JOINT INTERAGENCY FIELD EXPERIMENTATION 25-2

3 – 7 February 2025

Hosted by the Naval Postgraduate School

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A-12: Mulit-Agent UAV GPS-Denied Autonomy & Deconfliction

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

Rhoman is supporting Navy customers with multi-agent GPS-Denied UAV deconfliction systems, the experiment involves flying multiple UAV at once and deconflicting flight routes.

SYSTEM DESCRIPTION

UAV must be able to determine safe flight routes and detect and avoid obstacle and each other - the proposed experiment includes using a field-deployable multi-UAV management system to pair with GPS-Denied navigation systems to enable autonomous aerial logistics for contested environments.

B-02: Tactical Edge Embodied AI Mesh (TEEAM)

PROJECT INFORMATION

Organization Name:	Gambit Defense Inc.
Principal Investigator:	Benjamin Richardson
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

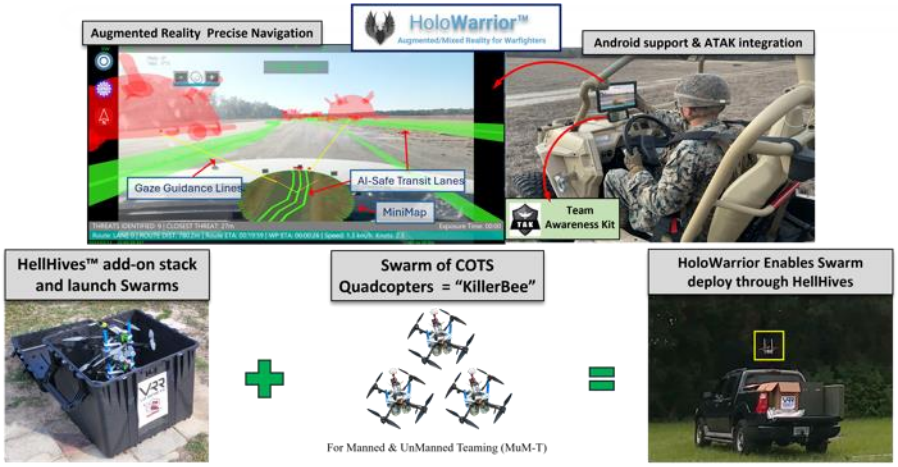
PROPOSED EXPERIMENT OVERVIEW

Establish a seek and find mission with three COTS UASs are tasked to find TOI with certain characteristics in an AOI. The COTS UASs are connected over a secure MANET networked through a GCS implementing ATAK through point and click interface. Each COTS UAS moves to the location using onboard VIO techniques with the assumption that GNSS is always denied. Upon arrival at the AOI the COTS UASs search trajectories are implemented, the full EM spectrum is mapped in both time, spectral and 3D space, the AOI is indicate and all objects are identified using a variety of techniques and the system dynamically repositions to ensure connectivity, ISR measurement resolution, and data haul back of the relevant information (ML compression techniques will be used to reduce the need to haul back 720p/30 fps+ full motion video to minimize power, emissions, and network traffic) to the GCS station.

SYSTEM DESCRIPTION

Gambit's Tactical Edge Embodied AI Mesh (TEEAM) is an ultra-low size, weight, power, and cost (SWaP-C) add-on device that functions agnostic of platform or system, using inertial navigation, EM mapping, and video/images with increased edge computing capacity to support managed data haul back and edge object detection. This supports an on-demand mobile ad hoc network (MANET) with visible, assessable, understandable, linked, trusted, interoperable, and secure (VAULTIS) characteristics and an artificial intelligence and machine learning (AI/ML) layer to enable jamming resilient communication for mode routing and asset inclusion within a self-healing network for tactical decision support and target identification. The envisioned use is rapid and reliable movement of intelligent data at the tactical edge enabling multiple missions and support functions through collaborative management with minimum cognitive load of over one hundred autonomous systems

B-07: CBRNE threat Avoidance, Detection, and Neutralization via HoloWarrior MUM-T kit for Vehicles



PROJECT INFORMATION

Organization Name:	VR Rehab, Inc (VRR)
Principal Investigator:	Kevin Hernandez
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 (DTRA-Army, CBD-Army, MARCORSYSCOM - Navy)

PROPOSED EXPERIMENT OVERVIEW

This experiment will evaluate the HoloWarrior MUM-T kit's capabilities in three distinct stages. The first stage involves precise navigation within a manned vehicle, using AR graphics to avoid invisible CBRNE threats. In the second stage, the vehicle co-pilot will employ HoloWarrior to launch drones from a HellHive mounted in the truck bed. These drones will perform area scans using emulated CBRNE detectors and then return to the vehicle. The final stage involves launching another drone to simulate the engagement of a detected CBRNE hazard by landing on the target with a payload matching the weight of energetic ammunition. Each stage is designed to validate key operational capabilities, from threat detection to engagement.

SYSTEM DESCRIPTION

The system at the core of this experiment is the HoloWarrior MUM-T kit, an advanced Mixed Reality (MR) platform designed by VRR Inc. to enhance situational awareness and autonomous operations. Central to the system is the HellHive, a ruggedized container that securely stacks multiple quadcopter drones. These drones are integrated with emulated CBRNE detectors and can be launched autonomously from the HellHive. The HoloWarrior interface enables real-time AR overlays, allowing operators to control drones and navigate complex environments with precision. The system's robust design supports automated threat detection, drone deployment, and engagement missions, providing a comprehensive solution for mission-critical operations in challenging environments.

