International SOF Week Collider Event Technology Focus Area 1

Technology Focus Area: Laser-Augmented Midwave Imager (LAMI) Demonstrator

Technology Focus Area Advocate: USASOC, NSW, PM-SOF Lethality, Visual Augmentation Systems

Problem Statement: Midwave Infrared (MWIR) cameras utilized by USSOCOM operators provide valuable imagery to the user, but don't inherently contain the ability to view near infrared (NIR) or short wave infrared (SWIR) lasers.

Operational Vignette: A USSOCOM operator is in an overwatch position utilizing his fielded LAMI in a hand-held form factor, observing an assault element maneuvering towards a compound. He sees NIR lasers through his LAMI from the compound right before hostile fire is focused onto the friendly assault element. The operator in overwatch is able to provide hostile positions to the assault element and help direct fire because he is able to view the enemy's NIR pointers.

Characterization of Successful Prototype:

- The purpose of this TFA is not to develop and build an entire shock-hardened weapon sight or packaged hand-held imager. Rather, it is to develop a build a **prototype demonstrator** (a 'brass board' or 'camera(s) in a box') that is primarily a MWIR imager, but with the ability to see either a NIR or SWIR (ideally, both) laser. Final 'fieldable' packaging is not desired for this effort.
- This could take the form of a single broad-band sensor, or a MWIR sensor + a second NIR or SWIR sensor coaligned with the MWIR sensor. Note that full NIR or SWIR imaging is not required, just the ability to accurately detect the laser or laser spot, and overlay that in the correct position on the MWIR imagery.
- A successful prototype would come with two sets of lenses:
    1. The first set of lenses would enables a user to recognize a human at 1200 meters with the MWIR channel and see a NIR/SWIR laser spot at that same distance.
    2. The second set of lenses would enable a wider field-of-view with the ability to recognize a human at 800m, and see a NIR/SWIR laser spot at the same distance.
- It should be kept in mind that a fielded version of the LAMI would be of the size, weight, and power (SWaP) to be mounted onto an operator's weapon or held in their hand to utilize.

International SOF Week Collider Event Technology Focus Area 2

Technology Focus Area: Acoustic Sensor

Technology Focus Area Advocate: TVS/RSTA, PM TCC, PEO-TIS

Problem Statement: SOF desires a family of interoperable acoustic sensor subsystems, for integration and use across a family of tactical ISR systems. The prototype acoustic sensor subsystem will be integrated into reconnaissance and unattended ground sensor kits.

Operational Vignette 1: The human packable acoustic sensor(s) will be used to detect, locate, track, and possibly classify/identify activity (personnel, animal, vehicle, vessels, etc.) at range in ground ISR missions and be subjected to the elements of solar, rain, snow, and wind. The acoustic subsystem will operate for multiple days while left unattended and will be remotely projected on a user interface that supports human-in-the-loop and potentially autonomous machine software.

Operational Vignette 2: The human packable acoustic sensor(s) will be used to detect, locate, track, and possibly classify/identify activity (personnel, animal, vehicle, vessels, etc.) at range in maritime ISR missions and be subjected to the elements of solar, rain, snow, wind, and extended full water submergence. The acoustic subsystem will operate for multiple days while left unattended and will be remotely projected on a user interface that supports human-in-the-loop and potentially autonomous machine software.

Characterization of Successful Prototype OV-1: A human packable device that can withstand the external elements of solar, rain, snow, and wind that can classify/identify activity (personnel, animal, vehicle, vessels, etc.) at a high confidence level. This device must have the appropriate battery power to survive multiple days while being able to be remotely projected onto a user interface that supports human-in-the-loop and potentially autonomous machine software.

Characterization of Successful Prototype OV-2: A human packable device that can withstand the external elements of solar, rain, snow, wind, and extended full water submergence that can classify/identify activity (personnel, animal, vehicle, vessels, etc.) at a high confidence level. This device must have appropriate battery power to survive multiple days while being able to be remotely projected onto a user interface that supports human-in-the-loop and potentially autonomous machine software.

International SOF Week Collider Event Technology Focus Area 3

Technology Focus Area: C5I / Sustainment and Protection / “Digital” Camouflage

Technology Focus Area Advocate: SOF AT&L-ST

Problem Statement: How Might Special Operations and Partner Force Teams Operate in Future operating environments exhibiting omnipresent sensors and intelligence collection? The joint and partner special operations warfighters require new disruptive approaches to successfully operate in a future operating environment where continuous remote surveillance and monitoring is the norm.

