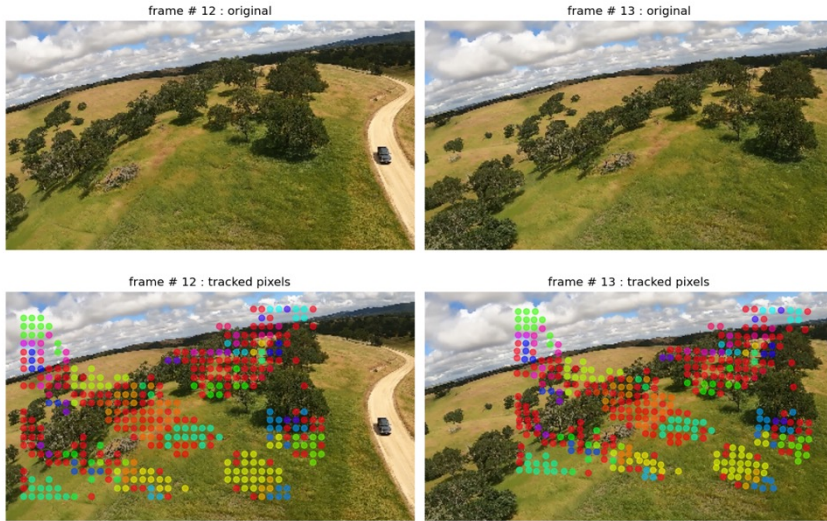




A-03: GPS-Denied Navigation & Autonomy: Vision Based Navigation System



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Rhoman Aerospace
Principal Investigator:	Thomas Youmans
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Both Federally & Internally

PROPOSED EXPERIMENT OVERVIEW

Testing of GPS-Denied Navigation & Autonomy: we plan to measure the modelled performance and flight routes of UAV flying without GPS using the vision-navigation solution that we're developing versus the measured performance of the vehicle. We aim for tests to, from, and around the CACTF area as well as up along Generals Rd in the tree/nature environment.

SYSTEM DESCRIPTION

The core technology of the system is a no-Emit GPS-Denied UAV Navigation system that allows a UAV to fly towards the rough area of a target in a GPS denied environment, identify and find the target, performance reconnaissance and take photos of the target, and return to launch, without GPS. The system uses various passive sensors and compute elements to deploy the algorithms that create the solution.



A-04: Sustained Autonomous overwatch/Patrol



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Airrow
Principal Investigator:	David Kaye
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Autonomous sustained UAS flight - with fully autonomous battery swapping / mission execution and regeneration.

SYSTEM DESCRIPTION

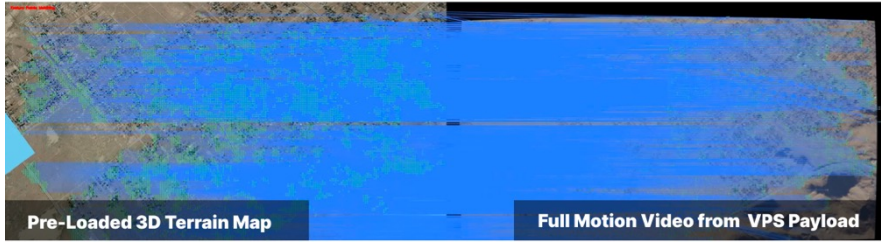
The Dronehub is the robot on the ground that replaces humans for UAS ground operations. The Airrow Dronehub is a computer vision powered robotic drone station. It houses smart battery bays, for rapid charging, payload bays for swapping out sensors from onboard the UAS, or for swapping out munitions, enabling the UAS to deploy munitions from the air, return for a reload and go back out for another mission - Autonomously, and with no humans on the ground - truly exploring the future of warfare.



A-05: Visual Positioning System (VPS)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Vermeer
Principal Investigator:	Austin Denhardt
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Vermeer's Visual Positioning System (VPS) uses computer vision algorithms to provide personnel, robots, and drones with global 3d location.

Vermeer intends to test drones flying on VPS position only without GPS input in order to enable autonomous missions in GPS denied, degraded, or spoofed environments.

SYSTEM DESCRIPTION

Vermeer's VPS uses EO/IR sensors, an edge compute device, and computer vision software to estimate global 3d position. The software combines map-matching, Simultaneous Localization and Mapping (SLAM), and integrator algorithms to estimate position and provide the drone with a GPS-like navigation coordinate.



A-06: Targeting In a GPS Denied Environment

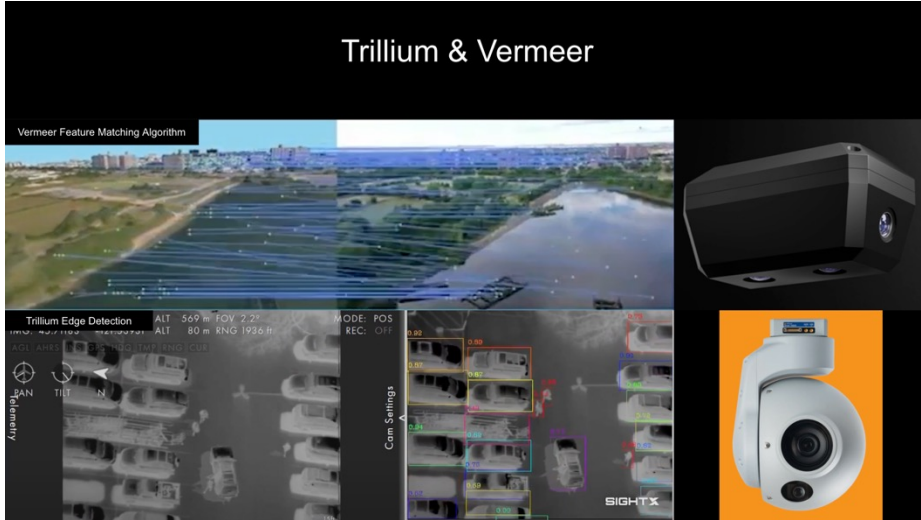


Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

PROJECT INFORMATION

Organization Name:	Trillium Engineering & Vermeer
Principal Investigator:	Austin Denhardt
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Both Federally & Internally

Trillium & Vermeer



PROPOSED EXPERIMENT OVERVIEW

Trillium Engineering and Vermeer intend to collaborate to solve the problem of targeting in a GPS denied environment. Vermeer’s visual positioning system accomplishes global localization for UAS platform navigation using computer vision. These estimates will be fed to Trillium's 1) Target Geolocation algorithm and 2) Automatic Target Recognition software. Then, experimenters will attempt to identify the position of features/targets around Camp Roberts without using GPS location.

SYSTEM DESCRIPTION

Trillium – Trillium’s gimbal provides EO and IR imagery to detect, track and classify objects of interest, as well estimating the location of targets in the image based on inputs from Vermeer's VPS.

Vermeer - VPS uses EO/IR cameras, an edge compute device, a pre-existing 3D map, and AI/ML algorithms to enable UAS to derive 3D position for navigation and targeting.



A-07: Skynet - Mission Based UAS Swarming - **POSTPONED**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Kraus Hamdani Aerospace, Inc.
Principal Investigator:	Stefan Kraus
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

KHA will demonstrate the endurance & swarming of multiple K1000ULEs (3 or more) airborne simultaneously while conducting ISR/EW and communications provisioning. With an EW payload, we gather signals of interest (SOI), provide Lines of Bearing (LoB), and geo-locations. High Confidence Grid (HCG) coordinates are determined from EW, which will cue the K1000ULE's FMV camera to slew and identify the emitter. Once the emitter is identified, KHA will send a COTS message over the network to display on the digital COP.