B-09: Quantum Shield

PROJECT INFORMATION

Organization Name:	Solideon
Principal Investigator:	Reynaldo Trevino
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

The experiment aims to validate the operational feasibility and effectiveness of Solideon's forward-deployable, on-demand manufacturing system in a simulated austere environment at JIFX. The system will be tested for its ability to rapidly produce critical replacement parts using various metal alloys, mimicking real-world scenarios of equipment failure and repair needs in remote or combat locations. Key metrics include part production time, system portability, material strength, and energy consumption.

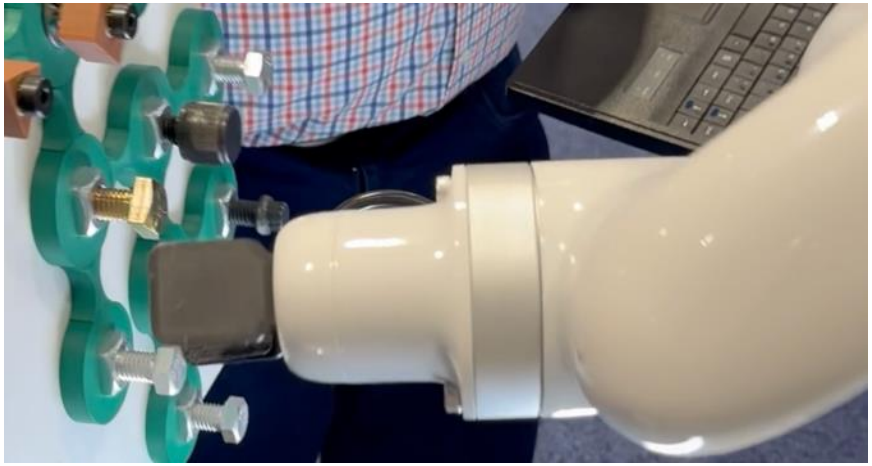
The experiment will involve fabricating a series of standardized and custom-designed components under controlled field conditions. Data collection will include time-to-deployment, production accuracy, tensile strength testing of fabricated parts, and energy efficiency measurements. Observations on ease of use, operator training requirements, and adaptability to environmental constraints will also be documented. Feedback from observers and participants will be analyzed to refine the system's operational readiness and assess its potential for military and commercial applications.

SYSTEM DESCRIPTION

The system is a forward-deployable, on-demand manufacturing platform leveraging advanced robotic and additive manufacturing technologies. It is designed to produce large, complex metallic components directly in the field, enabling rapid repairs and minimizing reliance on traditional supply chains. The modular system integrates robotic arms with Wire Arc Additive Manufacturing (WAAM) technology, capable of processing multiple metal alloys such as steel, aluminum, and nickel-aluminum bronze.

Portable and compact, the system can be deployed in austere or combat environments within hours and is compatible with standard military power sources. Its AI-driven software automates design and production workflows, requiring minimal operator training while ensuring precision and durability in fabricated parts. This technology addresses critical needs for operational resilience, allowing maintenance teams to rapidly restore mission-critical equipment while reducing logistical bottlenecks and downtime.

C-04: Adaptive Fully Autonomous Robotic Object Manipulation AI on the Edge



PROJECT INFORMATION

Organization Name:	ThoughtForge AI
Principal Investigator:	Matt Brown
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

In this experiment we see if our AI, on a single CPU without the use of internet on or exhaustive pre-training and with just 20W energy, can autonomously rotate 3 different shaped valves and 6 different shaped bolts in a previously unknown location 50 degrees. We will reset our model and move a board of varying shaped bolts and valves to an undetermined location within range and reach of our Lite6 UFactory robot and Intel RealSense Camera and cue it to rotate each of the 9 shaped objects.

SYSTEM DESCRIPTION

ThoughtForge has developed a new type of AI that is highly accurate (99.7% dynamic accuracy), robust (up to 79% noisy data) and efficient (less than 50Kb) resulting in explainable and traceable models that continue learning on edge post-deployment. Because our control models learn from the environment after a small (3 episodes or actions) amount of pre-training for a defined goal, they perform at a much higher level of accuracy in dynamic, changing environments and for tasks that require real-time feedback to complete.

C-05: Archimedes Directed Energy Weapons System

PROJECT INFORMATION

Organization Name:	Aurelius Systems
Principal Investigator:	Michael Laframboise
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Experimentation will include utilizing the Directed Energy Weapon and an AI-powered sensing and detection system with edge-deployed visibility and control, which minimizes latency and supports a networked C-UAS platform for defeating autonomous swarms.

The preliminary results of the AI Laser Sentinel proof of concept have demonstrated significant promise and potential for providing valuable C-UAS support. Further testing in an outdoor but controlled environment, which will enable testing to continue from the current 30 meters to up to 300 meters, are the next step in refining the AI powered sensor and the laser system itself while also validating the cooling system and the power supply required.

SYSTEM DESCRIPTION

Aurelius' low-cost directed energy laser systems for C-UAS applications leverages edge-deployed vision and control with a full-stack, AI-powered sensing and detection system which minimizes latency and supports a networked C-UAS platform for defeating autonomous swarms. AI Laser Sentinel is innovative due to its fusion of computer vision, AI, ML and directed energy in a low-cost man portable form factor that can blind and destroy SUAS with little to no user intervention working at the speed of combat.