Operational Vignette 1: Command, Control, Communications, Computing, Cyber and Intelligence problem set: How would joint (US) and partner SOF warfighters share and fuse information into a common architecture, enabling all levels of the force to make better decisions. Key aspects to be considered include multi-level security, tailorable encryption, network architecture, challenging environmental conditions, including intentional and unintentional jamming. Desired outputs/products should support a common operational picture that can be uniquely tailored.

Operational Vignette 2: Sustainment: How can we enable SOF peculiar logistics in Crisis and Conflict phases or Interchangeable logistic with “by/with/thru” partners. Key aspects to be considered include consideration of extended periods of operation (e.g. 40 days for a team of 12-20 warfighters) without access to re-supply, potential for pre-placement, extended ranges and terrain (consider Africa or the Indo-Pacific as use cases), harsh physical environments with extreme temperature conditions, etc.

Operational Vignette 3: Operations: How can we reduce/conceal/eliminate Joint and Partner Force SOF operators’ signature in the virtual/digital domain in the same way that camouflage is used in the physical domain? This domain includes cyberspace as well as the electro-magnetic spectrum. Key aspects to be considered include consideration of personally identifying information, widely employed commercial sensors, employment of publicly or commercially available information/databases, etc.

Characterization of Successful Prototype OV-1: A successful prototype (hardware or software) will be able to be used by SOF warfighters in simulated exercises and experiments to aid in the development of future TTPs and requirement generation.

International SOF Week Disrupter Event Categories

DISRUPTIVE opportunities that the US Government can successfully action are expected to be in the Technology Readiness Level (TRL) 3-5 range, but this will not be a limiter during review of anything proposed outside of these levels.

Emplacement and Access disruption:
Special Operations is interested in technologies and solutions associated with medium lift vertical take-off and landing capabilities. Proposed disruptions should support never before attained range, speed, and capacity.

Special Operations is also interested in enabling runway independent platforms and technologies to support logistics, mobility, sensing, and strike.

Scalable and Precision Effects disruption:
Special Operations is interested in intelligent kinetic and non-kinetic focused strike platforms and/or weapons that can be integrated capabilities that can be integrated into diverse delivery mechanism usable by US and international partners and allies independently or working jointly. A variety of approaches will be considered. Exemplar conditions may include: 1) small, unsupported operational unit deployed without immediate technical support (assume a 14-30 day independent mission with a team of 10-40 personnel). 2) Joint US, partner force, and potentially international civil organizations such as coastal defense forces, fire/police services, etc. operating multiple teams (up to 100 teams of 2-20) across distances ranging from 10 km to 150 km. 3) Joint US, partner force enterprise The logistics and operations of such systems can/should be organic, asymmetric, scalable (size and quantity), expeditionary, concealed and/or clandestine with minimal personnel and expertise. Proposed disruptions should enable or support never attained range, speed, automation, awareness (multiple senses), operation and transition between environments (ground, air, sea, space), and safety.

Special Operations is interested in sensing further than has ever physically been done in history. The disruptions can be any singular sensing capability or technology (e.g. visual, acoustic, electromagnetic, environmental, cyber, other), but would be advantageous when new methods of combined sensing is effective. Within the sphere of advanced sensing the application of the sensing capability understands and provides higher level information and/or intelligence to the operations (e.g. understanding patterns of life, independently cue US and/or US/Partner operational teams when anomalous conditions arise, etc.) Increasing the speed and accuracy every detail in an operational environment and reducing the cognitive load of the user or operator(s) is the focus for this interest. Technology and system size, weight, power, automation, range, accuracy, and administration (networks, Command and Control, security) will all be major factors to consider in any disruptive response.

Multiple Domain Communication and Computing disruption:
Special Operations is interested to enable small unit operations with advanced multi-scale compute, and multi-layered communication networking technologies. Small units may include people, platforms (small, medium, large, SOF, non-SOF, DoD, non-DoD, partners), sensors, partners, local resources, strategic resources, support teams and services. Distribution of coordinated nodes and resources across multiple capabilities and ranges is expected. Disruptions are expected to enable or provide ubiquitous connectivity and information from any source, protected at all layers (DoD standards) with layered and intelligent protections and redundancies to ensure no-fail information to appropriate users. The use of multiple electromagnetic, optical, acoustic, other sciences to enable this disruption is expected through phases of operation.

Special Operations is interested in science and technology in independent or stand-alone Position and Timing capability that provides equal to or better P&T than current commercial Global Positioning Satellite (GPS) solutions. Disruptions need to reduce and remove the use of any reference through days of operation without reducing the quantity of position or timing at appropriate levels. Disruptions must be open to platform and system integrations and would be most beneficial to use the same interfaces and standards to seamlessly integrate into systems that GPS currently provides the service.