MOP:

1. Daily flight sortie endurance hours, distance flown & operating altitude
2. Provision communications for other technologies
3. Number of SOIs identified and geo-located (HCG) with EW payload and identified with on board ISR sensor

MOE:

1. Provide EXCON with greater situational awareness on the digital COP with information provided by ISR and EW payloads.

SYSTEM DESCRIPTION

The K1000ULE is a fully electric, solar-powered Group-2 UAS with a demonstrated endurance of 26 hours. The K1000ULE is a tactical UAS capable of integrating a variety of mission support payloads to include: SOCOM-defined modular payloads. Intelligence, Surveillance, and Reconnaissance (ISR), Communications Provisioning, Signals Intelligence (SIGINT), Electronic Attack (EA), Electronic Intelligence (ELINT), Radio Frequency (RF) Survey and RF based Intelligence, Surveillance, and Reconnaissance (ISR) Targeting. Through multiple/redundant onboard systems, the K1000ULE can operate in contested environments to ensure the required coverage is available for operations in austere environments. To meet the mission requirements of operating in austere environments anywhere in the world, the K1000ULE can be launched from a vehicle-borne cradle or configured for vertical takeoff and landing (VTOL).



A-08: Short-haul drive & fly personnel/cargo movement



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	NFT Inc (d/b/a ASKA)
Principal Investigator:	Maki Kaplinsky
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Our drive and fly eVTOL is a size of a SUV in drive mode, capable of VTOL (Vertical Takeoff and Landing) and STOL - Short Takeoff and Landing. Full electric hybrid system with range extender (lithium ion batteries + gas-powered engine). We would like to experiment how the vehicle can be efficiently used as short-haul drive&fly cargo/personnel movement using road for driving, helipad for VTOL, and runway for STOL. Our experiment will not involve the actual flight yet, but involves :

- driving
- transition from the drive mode to the VTOL mode
- the transition from the drive mode to STOL mode
- transition from flight mode to drive mode
- driving in and out of the airfield in the drive mode

The data throughout the operations is collected through the sensors integrated

SYSTEM DESCRIPTION

Our vehicle is the world's first drive and fly eVTOL (electric vertical takeoff and landing) vehicle that can drive as a car on the road, capable of VTOL and STOL, and fly as an aircraft. We have the full scale working prototype to measure our experiment.



A-09: Phalanx Shield Multi-Domain



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

PROJECT INFORMATION

Organization Name:	Innovative Algorithms
Principal Investigator:	Jay Chestnut
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Experiment will test aircraft speed, altitude, endurance, and communications characteristics of the sUAS under development as well as the performance of the UAS detection module as integrated into the overall Phalanx Shield system.

SYSTEM DESCRIPTION

The Phalanx Shield sensor system with integrated small UAS and other detection equipment and software





A-10: GreenSight SA4 - Secure Advanced Aerial Attributable Asset



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Greensight
Principal Investigator:	Mitch Jones
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

GreenSight plans to test our new fixed wing UAS, ILED SA4. This is an electric long range UAV designed to operate autonomously in swarms at long range. In this experiment, we plan to obtain flight data on various modes of flight, including takeoff, climb, cruise, dash, and landing. During these flights we plan to obtain power and control logs to give us insight into the efficiency and stability of the aircraft in various conditions. JIFX presents a unique opportunity to test our aircraft at higher altitude and higher speed than what we are allowed to do under public airspace regulations. Flight data obtained during this experiment will be very valuable in understanding the limitations of the airframe.

SYSTEM DESCRIPTION

ILED SA4 is a fixed wing, electric, autonomous UAS. It has a wingspan of approximately 2 meters and a flight weight of approximately 35 lbs. It is powered by a single electric motor located on the tail of the aircraft and has control surfaces on the wings and tail. The aircraft is designed to be pneumatically launched through its central tail boom, though in this experiment it will be taking off and landing using landing gear from a runway. Command, control, and telemetry are done via a wireless link and the UAV is capable of autonomous flight using GPS and other sensors. The heart of the avionics is the GreenSight UltraBlue NDAA compliant flight control stack.



A-11: Laila Ground Testing



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Odys Aviation
Principal Investigator:	Axel Radermacher
Technology Readiness Level:	
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Test the in field assembly capability of the Laila drone in a simulated austere environment. Aircraft will be shipped in a commercial trailer with dimensions similar to a shipping container. Aircraft will be assembled and field commissioned using common hand tools. Similarly, aircraft will be disassembled and packed for return shipment.

SYSTEM DESCRIPTION

Odys is developing Laila, a Group 3 VTOL drone capable of delivering a 50 lb payload 250 miles or 100lb payload 100 miles. The aircraft has a wingspan of 6.8m, length of 5.0m, and an MTOW of 300kg. The propulsion system is hybrid, using both a JP8 powered turbine and batteries (charged in flight). The drone is designed to be deployed via shipping container and field assembled in austere environments.



B-01: Legion



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

PROJECT INFORMATION

Organization Name:	Swarm Aero
Principal Investigator:	Oliver Palmer
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Cost reduction through human-in/on-the-loop control of many live and virtual UAS operating 1000 miles away from the operator, in several dynamically adjusted missions.

SYSTEM DESCRIPTION

Legion is a cloud-based, Modular Open Systems Approach (MOSA)-compliant, aircraft agnostic, multi-aircraft command, control, and communications (C3) software platform.





B-04: WeatherHive Swarming Meteorological Measurement System



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Eli Davis
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UXS) Design, Deployment, Operation, Networking and Control
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

This experiment will test deployment and control of a swarm of nano drones. Each aircraft will gather meteorological measurements and perform takeoff, landing, and coordinated control from a central hive ground station.

SYSTEM DESCRIPTION

Weatherhive is a reusable, low cost, on demand, 1D-3D meteorological sounding system which provides real-time weather intelligence in austere environments. The system is based on a swarm of 250g nano drones deployed from a hive ground station which provides charging, deployment, and communication/control.

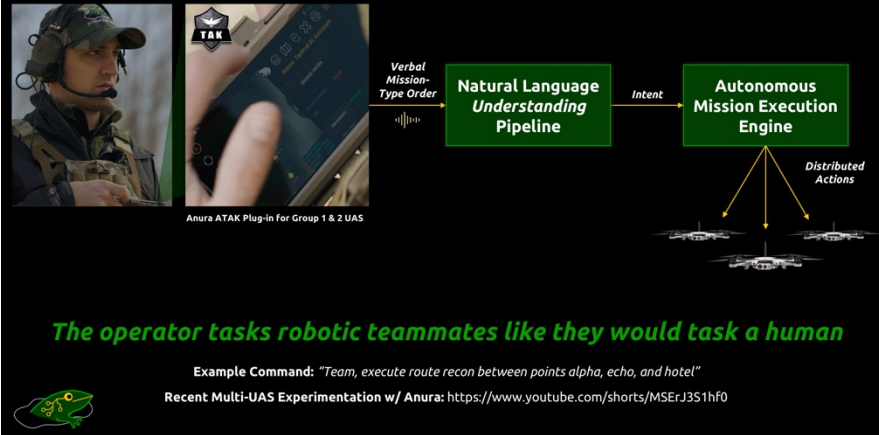


B-06: Anura: Tactical AI Assistant for UxS **POSTPONED**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

Anura for Multi-UxS Control Experiment Overview



PROJECT INFORMATION

Organization Name:	Primordial Labs
Principal Investigator:	Mick Adkins
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Both Federally & Internally

PROPOSED EXPERIMENT OVERVIEW

Our experiment is focused on using our Tactical AI Assistant, Anura, to control teams of heterogeneous UxS. We will use Anura’s Conversational Human-Machine Interface (C-HMI) to task the team of UxS via team-level and direct (via call-sign) mission-type orders. We will be measuring how well Anura’s autonomy engine translates the intent of the operator to tasking for each UxS. We will also be assessing how well the engine carries out the tasking.