Aurelius' AI Laser Sentinel represents a breakthrough in mobile directed energy technology. The system combines a powerful, air-cooled 10-20 kW near-IR laser with advanced AI-driven sensor fusion for precise targeting and tracking. Its innovative design achieves a power density of 0.75-1.5 kW/cm¬≤ at 1 km with a compact, sub-30 kg form factor, making it highly portable and effective against Group 1 and Group 2 UAS threats."

C-07: Identifying friendly Group 1 UAS Using Encrypted ADS-B to Share PLI (Position Location Information) with Friendly Forces using M5L2 Rebroadcast

PROJECT INFORMATION

Organization Name:	uAvionix Corporation
Principal Investigator:	Robert Wells
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Internally

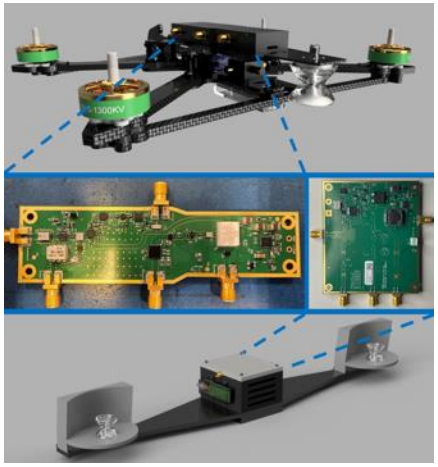
PROPOSED EXPERIMENT OVERVIEW

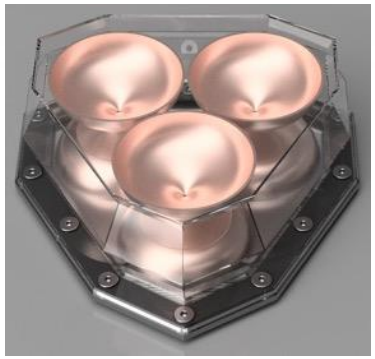
From an austere location, we will launch a Group 1 nano UAS to loiter over the test area. The UAS will transmit PLI (Position Location Information) using an encrypted ADS-B transceiver with an embedded GPS receiver. A single ground based antenna, located at the TOC (or any other location), will receive the encrypted ADS-B PLI and encode and rebroadcast the PLI as M5L2-B position reports. Portable Mode 5 passive receivers will then receive the M5L2-B position reports, decrypt the PLI, and display on an ATAK portable display. Additionally, a situational awareness view will be available in the TOC displaying the cooperative and friendly traffic in the area of operations, including civilian ADS-B equipped aircraft, military M5L2-B equipped aircraft, and the UAS in the experiment.

SYSTEM DESCRIPTION

This experiment demonstrates a method for enabling very small Group 1 Nano Vertical Takeoff and Landing (VTOL) UAS to integrate into existing airspace by leveraging encrypted ADS-B PLI (Position Location Information) reporting and Mode 5 Level 2-B rebroadcast.

D-03: Sub-Zero





PROJECT INFORMATION

Organization Name:	Massive Light
Principal Investigator:	Roger Stovall
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	D) Communication and Networking
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Massive Light will wirelessly test the ability to send and receive sub-thermal noise communications using a new featureless waveform type spread over 800 MHz of instantaneous bandwidth. This featureless communications system can satisfy the need to protect tactical communications from near-peer adversarial SIGINT and jamming. Massive Light believes its featureless waveform is not detectable to near-peer adversaries because the featureless spread spectrum code looks like Gaussian white noise, does not repeat, and exists below the thermal noise floor. The spread spectrum signal is inherently jam resistant.
Massive Light will test its spread spectrum, non-repetitive, sub-thermal noise (featureless) communications in the presence of a local wired jammer. The jammer-to-signal ratio and the spread spectrum bandwidth will be measured using a spectrum analyzer.
Massive Light will also test custom broadband, low-distortion antennas together with custom frequency flexible RF front-ends to support the featureless waveform for sub-thermal noise tactical communications.

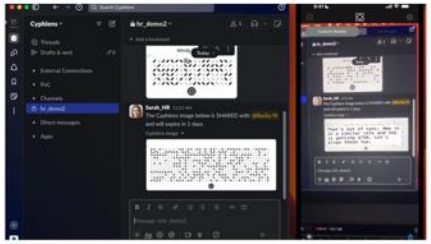
SYSTEM DESCRIPTION

Massive Light's patented low-distortion broadband systems enable 10-100x more bandwidth with a low SWaP-C package through revolutionary electromagnetics design, 3D printing, and real-time signal processing.
Massive Light's custom antennas were tested on USSOCOM Contract # H92401-23-C-0002 to send and receive multi-Gigahertz wide waveforms with low-distortion within the frequency range 0.8-24 GHz. Alternative traditional channel aggregation schemes for broadband communications require duplication of antennas, amplifiers, filters, mixers, transmission lines, DACs/ADCs, and FPGAs to satisfy the bandwidth requirements. Massive Light's unique approach removes all the duplicated hardware by condensing the RF front-end into a single broadband frequency-flexible design, as tested on USSOCOM CRADA SOF-AT&L 20-01-JS241 for frequency-flexible anti-jam drones.
Massive Light's Sub-Zero communications system is composed of two Xilinx Zynq Ultrascale+ Gen 1 FPGAs on ZCU111 evaluation kits, two custom frequency-flexible RF front-ends, two custom broadband low-distortion antennas, and two laptops.
Massive Light's TS-SCI Facilities Clearance enables classified conversations with customers.

