DOD Issues Electromagnetic Warfare-Related Small Business Research Topics

The Department of Defense is soliciting proposals under its Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs, several of which address electromagnetic warfare (EW) and signals intelligence (SIGINT) technology applications. SBIR and STTR contracts typically begin with Phase 1 feasibility studies valued at no more than $240,000. Some of these are selected for software or hardware development under Phase 2. Occasionally, when a research topic is well understood, it might proceed directly to Phase 2. A very small number of topics will reach Phase 3, in which a technology is matured and demonstrated, for example on an existing weapon system.

Beginning with the US Navy, it has announced the following SBIR and STTR topics:

N25B-T030: Multi-functional, Microwave Photonic Sensor for Modern Electronic Warfare & Signals Intelligence. The objective of this effort is to "develop a multi-functional, photonics-enabled (MPE) microwave sensor capable of enabling advanced electronic warfare (EW) and signal intelligence applications." According to the topic description, "The Navy seeks development of a photonic microwave sensor based on an environmentally rugged optical frequency comb locked to a compact and fieldable, high-performance optical reference cavity. The optical front end will feed microwave photonic extension modules with diverse functionality including: (a) a broadband spectrum analysis receiver module for the rapid detection and frequency identification of microwave tones between 1–40 GHz, (b) a broadband compressive sensing receiver module for the phase sensitive detection and reconstruction of

microwave tones between 1–40 GHz, and (c) provisions for a future broadband transmitter module for the generation of discrete microwave tones between 1–40 GHz with exceptional phase noise performance."

N252-094: Cue Aggregation Algorithms for Multi-function Receivers. Under this topic, the Navy wants to "invent and develop a set of new algorithms expressed in machine learning (ML) form running on commercial off-the-shelf (COTS) processors that can both aggregate multiple signals into classes of same pattern of emission and locate methods to distinguish look-alike signals from platforms with different spectral signatures or different intentions."

N252-099: Indirect Laser Detection and Characterization Device. Here, the Navy aims to "design, develop and demonstrate critical components and elements for a robust, compact, self-powered (rechargeable batteries), advanced optical sensing system for the detection, classification, and tracking of [an adversary high energy laser] in a cluttered environment to provide [off-axis] early cueing of self-defense systems" either in a body-worn or vehicle-mounted configuration using tiered fixed/mobile networking. It adds, "Due to the rapidly escalating threat that high energy lasers present to Armed Forces of the United States, it is desirable to have reliable early warning system for 'tip off' alert to lasers being used for sensing or damaging personnel or platforms….The capability also may offer measurement and signature intelligence (MASINT) when mounted on remotely operated or autonomous vehicles." The description also states, "Dual sensing sensors, both in visible and near infrared (VIS/NIR), and Short-wave infrared (SWIR) are near-term potentials that should be realized, however additional sensing capabilities in the mid-wave and long wave infrared (MWIR/LWIR) wavelengths are also of high interest areas for potential innovation, but believed to be beyond threshold requirements for a man-wearable or man portable system and

near-term solution for the initial architecture."

N252-111: Dynamic Scheduler for Digital Signal Processing in Software Defined Radios. The description for this topic states, "The Navy now desires [wideband SDR] technology that enables RF system reconfiguration of functionality to be performed dynamically at unit levels in operational environments. If significantly sub-second time scales reprogramming of the processors can be achieved, adaptive and cognitive responses to even densely populated instantaneous signal environments become conceivable." The objective in this effort is to "develop a stable control module for a wideband receiver that adapts in real time to changing mission priorities and the signal environment. This software/firmware module will take a list of signals to be processed and schedule the proper digital signal processing algorithms onto commercial off-the-shelf (COTS) processing cards available within the same server and ensure the signal data arrives on actionable timelines."

N252-115: Low Size, Weight, and Power (SWaP) Phased Array For Vehicle Tracking Using Signals of Opportunity. According to this topic's description, "the Conventional Prompt Strike (CPS) Program would like to use a passive phased array that tracks signals of opportunity (SoOp) to give real-time position updates/corrections to a hypersonic vehicle. Given a known position of a radiating system, the phased array can track the angle of arrival (AoA) of a radiated signal. With the AoA and known position of the stationary system, the position of the vehicle can be estimated. This allows corrections to the inertial measurement unit's (IMU's) drift error. The phased array may use any low earth orbit (LEO) or stationary high-power SoOp." Phase 1 work calls for a feasibility study "to show the use of a passive phased array to track a SoOp and give real-time estimations for the hypersonic vehicle's position. The technology shall show improvements in positional accuracy with varying distance and

incident angles from the SoOp, resistance to power saturation of noisy environment, while minimizing SWaP."

Proposals for the Navy topics listed above are due by May 21.

The US Air Force also announced several SBIR and STTR topics, including:

AFX256-CSO1: Low-Cost Payloads for Electronic Warfare. Under this research topic the Air Force wants to "develop low-cost payloads, along with supporting architecture, for small UAS (sUAS) platforms (Group 3 and below) capable of delivering coordinated and scalable EW effects (e.g., geolocation, jamming, spoofing, etc.) on target, en masse." The project goals include developing an EW system comprised of three or more sUAS, with a price target of $10,000 per system. In addition, the system should use mesh-type networking and utilize off-the-shelf hardware and open-source software. The technical point of contact is Andrew Allen, e-mail andrew.allen.9@us.af.mil.

AFX256-DCSO5: Homeland Convoy Counter Drone Operations. The objective of this "direct to Phase 2" effort is to "develop a system that minimizes the threat a UAS poses to military convoys in non-permissive environments [such as civilian roads and locations] that have the most restrictive rules of engagement." The Air Force wants to develop counter-UAS solutions that "detect UAS around the convoy and establish their trajectories with respect to the convoy. Human teaming with the detection system should be intuitive and cognitively low effort, similar to an alarm system in a security operations center. This system should have the ability to interfere with the UAS operations using Electronic Warfare or other non-kinetic means and have the ability to employ kinetic effectors that produce effects that have a low probability of collateral damage." In addition, the system must be SOSA-compliant. The topic point of contact is Vince Belovich, e-mail vincent.belovich@us.af.mil.

Proposals for these Air Force topics are due by June 25.

The full list of current SBIR/STTR research topics is available at the Defense SBIR/STTR Innovation Portal. – *JED Staff*