SYSTEM DESCRIPTION

Primordial Labs is developing Anura, a Tactical AI Assistant for UxS that drastically reduces operator cognitive burden.

Anura provides a simple and intuitive Conversational Human-Machine Interface (C-HMI) to make tasking robots, like UAS, just as simple as talking to a human teammate.

This C-HMI is paired with our modular, platform-agnostic autonomy engine which provides a unified & natural method of control for all unmanned systems.

All processing is performed at the edge with no reach-back to any servers.



B-07: Motion-First Perception, Localization, and Odometry for Offroad Autonomy

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023

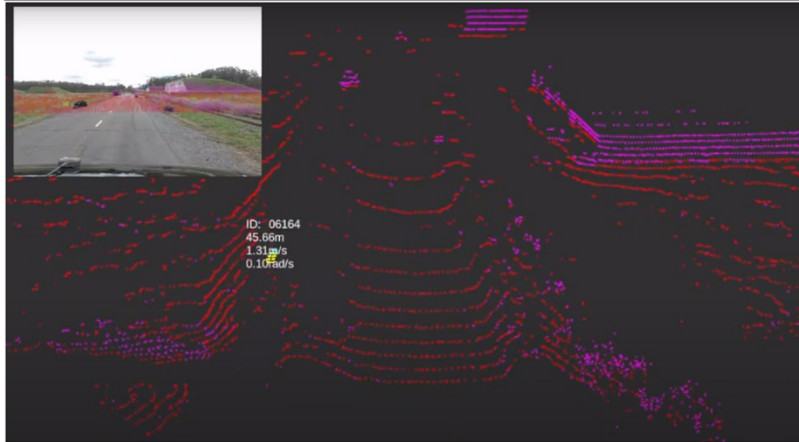


Figure 4. BlueSpace software is capable of tracking a pedestrian in a ditch partially occluded by tall grass without any prior training. The next step is to assess how our software works in harsher environments to enable rapid scaling to any set of conditions.

PROJECT INFORMATION

Organization Name:	Bluespace AI
Principal Investigator:	Jeremy Templeton
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Offroad autonomy requires accurate perception of static and dynamic objects in unstructured environments, and vehicle localization/odometry without GPS measurements. BlueSpace develops novel software to meet these needs, but they must be assessed in representative offroad environments provided by Camp Roberts. We will perform a suite of tests recording raw sensor data and odometry/perception outputs from our software to quantitatively compare our estimates of target and ego motion against ground truth data taken from both vehicles. Data will be collected in both clear air and dust to quantify the software’s robustness to environmental conditions. Tests will be conducted on uneven surfaces with elevation gain to challenge the odometry and perception systems in a way not possible on-road. Test variations will evaluate detection of vehicles and people executing different maneuvers, including while partially occluded while driving different routes to assess localization and odometry relevant to the Army RCV Program.

SYSTEM DESCRIPTION

BlueSpace software leverages emerging 4D sensor technology (FMCW Lidar, Imaging Radar) to create a motion-first approach to perception. Our software takes advantage of high-fidelity doppler velocimetry coupled with high density position returns to segment a point cloud into moving and static objects. Unlike black-box AI systems, the bases for our segmentation are kinematics of rigid body motion and statistics to associate 4D points with different objects. Unlike perception solutions that use machine learning to first classify, then segment, and finally infer motion, we use direct measurements of motion to flip the process on its head, enabling motion-first segmentation and identification. No training data or HD maps are required. We have demonstrated 10-100X improvement in motion accuracy compared to other products on the road, while our software’s foundations in mathematics and physics enables us to reason about performance bounds and conduct rigorous system analysis.



B-08: Tactical Mixed Reality FPV Drone and Robotic Goggles



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	ISEEYOU360 Inc.
Principal Investigator:	Tom Yoakum
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

There is an expressed immediate need for first person view capability to be integrated into goggles for UAS/UAV system operators. The experimentation will measure distance at which operators can recognize movement to the rear, ability of operator to navigate uneven terrain with front camera view, ease of use, time required to train operator on device, and ability of operator to stay on task while maintaining situational awareness.

SYSTEM DESCRIPTION

ISEEYOU60's Tactical Mixed Reality First Person View Drone Goggles integrate emerging tech with proven wearable devices. The system provides digital eyes with rear facing view, persistent surveillance, and live streaming of forward and rear facing visuals while providing live feed of the drone. This core technology allows for collecting and recording data analytics for operator mission review and a base platform for additional features and core competencies. This is a novel tactical mixed reality FPV goggle, developed with input from warfighters. No light signature for enemy detection vs. tablet. Provides immersive footage when the UAS is underway. Field of view includes customizable picture in picture. Reduces light strain on operator's eyes and makes operator less vulnerable to attack.



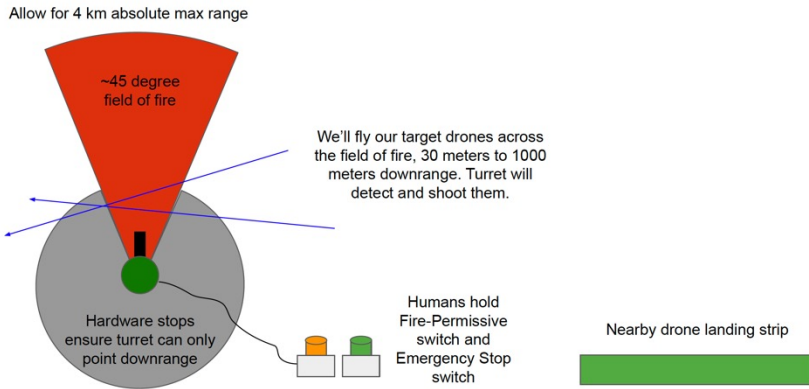
C-01: Auto-Turret Target Acquisition and Tracking Experimentation



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023

Range setup



PROJECT INFORMATION

Organization Name:	Allen Control Systems
Principal Investigator:	Steve Simoni
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Allen Control Systems (ACS) is designing an automated C-UAS turret using small-arms calibers. ACS plans to conduct the experiment by having either the USG, other participants, or ourselves fly UASs near our turret while we test its ability to acquire, traverse, elevate, and track single and multiple target drones. At this point our plan does NOT include live fire testing. The turret will be equipped with instrumentation that will mimic the sight of the weapon which will allow us to accurately track hits and misses on single and multiple aerial targets.

SYSTEM DESCRIPTION

ACS is designing an automated C-UAS gun turret using small-arms calibers. The intended use is defending a small area (such as a power plant or electrical substation) from loitering munitions such as the Shahed-136 and smaller.

Expected performance: 1000 meter range using 7.62mm ammunition being fired from a standard M-240B MG.

Total system weight ~200lb. Portable, battery-powered, rechargeable from vehicles or grid power.