E-02: Secure Communications in Contested/Denied Environments

1. Decryption keys assigned to mobile device
2. Camera used as a reader
3. Visually encoded cyphers

Teams/Slack Integration



PROJECT INFORMATION

Organization Name:	Cyphlens
Principal Investigator:	Joe Kigin
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	E) Cyber, Cyber Security, and Electronic Warfare
Funding	Internally

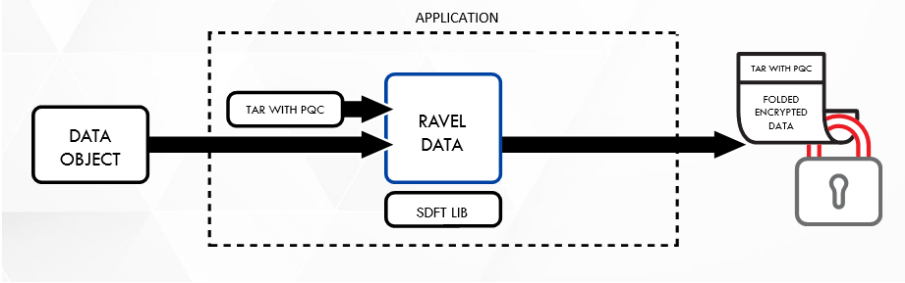
PROPOSED EXPERIMENT OVERVIEW

Show the enhanced capability (compared to past JIFX's) of Cyphlens to help further ensure Secure Comms in Contested/Denied Environments, now a) fully-integrated into Teams, b) on a Desktop and c) also using existing objects (ie. real QR codes) as Cyphlens cipher objects, which allows for very good/high LPI/LPD. These new capabilities have recently been shown to 2 SOCOM PEO's and were shown at Thunderstorm 24-4 and were met with high interest

SYSTEM DESCRIPTION

Cyphlens uses the camera on a smartphone/device/laptop/desktop to encrypt/decrypt sensitive information and allow it to be shared via contested channels and/or using common DoD messaging applications (eg. Teams, Signal, WhatsApp, Discord) or even SMS/iMessaging

E-03: SANDMAN



PROJECT INFORMATION

Organization Name:	NUTS Technologies Inc.
Principal Investigator:	Yoon Auh
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	E) Cyber, Cyber Security, and Electronic Warfare
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Experiment Description: NUTS Technologies will test the hypothesis that users or operators can dynamically change to new ciphers, without the need to involve IT administrators or developers, including Post-Quantum Cryptography (PQC), during a communication session with minimal clicks. The experiment may involve a wireframe interface or console allowing operators to switch between ciphers seamlessly.

Measurement Plan: We will measure the time taken to change ciphers and the number of clicks required.

Data Collection Plan: Data will be collected through user interaction logs, time-stamped event records, and performance metrics. User feedback will also be gathered to assess the ease of use and overall experience. This data will be analyzed to determine the efficiency and effectiveness of the dynamic cipher change process.

SYSTEM DESCRIPTION

NUTS Technologies SDFT crypto agile solution is a modular cryptographic architecture that allows companies to normalize and easily swap out cryptographic algorithms as needed. It has been granted patents on the uniqueness on the technology, has completed performance on a NIST SBIR Phase I on the feasibility of integrating NIST PQC candidates into SDFT, and a DAF SBIR Phase I feasibility study on integrating SDFT into a DAF network.

G-02: TerraSuite/VORTEX

PROJECT INFORMATION

Organization Name:	Skyline Software Systems, Inc
Principal Investigator:	Blair Jenkins
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Our experiment plan will be based on the speed in which data can be collected, rendered into a highly accurate 3D GIS product through our VORTEX (edge node) and pushed out into COP platform for near real time situational awareness and execution of mission critical task, post disaster or military specific planning.

SYSTEM DESCRIPTION

The core system is Skyline's mature GIS/GEOINT modeling software (TerraSuite), we have mated the suite with our proprietary mobile edge node processing system, VORTEX that is capable of rendering large sale and highly detailed and accurate 3D models of an AOI in near real time. Additionally, the system has an onboard AI workflow for predictive modeling and object detection and classification. Summation, the solution brings a large scale (enterprise level) GIS capability into a mobile container that can be deployed in austere environments with no higher-level support required.

G-05: Wingman AI

PROJECT INFORMATION

Organization Name:	ThermoAI INC
Principal Investigator:	Aiden Livingston
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally (NSF, AFWERX, NAVSEA)

PROPOSED EXPERIMENT OVERVIEW

The experiment at JIFX will demonstrate Wingman's ability to enable Condition-Based Maintenance Plus (CBM+) for Navy legacy systems. We will retrofit Wingman onto a simulated industrial control system, replicating common equipment found in aging DoD infrastructure. The test will involve inducing a series of controlled anomalies, such as overheating, vibration changes, and pressure deviations, to validate real-time anomaly detection, diagnostics, and alerting capabilities.

Key objectives include verifying Wingman's unsupervised learning performance, multi-sensory data integration, and consensus-building AI decision-making. The experiment will measure response times, detection accuracy, and the ability to prioritize actionable insights.

