SOCOM22D-ST01: Phase I Open Call for Science and Technology (S&T) Innovation

ADDITIONAL INFORMATION

N/A

TECHNOLOGY AREAS:

Battlespace | Electronics | Information Systems | Sensors | Space Platforms | Weapons

MODERNIZATION PRIORITIES:

Artificial Intelligence/ Machine Learning | Autonomy | Control and Communications | Cybersecurity | Directed Energy | General Warfighting Requirements (GWR) | Microelectronics | Network Command

KEYWORDS:

microelectronics; directed energy; cybersecurity; network command, control and communications; autonomy; artificial intelligence; machine learning; general warfighting requirements; sensors; electronics; information systems; battle space; data processing; energy; batteries; situational awareness; computer devices and systems; sensory cues; cyber; stealth; social media; publicly available information; collection; processing; exploitation; dissemination

OBJECTIVE:

The objective of this Open Call for S&T Innovation topic is to develop applied research toward an innovative capability within SOCOM S&T Capability Focus Areas (CFA). The following are the CFAs and areas of interest.

ITAR:

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

DESCRIPTION:

Next Generation Intelligence, Surveillance, Reconnaissance, and Situational Awareness
The focus is to increase and enhance Special Operations Forces (SOF) ability to understand and manage threats and the environment, process multiple data and communications inputs for optimized decision making, and support rapid, on-the-move ability to learn and communicate knowledge to enhance tactically relevant situational awareness in peer/near peer environments. Develop cross-cutting ISR capabilities in all domains, to include sea, air, land, cyber, and space.

The technology areas of interest are intelligence systems and sensors that provide persistent, autonomous, and near-real time CPED (collection, processing, exploitation, and dissemination), leveraging artificial intelligence and machine learning to provide predictive analysis, current operational and intelligence pictures utilizing myriad sensors, LPI/LPD communications, and machine processing to augment the analyst and operator in multiple domains.

1)(U) Collaborative Automation and Minimization of PED through machine learning and other offboarding efforts
2)(U) Exploitation of maritime access opportunities (Data Transport, Platform) to fuse with other domains, e.g. ground, air, cyber.
3)(U) Expansion of ISR operations to include exploitation of cyber, social media, and publicly available information
4)(U) Explore miniaturized space efforts and advocate for SOF equities in larger US Space Command and US Space Force programs to integrate SOF tactical capabilities and technologies with national and strategic capabilities
5)(U) Stealth for sensor and data access, emplacement, access, collection, transport, and fusion

Next Generation Effects
The technology areas of interest are force protection at the edge, non-kinetic scalable effects, Mission Information Support Operations, Electronic Warfare, Cyber Effects, and Tactical directed energy.

Specific technologies of interest within the Cyber Effects category are:
1)(U) Cyber Platforms that have the capability to provide digital and physical situational awareness in connected environments through utilization of IoT devices, networks, and systems.
2)(U) Cyber Applications capable of tracking and exploiting targeted mobile electronics, SCADA systems, and IoT devices.
3)(U) Cyber payloads with deny, disrupt, degrade, or destroy capabilities that are able to be employed to both networked and air-gapped computer devices and systems.

Futures
The overall objective of Futures is to serve as the Command's high-risk, asymmetric, and disruptive concept, capability and technology investigator and incubator. The capability and technology areas of interest are:
1)(U) Utilization of neuromorphic computing for SOF-peculiar data processing and machine learning applications.
2)(U) Characterization and low-rate fabrication of high-performance batteries for SOF-peculiar requirements. Specifically, those with gravimetric energy densities > 700W-h/kg and volumetric energy densities > 1000 W-h/l (Li2-S, Li2-O2, or others).
3)(U) Secure, federated deep reinforcement learning (DRL) for optimization of distributed Deep-Q Networks (DQN) in heterogenous networks. Desired investigation includes reduction of client-server communication to facilitate Edge User operation (limitations on communication bandwidth, data privacy, and other SOF-peculiar concerns).
4)(U) Hypercognition through novel data sensory input, including incorporation and characterization of advanced mathematical elements of multimodal visualization, characterization of haptic, auditory and other sensory cues in data processing.

PHASE I:

Conduct a feasibility study to assess what is in the art of the possible that satisfies the requirements specified in the above paragraphs entitled "Objective" and "Description."

The objective of this USSOCOM Phase I STTR effort is to conduct and document the results of a thorough feasibility study ("Technology Readiness Level 3") to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I STTR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM STTR funds during Phase I feasibility studies. Operational prototypes developed with other than STTR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II:

Develop, install, and demonstrate a prototype system determined to be the most feasible solution during the Phase I feasibility study.

PHASE III DUAL USE APPLICATIONS:

This system could be used in a broad range of military and commercial applications.

REFERENCES:

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2. Liu et all, Apr 2022, Neuromorphic computing for content-based image retrieval https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264364
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6. Zue et al. 2017. Gravimetric and Volumetric Energy Densities of Lithium-Sulfur Batteries li.mit.edu/A/Papers/17/Xue17MiaoCOE.pdf
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magnetic alignment of emulsion-based slurries
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