C-02: SUPERION Tactical RF Sensing for Shared Situational Awareness



POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Stucan Solutions Corp
Principal Investigator:	Stuart Taylor
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

SUPERION is an agile and responsive SIGINT capability delivering a high-end, 360-∞, passive RF detection capability between 400MHz and 6GHz. The system delivers effective alerting against RF signals of interest, including drone/UAS targets, at FOBs / advanced reconnaissance positions, military installations, and strategic locations. Currently, ground forces do not have access to such an all-encompassing capability that is available in a dismounted soldier format, and which can be rapidly deployed in austere environments.

SYSTEM DESCRIPTION

SUPERION is a 24/7/365, scalable, modular passive Radio Frequency (RF) drone/Unmanned Ariel System (UAS) detect, track and identify (DTI) capability with a proven track record in the UK mainland, Europe and overseas with several Defence, Security and commercial organizations. SUPERION provides an operator with timely, accurate and actionable intelligence on drone(s)/UAS and GCS activity. The system was developed and refined around a signals intelligence (SIGINT) capability, therefore not only is SUPERION able to provide a “distracted” operator drone(s)/UAS DTI intelligence it also provides an electronic surveillance (ES) feature able to identify: emerging/infrequent threats, V/UHF communications i.e. Push to Talk (PTT) / Combat Net Radio (CNR)), Improvised Explosive Device (IED) trigger signaling, development of a RF pattern of life (PoL) or support to surgical jamming. SUPERION can perform protocol decoding; exploitation of Direct Remote ID which gives reporting of 3D positional information from compliant and in some cases non-compliant drones.



D-02: ROADFI360 – Comms Box

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7-11 August 2023



PROJECT INFORMATION

Organization Name:	ISEEYOU360 Inc.
Principal Investigator:	Tom Yoakum
Technology Readiness Level:	TRL 8: The technology has been successfully tested in the field and exposed to elements in real operating conditions to test for performance and future revisions.
Research Area of Interest:	D) Communications and Networking
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

ISEEYOU360 will demonstrate that ROADFI360 has been developed as a dual use, fast deployable, rugged, man transportable, internet connectivity device. Using an array of cellular, LAN, and Starlink if available, these signals can be mesh bonded allowing for rapid tactical connectivity. It will be utilized to improve connections between its Tactical Mixed Reality FPV goggles and smart controllers of drones/robotics that it is paired to at the event while providing high speed internet, critical information, communication with other teams, and remote data and communication operations. Testing may include stress testing battery, and testing range of operational capability.

SYSTEM DESCRIPTION

ROADFI360 is a self contained portable high-speed connectivity Wi-Fi system contained in a ruggedized case designed for use in limited cellular reception locations.

- Battery powered broadband kit
- 4G and 5G capable
- Internet and voice communication for up to 150 active devices
- Customizable & upgradable
- Rugged waterproof case
- High speed mobile data and internet connectivity on the move



F-01: Multi-Domain Expeditionary Artificial Intelligence and Behavior Analysis at-the-edge for Tactical Surveillance Application



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Gantz-Mountain Intelligence Automation Systems, Inc.
Principal Investigator:	Greg Wilson
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Gantz-Mountain will continue experiments in expeditionary artificial intelligence and behavior analysis as the edge for tactical surveillance applications. Specifically, this will include integration of software upgrades to improve robustness along with exploring logistical applications for the technology. Additionally, the MT-5 will pass near real-time alerts and imagery of threat behaviors across Mission Command systems (TAK, COPERS, etc.).

Capability Experimentation goals:

- Techniques to increase robustness of AI-driven Behavior Analysis at the tactical-edge
- Explore Autonomy and Human Machine Teaming applications for expeditionary AI and behavior analysis
- Slew-to-Cue of Long-Range Intelligence Sensor Node (LRISN) from trigger
- Implementation of third-party classifiers

SYSTEM DESCRIPTION

MT-5: The world’s toughest Warriors and First Responders deserve custom built expeditionary smart surveillance technology with Artificial Intelligence and Behavior Analysis at-the-edge to guarantee success. Gantz-Mountain Intelligence Automation Systems Inc. has pioneered revolutionary turn-key smart-edge surveillance and intelligence automation systems to answer this call.



F-02: Dismounted Position & Navigation Sensor (DPNS) - **POSTPONED**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

PROJECT INFORMATION

Organization Name:	Stucan Solutions Corp
Principal Investigator:	Stuart Taylor
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

DPNS delivers a low SWAP-C boot mounted 3D positioning, navigation and team tracking capability to the dismounted user, in the absence of GPS. This allows for precise 3D situational awareness in GPS-challenged environments such as urban canyons, buildings, caves, tunnels and areas with heavy Electronic Counter-Measures (ECM and hostile RF jamming).

Dismounted infantry soldiers currently don't or have limited ability to track users in GPS challenged environments.

SYSTEM DESCRIPTION

DPNS is a footwear mounted low SWAP-C GPS Denied Position & Navigation System. The System has several innovations to give outstanding (relative) real-time 3D positional accuracy, in the complete absence of a GPS/GNSS signal (inc. 3D positioning within buildings/underground). These innovations include an ensemble of low-cost solid state IMUs, algorithms that use characteristics of the human walk/gait to significantly reduce inaccuracies/drift with virtually no distance drift over time. Other features are wireless Qi charging and open interface for integration into any C2 application. The DPNS system is currently supplied with a dedicated Android App, but the architecture will support ATAK integration. DPNS has been designed to operate fully within GPS-denied/degraded environments (e.g. buildings, urban canyons and underground) and complex RF environments where GPS and/or ECM jamming is present.





F-03: Informational Warfare Enabler Kit Detachment (IWEK-D)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Ombra
Principal Investigator:	Michael Fieldson
Technology Readiness Level:	TRL 3: Analytical and experimental critical function and/or characteristic proof of concept.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

IWEK-D is a portable, highly-interoperable system designed to provide the Psychological Operations (PsyOps) community with the capability to collect and exploit media during military operations. The experiment's primary purpose is to enable operators to gather relevant information and media materials, such as images and videos, from the operational environment, and then analyze and disseminate them to target audiences to influence their behavior and support mission objectives. Additionally, the IWEK-D experiment is highly portable and easily configurable, allowing operators to rapidly deploy and reconfigure the system as operational needs change.

SYSTEM DESCRIPTION

The IWEK-D system, with its three tool kits and integration of cloud solutions and enhanced security measures, can contribute significantly by providing Operators with necessary tools for media content capture, presentation, and display, even in degraded, austere, or contested environments. The basic technological components are integrated with reasonably realistic supporting elements to ensure that the system is tested in a simulated environment that closely mirrors the operational environment. This allows for the identification and resolution of any issues that may arise in a controlled environment, rather than in the field where they could have significant consequences.



F-04: Variable Offsite Reconnaissance Terrain Explorer (VORTEX)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Skyline Software Systems
Principal Investigator:	Blair Jenkins
Technology Readiness Level:	TRL 8: Actual system completed and qualified through test and demonstration.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Skyline’s main objective for JIFX is to determine how; having this tool embedded with an infantry unit will impact the decision-making process. We would like the ability to engage with other tech providers during the length of the exercise about how they collected the raw data (preferred method), was it better for urban vs. rural and how quickly they became familiar with our system and its ease of use. Additionally, we would like to offer the use of VORTEX to other technology companies (drones) in order for us to process there collected and process there photogrammetry. NOTE we have been working with Rhoman Aerospace refining this process after the last JIFX.