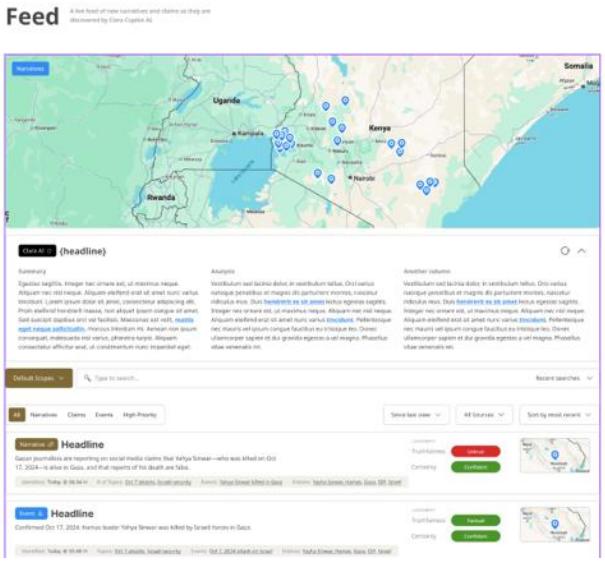
This demonstration will prove Wingman's capability to operate autonomously, providing maintenance teams with actionable intelligence to reduce downtime, prevent failures, and optimize repair schedules, all while being cost-effective and easily adaptable to legacy systems.

SYSTEM DESCRIPTION

Wingman is a lightweight, AI-driven sensor platform designed to deliver Condition-Based Maintenance Plus (CBM+) capabilities for legacy systems. It integrates multi-modal sensors to monitor parameters like temperature, vibration, and pressure in real-time. At its core, Wingman employs unsupervised machine learning to analyze data streams, detect anomalies, and identify patterns without requiring pre-labeled datasets.

The system's consensus-building AI mimics human diagnostic processes by combining sensory inputs to deliver highly accurate insights. Its retrofit-friendly design ensures compatibility with existing Navy equipment, requiring minimal customization or system integration. Wingman provides actionable alerts to maintenance teams, enabling proactive decision-making, reducing unnecessary repairs, and preventing unexpected failures. Built for scalability and affordability, Wingman is a cutting-edge solution that brings advanced predictive maintenance capabilities to aging DoD infrastructure, bridging the gap between current systems and next-generation CBM technologies.

G-06: Narrative Intelligence: Actionable Insights for Information Operations



PROJECT INFORMATION

Organization Name:	Clara Copilot AI
Principal Investigator:	Tyson Myhres
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

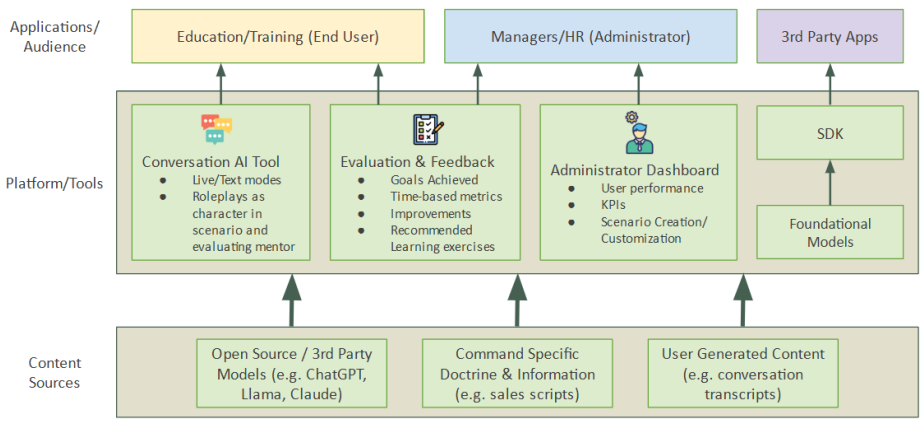
Clara Copilot proposes using its web-based application to revolutionize how narrative intelligence is exchanged in a diverse and challenging information environment.
Clara Copilot identifies biases and vulnerabilities and provides actionable recommendations from publicly and commercially available information to decision-makers for modern military information operations.
We will engage with the DoD stakeholders and Technology evaluators for end-user feedback to show them how they can operate through the integration of advanced technologies and information systems to enhance situational awareness, decision-making, and operational effectiveness.

SYSTEM DESCRIPTION

Clara provides real-time situational awareness into the narratives, stories, and messages within the information environment so that military leaders can effectively implement strategies for geopolitical events using Artificial Intelligence signal processing.

Clara transforms open-source data in real-time into prioritized, actionable, predictive insights, ensuring rapid, informed decision-making, and a proactive adaptive strategy. Clara's commercialization potential showcases a commitment to building a future where AI is a fundamental pillar of organizations, enhancing human capabilities, and ensuring a more prosperous, safer, and more stable world.

G-08: AI-Powered Role-Player Training



PROJECT INFORMATION

Organization Name:	Delta Learning AI
Principal Investigator:	Mark Buonforte
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Effective training often struggles to replicate real-world scenarios in a way that's engaging and adaptable to specific needs. My experiment focuses on addressing this challenge by showcasing Delta AI's prototype, AI-powered, scenario-based training interactions that are tailored for SOCOM and Leadership training. The experiment invites attendees to engage with the scenario and provide real-time feedback on how the system can adapt to meet situation-specific requirements. This hands-on involvement will not only demonstrate the flexibility and effectiveness of Delta AI's technology but also gather insights on areas for improvement. Additionally, the experiment aims to explore potential applications of Delta AI across other functional areas, identifying how our AI-enabled role players can become valuable assets to the DoD and be tailored to achieve whatever training or learning objectives are desired. The ultimate goal is to refine our solution and uncover broader opportunities for collaboration.

