention,
2. ability to handle dynamic, unstructured, uncertain and harsh maritime environments,
3. can support a variety of diverse missions and tasks,
4. support many heterogeneous UMVs that cooperate autonomously on their perception and decision-making, with the UMVs in that group performing a variety of different tasks.

We're looking to create groups of unmanned boats (UMVs) that can intelligently work together using minimal computer resources. Your task is to draw inspiration from nature, like how fish or birds move in harmony, to develop these autonomous systems. These boats must adapt to changing conditions and unexpected movements of other vessels, without human intervention. We're starting with early-stage technology. Testing will include simulations and small-scale models. The systems should be adaptable across various UMVs and comply with maritime autonomy standards, documenting any deviations from these standards.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required in order to satisfy the requirements of Phase I:

- Proposals must show that the Offeror understands the current state of the art in UMV autonomy and explain how the proposed approach will advance the state of the art.
- Proposals must describe in detail the Offeror’s concept for maritime autonomy for UMVs. The proposal should clearly explain the rationale for the selection of the proposed concept for next-generation autonomy and how it will satisfy the four capabilities of this topic within the two constraints stated in the Description section above. This rationale must be clearly supported by, for example, analysis, testing in simulation, and/or small scale-model testing. Approaches to next-generation autonomous control that are adapted from systems other than UMVs are of interest and approaches that leverage previous research in this area are also of interest.

- The proposal should describe the approach to testing of the next-generation autonomy algorithms. The proposal must provide a clear explanation of the feasibility of the proposed testing methodology.

For more details, you can refer to the full description here – **https://navysbir.com/n24_4/N244-D04.htm**

Challenge: 3 Unmanned Air Vehicles (UAV) Data Collection & Processing. (NAVAIR)

An Unmanned Air Vehicles (UAV) needs onboard, real-time data collection and processing abilities that adapt based on dynamic mission, situational, and environmental parameters. UAV design needs to be able to scale with the addition of new assets without impacting its own UAV security, availability, throughput, or reliability. UAVs conducting missions involving sensitive data, such as ISR-T, will require secure operational architecture design for operation and data storage. The use of additional information assurance (IA) and cybersecurity solutions are needed to ensure the confidentiality and integrity of sensitive data.

Challenge Statement

- In need of AI/ML applications to enable autonomous systems and human-intelligent agent teaming; scalable and collaborative behaviors in support of heterogeneous air and ground manned-unmanned teaming (MUM-T) intelligence, reconnaissance and surveillance operations.
- In need of AI/ML methods to increase UAV's onboard understanding, manipulation, and reflexive in dynamic environments using perception, decision making, and adaptive behaviors in contested environments in performing MUM-T operations.
- In need of Visibility-Aware Route Planning to ensure coverage of critical / obscured threat areas and specifically areas that are beyond line of sight
- In need of Closed-Loop Sensing couples vision processing and UAV control to maximize recognition accuracy; Finding Objects via Closed-Loop Understanding of the Scene (FOCUS) improves algorithm performance through smart sensor positioning
- In need of Advanced Threat Classification combining pre-trained and online detectors (ATR) for enhanced detection / recognition with lower computational footprint.
- Develop architectures, algorithms, data sharing approaches, and control methodologies to enable scalable numbers of heterogeneous, air and ground intelligent systems to collaboratively perform (autonomous and semi- autonomous) maneuver for operations; investigated methods, metrics, and tools to facilitate, simulate, and enable testing and evaluation of emerging approaches for individual and collaborative intelligent systems in relevant constraints and environments.
- Develop methods for metric- and semantic-based world models as well as small unmanned aerial system and unmanned ground system coordinated maneuver; validate methods to enable

tactically-informed behaviors and maneuver of autonomous systems under relevant constraints and environments. I

- Develop methods and conduct experiments to increase operational speed and environmental complexity for air and ground based autonomous vehicle perception, learning, reasoning, navigation, and physical capabilities to augment and increase the freedom of maneuver in complex and contested environments.
- Develop methods to rapidly identify and adapt on the fly to changing UAV mission tasks; create methods and techniques that allow for longer-duration UAV autonomy, measured by time between intervention; conduct experiments to increase operational speed and distances in complex terrain.
- Develop applications to integrate complex and varying terrain awareness and UAV capability into tactical decision-making process enabling cooperation with multiple air and/or ground autonomous agents for improved maneuvers in complex terrain engaging UAV perception, learning, reasoning, navigation and physical maneuver.
- Develop UAV autonomous tactical behaviors contextualized in perimeter defense and pursuit-evasion which are resilient to adversarial threats, accounting for UAV team maneuver relative to defending agents and anticipated attrition.
- Develop cost effective communication systems for use in Anti-Access and Area Denial (A2AD) environments via UAV-assisted Intelligent Radio Access Network operating as a Beyond 5G (B5G) base station or relay in a Resilient Tactical Networks.
- Develop and demonstrate Neuromorphic Computing Devices (NCDs) and Weightless Spiking Neural Networks (WSNNs) algorithms, models and simulation tools applicable to small tactical unmanned air systems and smart munitions performing electronic warfare operations in a collaborative high-density threat environment battlespace.
- Develop and demonstrate a compact battery-operated mid-wave infrared (MWIR) hyperspectral imaging (HSI) video camera that enables real-time hyperspectral video imaging with over 24 frames per second, high spatial resolution (1024 x 1280 pixels) and spectral resolution (<5 nm), and size and weight > 20X improvement over conventional HSI camera.
- Develop capability for an Unmanned Air Vehicle (UAV) to autonomously detect platform induced bioluminescent disturbances and collapse bubbles, and provide a real-time platform classification by applying artificial intelligence (AI) and machine learning (ML) techniques to an above-water observer.
- Develop wideband multi-function radio frequency payloads using an innovative Modular Open Systems Approach that is scalable across Unmanned Aerial Systems (UAS) Groups 1 through 3 with Electronic Warfare (EW); Radar; Command, Control, Computing, Communications, Cyber, Intelligence, Surveillance, Reconnaissance and Targeting (C5ISRT); and edge-based High-Performance Computing (HPC) capabilities.
- Develop a method for Automatic Target Recognition (ATR), Tracking, and Targeting of platforms in multiple domains including Electro-optical, Synthetic Aperture Radar (SAR), and RF domains. Solutions shall meet small UAV Size, Weight, and Power + Cost (SWaP+C) requirements and to be operated independently at the tactical edge with no cloud computing. The solution should leverage advanced computing architectures such as neuromorphic architectures, AI/ML for Multi Domain Operations (MDO).

- Continued miniaturization of embedded signal processing to allow multiple missions to be carried out by a small UAS in flight without returning to base for swap out of payloads.