SYSTEM DESCRIPTION

The VORTEX is a scalable geospatial tool set designed to be used in near real time for mission critical tasks. The Vortex is completely untethered, making it perfectly suited for austere or denied environments. As designed the VORTEX can ingest any form of common use frame-based data (LiDAR, 2D Ortho, Red Edge, Point Cloud, Thermal and all forms of Photogrammetry including Full Motion Video). The VORTEX is designed to bridge the gap between commanders in the field and intelligence agency, giving the user the ability to create, in near real time accurate 3D models of the battle space. Coupled with Skyline’s powerful analytical tool set VORTEX can preform a variety of mission to include; Close Target Reconnaissance , Mission Planning, Battle Damage Assessment, Precision Targeting, Terrain & Line of Site Analysis and After Action Review to name a few.



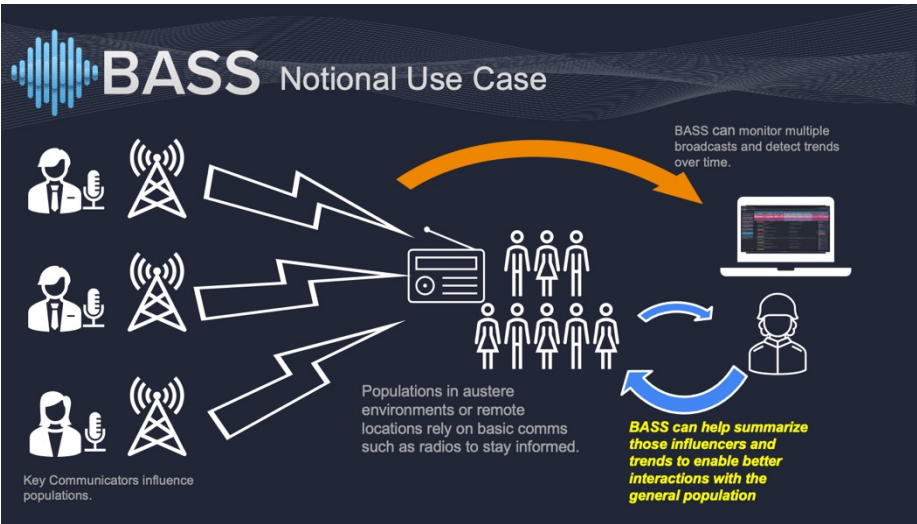
F-05: BEATs - Broadcast Evaluation and Analysis Translation Experiment



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

PROJECT INFORMATION

Organization Name:	Blue Ridge Dynamics, Inc
Principal Investigator:	Kyle Miller
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally



PROPOSED EXPERIMENT OVERVIEW

For the BEATs experiment we plan to analyze FM or AM radio broadcasts from austere and remote regions. Using a state-of-the-art machine translation AI, BASS aims to uncover patterns in sentiment and trend fluctuations within these often-overlooked areas.

Our data collection plan involves capturing and digitizing a vast array of broadcasts, with a focus on the languages most prevalent in the regions under study. Our AI, trained on diverse multilingual datasets and fine-tuned for sentiment analysis, translates and deciphers these transmissions, mining them for embedded emotions and implied meanings.

Our evaluation framework hinges on both quantitative and qualitative measures. Quantitative assessment will analyze sentiment scores over time and trends in topic prevalence. Qualitative evaluation will focus on the contextual understanding of sentiment and trends. By enabling a deeper understanding of these remote regions, BASS aims to revolutionize how we interpret and respond to these communities' voiced sentiments and concerns.

SYSTEM DESCRIPTION

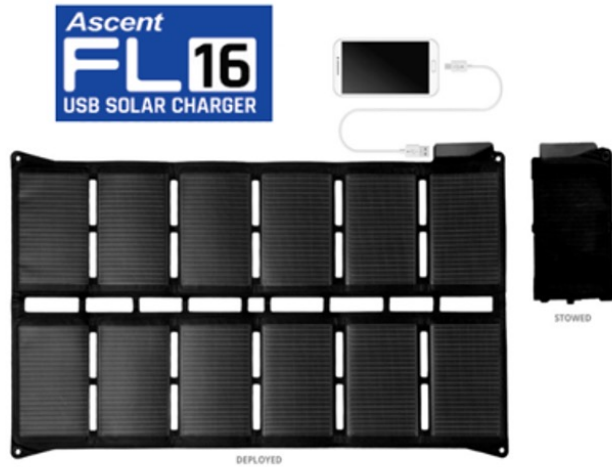
The BASS system is a groundbreaking web-based tool powered by Whisper.ai models. It offers automatic machine transcription and translation of FM radio broadcasts, specifically engineered for austere and remote regions. BASS boasts a wide array of features including speaker clustering and identification, and music detection, adding depth to its analysis capabilities. One of BASS's defining attributes is its ability to operate disconnected from the cloud, ensuring uninterrupted service even in the most remote locales. With a user-friendly and intuitive interface, BASS enables users to easily navigate through its robust features and vast data analysis results. By turning complex radio broadcast data into actionable insights, BASS redefines the landscape of sentiment analysis in remote and underserved regions.



F-06: Expeditionary Power for ISR, Computing and Operation Critical Technologies - **Cancelled**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Ascent Solar Technologies
Principal Investigator:	Shannon O'Reilly
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

The ASTI FL16 Solar Charger will be paired with a variety of collaborator technologies to assess use in the field providing primary and auxiliary power. Anticipated collaborator technologies include Unmanned Aerial Systems and Unmanned Ground Vehicles (UAS & UGV), those systems ground control stations, AI-Augmented Decisions Support Systems, and in-field stationary ISR sensors. During the exercise various qualitative data will be collected such as time to deploy, ease of deployment for each technology with a focus on austere in-field deployment. For each test scenario, base data such as charge time and rate, surface temperature, and thermal signature will also be collected.

SYSTEM DESCRIPTION

The FL16 Solar Charger provides 16W USB (5V, 2.4A) power in direct sun, and usable power in low-light/overcast skies. Made of ASTI's ultra-flexible and lightweight PV technology the FL16 is the most advanced and reliable in-field solar charging solution for the warfighter.

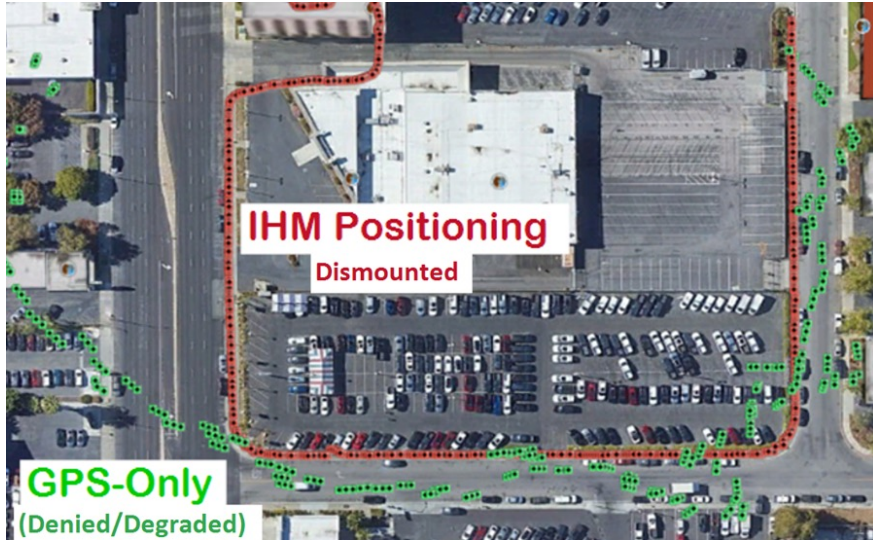
- Charges USB EDU's (eg. ATAK) at the same or faster rate as a traditional wall plug
- Can provide more than enough power in 1 day's charge for 24hrs of navigation and communications
- Significant weight savings vs. BB2590 and PRC152
- Allows continuously-replenished power for EUD's, with no ongoing logistics demands; allows units to move faster and with more resilience in all logistics scenarios.