SYSTEM DESCRIPTION

Delta AI's training platform allows trainees to simulate realistic, high-impact conversations using an AI agent. We leverage Large Language Models (LLMs) along with text-to-speech (TTS) and speech-to-text (STT) models to produce an AI agent that can listen, think, and speak to the trainee in real-time. Once a trainee completes a scenario, an LLM evaluates the trainee's performance and provides instantaneous and consistent feedback based on a custom rubric. We leverage LLMs to serve two purposes: providing the trainees with 1) the ability to role-play a persona in a live scenario, and 2) a mentor that evaluates the member's performance and recommends new training exercises to improve areas of weakness. We are able to accomplish this by developing a modular ecosystem of LLM prompts that are refined and evaluated for efficacy and consistency.

J-01: xCell DVT

PROJECT INFORMATION

Organization Name:	Firestorm Labs Inc.
Principal Investigator:	Bill Buel
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	J) Expeditionary Operations
Funding	Both Internally and Federally

PROPOSED EXPERIMENT OVERVIEW

We will test and measure the following parameters

1. Time to deployment and readiness. (We will time each operation to verify our cycle time estimates)
2. Man-Power needs for all phases (We will identify bottle necks, dwell times and training levels)
3. Overall Power consumption during operations (we will clamp the power from our generator and measure peak, nominal power draw). We will bring our own generator and also measure fuel consumption.
4. Air Quality During Operations (We will measure Temp, VOC's and particle size/count)
5. Additive manufacturing part production and Assembly (We will print actual parts, post process them and assemble a usable sub-assembly and document any issues related to workflow, equipment utilization and available tools, during the entire process)
6. Field Deployment Logistics (We will test our equipment deployed in a typical base setting and evaluate the overall equipment performance and time to ready in such environment)

SYSTEM DESCRIPTION

xCell is a mobile expeditionary additive manufacturing workcell, capable of producing high strength, durable, precision, ready to use parts to build (1) Firestorm Core products such as tempest drones and (2) Produce functional spare parts for a variety of 3rd party systems and equipment.

J-03: METEOR - Quiet Tactical Power

PROJECT INFORMATION

Organization Name:	Joule Case, Inc
Principal Investigator:	Justin LeVrier
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	J) Expeditionary Operations
Funding	Both Internally and Federally

PROPOSED EXPERIMENT OVERVIEW

METEOR is a significant enabling capability most aligned with Expeditionary Operations, though as a modular quiet tactical power solution METEOR also supports the Infrastructure and Powert. METEOR provides power everywhere a fuel-consuming generator does without the burden of noise and fuel. Consequently we envision METEOR being placed by JIFX controllers everywhere to power priority technologies where noise and fuel operations would interfere. METEOR stands scales from 6kW-40kW by simply connecting additional power modules via 2-quick connect cables; likewise the energy scales from 6kWh to unlimited runtime to deliver mission required power duration ISO tactical operations without ""refueling"" (recharging via solar, wind, onboard vehicle/aircraft power, etc) or swap out via LOGPAC, at a FARP for a "Hot Refuel", or pushed to a secure area for off-grid recharging. METEOR directly enables Energy Resilience and mitigates Contested Logistics with modular, readily tailorable power and energy (on demand) without class III/POL or maintenance.

SYSTEM DESCRIPTION

METEOR stands for modular expeditionary tactical energy operations resource, is designed to be "man-portable", and scales from 6kW-40kW by simply connecting additional power modules via 2-quick connect cables; likewise the energy scales from 6kWh to nearly unlimited runtime by quick-connecting energy modules to deliver mission required power duration to support tactical operations without the need for "refueling" (recharging via solar, wind, onboard vehicle/aircraft power, etc) or energy modules may be swapped out. The basic features are:

- Hand assembly in the field, scales power solution using smaller carryable components
- Individually ruggedized and weatherized battery and inverter cases
- Ease of mobility. All corners have handles. Large enough to be glove friendly
- Easy connect with simple cables
- Highly modular configuration - can be placed/stacked vertically or horizontally.
- Battery agnostic Intelligent power system with BMS and inverter/rectifier using best commercial components
- Easy off-grid recharging.

K-01: Remote powering using battery generators and solar recharging in a tactical environment

PROJECT INFORMATION

Organization Name:	New Use Energy Solutions Inc.
Principal Investigator:	Paul Shmotolokha
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 intend to deploy several sizes of portable battery generators each with different inverters, battery sizes and tactical milgrade solar arrays of various sizes that can power equipment that we bring as well as those of other experimenters. This includes all the equipment used by recon and FPV drone teams, man portable Electronic counter measures (anti-drone), communications and IT equipment, and portable medical devices such as battlefield blood storage. We will test load consumption, ability to recharge in a lower sun month, heat and EMI emitted from the generator and the solar array, portability, optimal placement of solar arrays to avoid detection and create maximum distance from critical equipment (test cable lengths). We also need to put maximum stress on the equipment especially the solar arrays simulating a military environment including damage from shrapnel or bullets . We work in Ukraine with military units but need more environmental testing..