G-01: Intelligent Human Motion Denied GPS Trials



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Yotta Navigation
Principal Investigator:	Andrew Hazlett
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Yotta Navigation plans on conducting data collection for 10 types of complex motion in the CACTF simulated operational environment. The motion will assist creating online motion models for classification and GPS denied navigation with complex motion types. Yotta Navigation will test to be able to provide positioning at less than 5% position error over distance traveled in GPS denied environments while crawling through CACTF tunnels and complex motion indoors.

SYSTEM DESCRIPTION

Intelligent Human Motion is Yotta Navigation Corporation’s latest advancement in real-time dismounted human motion tracking and positioning. IHM provides real-time human motion event profiles for both time series and spacial analysis. The IHM Nav based positioning engine fuses motion sensors, radio frequency (RF) positioning and geographical data to provide an accurate and robust navigation system. IHM Nav provides continuous positioning in GPS denied conditions, including indoor and subterranean environments, and GPS jamming/spoofing attacks. IHM Nav also enables GPS duty cycling power saving, providing a critical solution to battery longevity and heat generation reduction for M-Code receiver handheld integration. IHM combines the large amounts of sensor data into actionable insights to provide situational awareness of human actions and location. IHM has been applied to tactical operations, human performance analysis, medical based studies, geolocation based marketing and sports tracking apps.

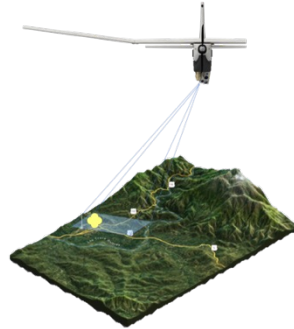


G-02: SmartCam3D ATAK and WinTAK Plugins | Geospatial Augmented Reality and Annotation Tools for Real-Time FMV



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Rapid Imaging Technologies LLC
Principal Investigator:	David Geisler
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Rapid Imaging’s intention for this experiment is to test its SmartCam3D–Æ Geospatial Augmented Reality ATAK and WinTAK plugins ,Äi which are tied to an effort with AFSOC (Ray Heath). Specifically, Rapid Imaging intends to test its geospatial overlay technology and FMV annotation tools (i.e., Geocoding, Cross-Cueing, Point Insert, Measurement, and Geospatial Telestrator) with real-time, full-motion-video sourced from an airborne sensor. The primary sensor we intend to test with is a Parrot ANAFI, but additional ad hoc experiments leveraging other airborne gimbals at JIFX might be possible. Measurable insights gained from this experiment will relate to sensor metadata and specifically, the effect of metadata update rate (Hz), variable accuracy (e.g., 6DoF), and metadata synchrony, on overlay aesthetics (as measured by observer surveys). Additionally, the accuracy of SmartCam3D’s FMV annotation tools (i.e., Geocoding, Point Insert, and Measurement) will be ground-truthed and notated in an Excel file to determine positional and/or measurement errors.

SYSTEM DESCRIPTION

The technology at the core of our experiment is SmartCam3D–Æ, which underpins our ATAK and WinTAK plugins. SmartCam3D–Æ is like Google Earth for real-time, full-motion-video (FMV) ,Äi allowing end-users to view and interact with FMV in the same ways they would a traditional satellite map display. Core Capabilities of the technology include Geospatial Augmented Reality, allowing end-users to display nearly any entity with a geographic context within real-time, full-motion-video; FMV Geocoding, allowing users to tap or click anywhere within the FMV and receive the geocoordinates of that location; Cross-Cueing, which allows users to simultaneously navigate the FMV and Moving Map; Point Insert, which allows end-users to mark entities using points, vectors, or polygons; FMV Measurement, which allows users to measure within real-time FMV; and a Geospatial Telestrator, which allows users to enjoy a "John Madden-like" experience creating custom, free-hand annotations on real-time FMV.



G-03: modelspace LIVE: A Digital Platform For Military Operations

Postponed

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4

7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	modelspace incorporated
Principal Investigator:	Terence Higgins
Technology Readiness Level:	TRL 3: Analytical and experimental critical function and/or characteristic proof of concept.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Having attended JIFX 22-1, we plan to build on our previous experimentation with participation from fellow experimenters, observers and vendors. modelspace LIVE is a data collection and analysis platform that leverages the US military mission-cycle process of planning, execution and analysis, and novel and emerging technologies, to provide warfighters advanced decision-making abilities for the highly complex battlefields of the future.

SYSTEM DESCRIPTION

Integrating elements of automation, machine learning, cloud computing and advanced data analytics, modelspace LIVE aims to be the mission planning, execution and analysis platform of the future. Overhauling the user/warfighter experience in military mission planning and analysis, while underpinning the entirety of the mission-cycle process with data collection and analysis, LIVE presents analyzed data to decision-makers at all levels, objectively increasing efficiency and effectiveness, while lower risk to mission and force.



G-04: The Frontline Perception System

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	TurbineOne, Inc
Principal Investigator:	Ardin Lo
Technology Readiness Level:	TRL 8: Actual system completed and qualified through test and demonstration.
Research Area of Interest:	G) Situational Awareness
Funding	Both Federally & Internally

PROPOSED EXPERIMENT OVERVIEW

TurbineOne will experiment with applying multiple edge-deployed machine learning models with the Frontline Perception System (FPS) analyzing disparate video and SIGINT sensor feeds, showing that users can harness ML even in comms-contested environments. The FPS is currently able to build and apply one model to one sensor, this experiment seeks to combine and deploy multiple user-built ML models (ie. pose + gun detection) onto one sensor feed and generate smart alerts that are sent to the user's mobile ATAK or laptop device. The user will label relevant video screenshots to build a model in FPS, then test the model themselves. This demonstration will be conducted without the Internet or the cloud to simulate battlefield connectivity. We will measure the reduction (10x expected) in manual feed monitoring time compared to the workflow of receiving an ML detection alert as well as model detection accuracy.

SYSTEM DESCRIPTION

The first of its kind, the Frontline Perception System (FPS) is an AI/ML software platform that monitors all sensors and cues decision-makers based on ML detections, even in a comms-contested environment. The FPS identifies, classifies, and labels threats, and subsequently alerts users in real-time with the right information at the right time to obtain decision advantage and reduce cognitive overload. Additionally, the FPS's MOSA architecture enables integration of any sensor feed and any ML algorithm, avoiding vendor lock. FPS is the only product that enables Warfighters to build, fix and deploy new, responsible AI/ML capabilities entirely within comms-contested environments and without having to code. With a few swipes and button selections, an operator is easily able to train a specific ML model to identify relevant threats in near-real time without a cloud connection. An operator with no technical training or experience can easily train and fine-tune ML algorithms with FPS.

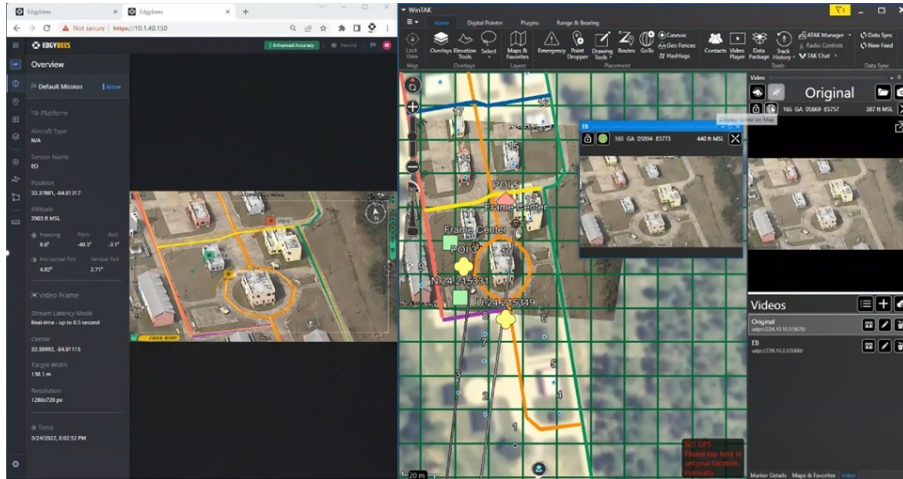




G-05: Enhanced and Accurate Real-time Situational Awareness – Edgybees MX TAK - **Postponed**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Edgybees Inc.
Principal Investigator:	Sheffy Glassberg
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Edgybees MX will enhance a multicast MISB 0601 compliant stream and multicast/unicast it back to the network in less than 120 milliseconds. The Edgybees-out stream will be consumed on a TAK device alongside the original stream.

The users will share the same KMLs between TAK and Edgybees MX for better Situational Awareness and common language.

The pilot/sensor operator will add a Point of Interest (POI) on the Edgybees MX video screen and note its MGRS as it appears on Edgybees MX. The POI will be sent as a CoT message to TAK.

The TAK user will place and send a CoT message from his TAK to Edgybees. The MGRS of these CoTs will be noted as well.

All the collected coordinates will be placed on the base map and the differences will be collected and compared using the Edgybees and the Original streams.

The FMV footprint will also be measured.

SYSTEM DESCRIPTION

Edgybees MX georegisters Full Motion Video (FMV) in real-time to allow Enhanced Situational Awareness (SA) and educated decision making. Edgybees MX accurately overlays GIS data, e.g., street maps, street names, landmarks, and other mission critical data such as mission planes, trackers, and CoT over the video.

The enhanced stream can be consumed over a Google Chrome webpage and/or using any existing PED-like tool.

The API-based system allows for rapid integrations with customer specific tools and capabilities, e.g., IRC chat channels, and CoT.

The integrated CoT API allows the pilot and the end-user instantly collaborate over the video and over TAK devices.

The enhanced stream can also be correctly overlaid on top of the TAK map to enhance SA and collaboration even more.

Edgybees MX delivers CAT1-like* accuracy at the fingertips of the ISR/UAS crew and the dismounted end-users.



G-06: Maritime Domain Awareness with Multi-spectral Polarimetric Sensor Suite



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Polaris Sensor Technologies, Inc.
Principal Investigator:	Larry Pezzaniti
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Polaris will collect video data of maritime surface vessels using a multi-spectral imaging system, operating in the Visible, SWIR and MWIR portion of the spectrum, called Hydra, developed under Navy SBIR Topic N181-023. The sensor includes polarization sensing, which excels at detecting and providing data for identification of surface vessels at long standoff distances under a wide range of sea states and weather conditions. Polaris would request to conduct experiments with the sensor pointed down at the ocean surface at declination angles >15 degrees at 1km+ standoff distances. The data will be used for comparison of detection capability in the different sensing modalities and to provide additional data to AI/ML algorithms currently under development at Polaris for object detection and identification.

SYSTEM DESCRIPTION

Polaris will collect video data of maritime surface vessels using a multi-spectral imaging system, operating in the Visible, SWIR and MWIR portion of the spectrum, called Hydra, developed under Navy SBIR Topic N181-023. The sensor includes polarization sensing, which excels at detecting and providing data for identification of surface vessels at long standoff distances under a wide range of sea states and weather conditions. Polaris would request to conduct experiments with the sensor pointed down at the ocean surface at declination angles >15 degrees at 1km+ standoff distances. The data will be used for comparison of detection capability in the different sensing modalities and to provide additional data to AI/ML algorithms currently under development at Polaris for object detection and identification.



G-07: Command and Control Situational Awareness in Denied Comms Area - **Postponed**



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023

The cost of outfitting a wildland firefighter

According to spokespeople from the U.S. Forest Service, it costs about \$2,700 to outfit a wildland firefighter from head to toe. The breakdown, as modeled by Logan Baird of the Forest Service's Española Ranger District:



PROJECT INFORMATION

Organization Name:	3aminnovations
Principal Investigator:	Bruce Arvizu
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Experiment will put in a series of exercises in which to expend resilience and reliability of tracking and mapping off line. Integrate small android phone to capture satellite signal for messaging, mapping and encrypted micro messages. We will measure how far signals can be transmitted or received in remote locations on foot and in vehicle. The real test will be how robust a very small smart phone can operate integrated receiving sat comms with mapping data and text encryption messaging.

SYSTEM DESCRIPTION

The core of the experiment will include tech from enabled gps tracking tech, inertia software, mapping and latest LEO low earth orbiting satellite tech. Encrypted signal messaging and shortening could make the comms more efficient. we are going to test ability of cell/sat comms from a denied area using a robust resilient small smart to communicate and add mapping, data, texting real time for assets in operational area.



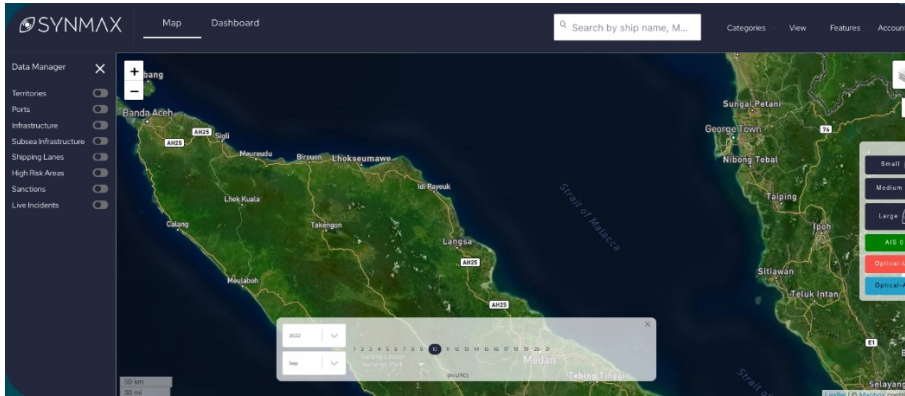
G-08: Artificially Intelligent Decision Support

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7-11 August 2023



PROJECT INFORMATION

Organization Name:	SynMax
Principal Investigator:	Kristen Paz
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internal



PROPOSED EXPERIMENT OVERVIEW

We will explore Theia’s capabilities to support the operational decision cycle through global monitoring of vessels, 10m and above, across millions km2 of ocean. SynMax AI enables maritime event detection at strategic and tactical levels. This experiment allows us to validate Theia’s use for automating analysis of satellite imagery to detect true dark ships and significantly enhance the Joint Force kill chain with its ability to identify and track targets within an AOI.