SYSTEM DESCRIPTION

NUE builds systems that deliver AC and DC energy in tough portable cases (Pelican like). We recharge via Military grade solar arrays, grid power or gas generators. Inside each battery generator is a LiFePO4 lithium cell back from 600Wh to 5100Wh, battery management system, bluetooth, inverters providing AC power, AC chargers, solar charge controllers, DC connections for daisy chaining units, DC to DC converters to provide USB and 12v DC power, fans, screens, breakers, brackets, cushioning and cabling. Integrating these components and manufacturing are the key challenges as is monitoring and control. The mobile solar arrays use special panels (no glass, no frames, no reflective material) that NUE manufactures into quick to deploy energy recharging sources with the correct voltages needed by the advanced inverters and charge controllers used by our systems.

K-02: Theia - More Effects, Less Complexity

Figure 1. HAILO AI Chip

Figure 2. Visualizing sound as heat

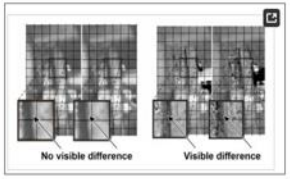


Figure 3. Motion Amplification. Image courtesy of Michal Smieja, "*Motion Magnification of Vibration Image in Estimation of Technical Object Condition-Review*"

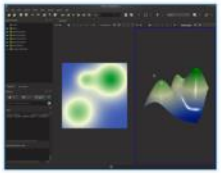


Figure 4. Topological Image using TKK

PROJECT INFORMATION

Organization Name:	Husmann Technologies
Principal Investigator:	Darrin Husmann
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	K) Infrastructure and Power
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Theia will use AI, vision and sound (a defacto passive 'nervous system') to monitor equipment on a workover rig (serving as an ersatz ship engine room). Discrete, ontological and topological data will be processed in JSON format IAW ISO 15143-3, SAE J1939, OPC-UA and ISO 13374 (MIL-STD-31000 (-)).

SYSTEM DESCRIPTION

Theia is an advanced diagnostic and optimization platform tailored for DoD to enhance operational efficiency and readiness.
Theia enables precise, real-time monitoring of engines, aircraft, and shipborne systems. Using motion amplification and sound visualization, Theia enables for early detection and trend-analysis of potential issues, supporting condition based maintenance and reducing the risk of unplanned downtime, ultimately increasing mission success rates.
Theia's integration of innovative large-language models (LLMs), custom transformers, topological analysis and fuzzy logic enables data-driven decisions faster and more accurately. Theia delivers insights across dispersed assets, enabling seamless coordination and proactive maintenance.
Theia seeks to support GENISYS, NPNM and other work (NSWCPD) currently in progress.

K-04: Off Grid Renewable Energy (OGRE) System

PROJECT INFORMATION

Organization Name:	Bren-Tronics
Principal Investigator:	Christian Chandler
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	K) Infrastructure and Power
Funding	Internally

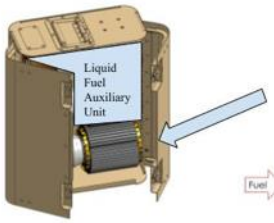
PROPOSED EXPERIMENT OVERVIEW

Bren-Tronics objective is to provide expeditionary power technology via the Off-Grid Renewable Energy (OGRE) system capable of supporting the Warfighter utilizing revolutionary power and energy improvements in generator technology to support off grid Operations. The mission sets that the OGRE fulfills transcends DoD, USGov (i.e. FEMA), and NGO where the use cases are endless. The Measurements and data collection plan will be gathered during planned and ad hoc experiments throughout the week. Inbriefs and hotwashes will be conducted daily to identify objectives for operator to accomplish utilizing the OGRE system. Bren-Tronics personnel will be on site to support. Ease of use and reliability will allow for dismounted and improvised small team operational scenarios.

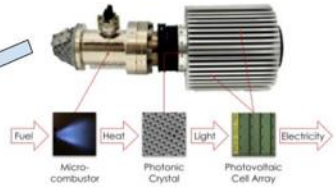
SYSTEM DESCRIPTION

The OGRE is a portable 2 man carry energy storage system that delivers 2000W continuous power with 3500W Surge (120VAC 60Hz, 16.5A), Pure Sine Wave output power. The system provides the Operator 2 AC outlets, 2 USB A ports, 2 USB C ports. It has a 1,000W, 30A power input and can be recharged via solar in austere expeditionary environments or via A/C shore power. The operating display shows State of Charge (SOC), State of Health (SOH), time to full charge, time to empty. Physical specifications are 70lbs, EMI Shielding (Plastic housing?) and will be IP67 waterproof with operating temperate from -20c - +50C.

K-06: LightCell: Reliable, Long-Endurance, Multi-Fuel Power Generation for Sustained Operations



JIFX 25-2 Prototype: the LightCell Multi-Fuel Power Generator Operates on any liquid or gaseous fuel. The Liquid Fuel Auxiliary Unit being miniaturized for integration into Tactical Power Generator. (Dimensions: 14 x 19 x 7 inches)



Mesodyne's LightCell core technology uses a patented TPV process to convert gaseous and liquid fuels into electricity without moving parts

PROJECT INFORMATION

Organization Name:	Mesodyne, Inc.
Principal Investigator:	Veronika Stelmakh
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	K) Infrastructure and Power
Funding	Both Internally (VC) and Federally (SBIR)

PROPOSED EXPERIMENT OVERVIEW

We intend on demonstrating and testing our newest, multi-fuel capable LightCell power generator prototype in support of resilience, efficiency, and continuous functionality in prolonged missions. We will be charging our own equipment, mainly laptops and phones, as well as military batteries to demonstrate the power generation capability. The focus of this experiment will be prolonged operation on varying fuel types (kerosene, JP-8, diesel, gasoline, propane, etc.) in order to test the LightCell's ability to reduce downtime, optimize resources, and ensure mission resilience.