SYSTEM DESCRIPTION

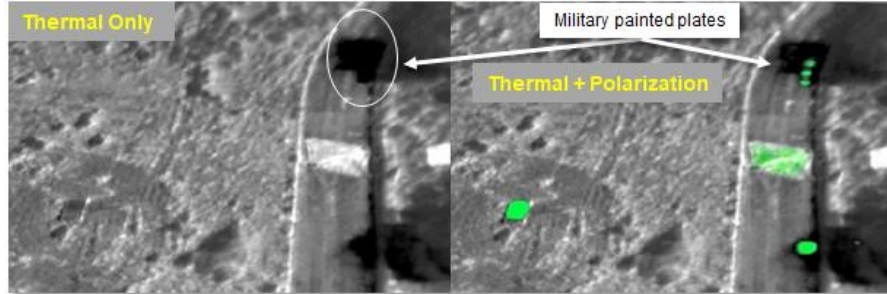
Theia is an automated maritime domain intelligence platform fusing multiple intelligence disciplines with AI and machine-learning techniques, meaning it can ingest and analyze vast volumes of data at scale. Collecting and analyzing intelligence using this methodology significantly increases a unit’s decision superiority, permitting the creation of near real-time intelligence in GPS and radio frequency-denied environments. Combining technology and resources provides precision information to commanders, who can utilize Theia to find, fix and track maritime activity at scale, filling critical intelligence gaps.



J-03: Multi-modal sensing for C-IED



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Polaris Sensor Technologies, Inc.
Principal Investigator:	Larry Pezzaniti
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	J) Expeditionary Operations
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Polaris will exercise the Pyxis polarimetric infrared camera for enhanced detection of surrogate surface laid and buried mines and improvised explosive devices for route clearance applications. The Pyxis camera is a small, uncooled IR camera system that can be mounted on a vehicle and driven along a route for testing. The polarimetric capability detects material and surface roughness differences that can often be invisible to conventional thermal cameras. We will request surrogate mine and mine-like targets and are prepared to bring our own. These will be emplaced in representative IED locations and observed from a vehicle platform. Test metrics will include detection vs. false alarms, probability of detection, and clutter characteristics. The data will be used to provide further information for AI/ML algorithm development after the event.

SYSTEM DESCRIPTION

The Pyxis sensor exploits the polarization of light in the thermal infrared, where light becomes polarized as it is emitted from surfaces in the environment. The amount of polarized light depends on the material and surface properties of the emitting substance, not on temperature. Thus, IED materials and the surrounding natural materials can be the same temperature and have different polarization signatures. Pyxis measures the polarization in addition to the thermal and hence performs detection more effectively in a greater variety of conditions. The Pyxis camera uses a modified uncooled microbolometer camera with the addition of a pixelated or checkboard polarization filter. This approach enables real-time, simultaneous acquisition and calculation of the polarized and thermal video in a package that is compact, energy efficient, and light enough to be integrated onto small unmanned aerial systems (UAS). A range of standard lenses enables a selection of magnifications and fields of view.



K-01: OBEX Blast & Ballistic Protection System



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Stucan Solutions Corp
Principal Investigator:	Stuart Taylor
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	K) Infrastructure and Power
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

We would like to build the OBEX in an operational environment to demonstrate the ease and simplicity of the system. Demonstrate how it can be deployed for operations and utilized in multiple configurations to support the warfighter and protect infrastructure.

SYSTEM DESCRIPTION

OBEX is a rapidly deployable, modular and scalable wall system that protects against blast and ballistic threats using 2 technologies: AIR-Æ (Advanced Impulse Reduction) Blast Protection & HardTac Ballistic Protection. Currently, most construction solutions used for military and domestic operations are based around concrete walling and HESCO gabion baskets which provide protection resulting from their bulk and mass. This precludes rapid protection and deployability in mobile settings. OBEX is expeditionary, lightweight, and re-deployable, allowing the system to be moved as the battlespace develops



K-02: QUICKBLOCK



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Stucan Solutions Corp
Principal Investigator:	Stuart Taylor
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	K) Infrastructure and Power
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

QUICKBLOCK offers an alternative to traditional building materials or wire mesh containers and is ideal for scenarios where speed and portability is a priority (e.g. a 4m x 3m QUICKBLOCK structure can be built in 25 mins). The blocks are structurally sound in their hollow form (with a compressive load strength of 3.6 tonnes) and can be in-filled with a range of materials for additional strength and stability (providing ballistic and blast protection). In a post conflict environment these blocks can be repurposed for real life support including the addition of insulation materials to protect against the inclement environment.

SYSTEM DESCRIPTION

QUICKBLOCK is a reusable solution, offering value for money as it has multiple uses. Assembled structures can be dismantled and rebuilt or repurposed elsewhere offering a solution which can be redeployed depending on the ongoing requirement.

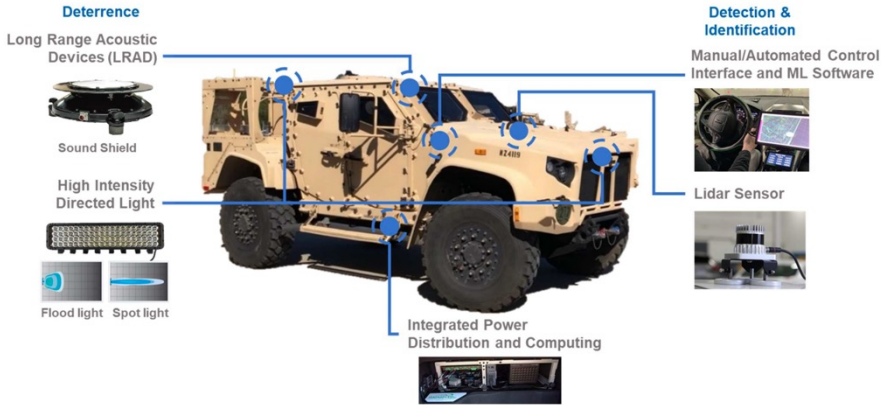
Compared to other systems on the market, QUICKBLOCK is lighter, faster to deploy and stronger than most solutions.



M-01: Autonomous Multi-Sensory Non-Lethal Deterrence System



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-4
7 – 11 August 2023



PROJECT INFORMATION

Organization Name:	Cornerstone Research Group, Inc.
Principal Investigator:	Catherine Ashley
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	M) Precision strike, Non-Lethal Weapons, Information Operations
Funding	Both Federally & Internally

PROPOSED EXPERIMENT OVERVIEW

Demonstrate that the system detects, localizes, and tracks one or more humans in real-time; demonstrate the machine learning model that autonomously estimates a level of threat for each human; verify that the system is calculating the appropriate threat level; verify that the system employs non-lethal deterrents preferentially in the direction of the perceived threat(s) at an appropriate level of force. The system will be integrated into an autonomous vehicle and will be demonstrated when the vehicle is stopped and in motion at various speeds.

SYSTEM DESCRIPTION

This technology consists of human/pedestrian sensing hardware (LIDAR sensors), detection and tracking software (machine learning), and a machine learning-based threat decision system utilizing parameters of the humans to determine if or when they will likely interfere with ground vehicle operations or if the ground vehicle presents a threat to the human's safety. If threat thresholds are reached, the system autonomously deploys multimodal non-lethal deterrents in the direction of the perceived threat. If threats persist, the system autonomously increases intensity of the non-lethal response; similarly, if threats subside, the system reduces intensity until no threat is present or warrants a response. The prototype system includes high-intensity acoustic and an array of high-intensity LED direct lights covering the four sides of the vehicle. Other non-lethal hardware can also be added based on customer preferences.