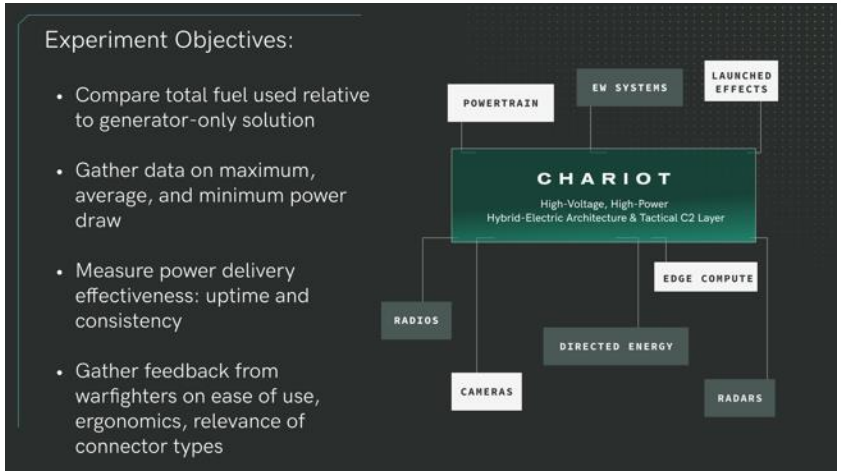
We will encourage end users and any other relevant stakeholders to interact with the demonstration however they see fit as a means of evaluating the technology's impact in the field. The feedback from this experiment will be directly used in further development of our LightCell technology in order to maximize the effectiveness of a final product.

SYSTEM DESCRIPTION

Mesodyne's patented LightCell is a new class of power generator that converts fuel into electricity via light. Simply put, the LightCell enables portable, efficient, quiet, reliable, long-endurance power anywhere, anytime, and from any fuel. With more than 10x the energy density of batteries, the LightCell enables people, sensors, autonomous vehicles - virtually any system that requires portable power - to perform their mission beyond what is possible today and extend range, endurance, and lethality across a multitude of platforms.

We will be testing the latest LightCell prototype capable of generating power from any liquid or gaseous fuel, highlighting the ability to scavenge fuels in extended deployments. Experiments and ad-hoc collaborations will be conducted to test this prototype's ability to operate reliably over extended durations using multiple fuel types. This prototype will have been recently tested at SOCOM TE25-1 in Norway and arctic testing data from this event will be available.

K-07: Sustained Edge Power



PROJECT INFORMATION

Organization Name:	Chariot Defense
Principal Investigator:	Adam Warmoth
Technology Readiness Level:	TRL 3: Analytical and experimental critical function and/or characteristic proof of concept.
Research Area of Interest:	K) Infrastructure and Power
Funding	Internally

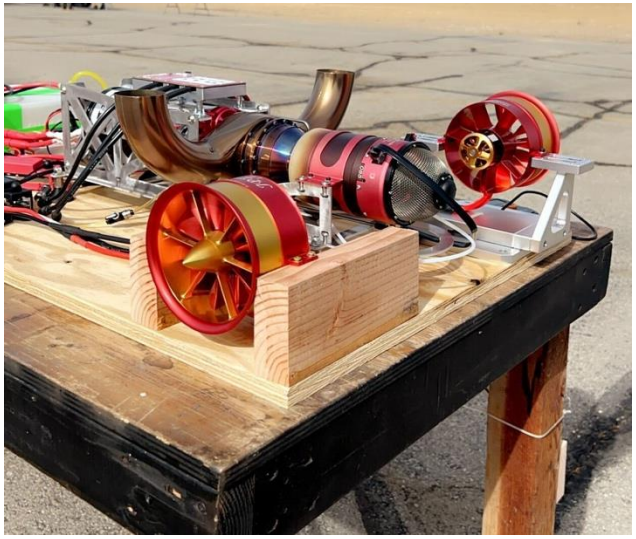
PROPOSED EXPERIMENT OVERVIEW

Chariot proposes to conduct an experiment regarding how its alternative energy generation and storage capability can enable sustained operations in expeditionary and contested environments by reducing fuel consumption and the power-demand curve of defensive and surveillance sensors and unmanned platforms. In the experiment, Chariot will power a topical sensor, high-energy based effector or robotic platform to demonstrate how the prototype reduces reliance on inefficient, fuel-hungry legacy generators and cuts back on the need to have military vehicles needlessly idle to provide power output. The experiment will allow Chariot and the Government to gather data to demonstrate capacity for supporting high-power systems with clean electric signal and scalable power. Chariot and Government sponsors will seek to capture and produce data that would refine battlefield metrics for these systems like usability at the edge, uptime, power stability, energy efficiency, and adaptability to requisite systems across C4, directed energy, and unmanned systems.

SYSTEM DESCRIPTION

Chariot Defense is building a truly scalable power architecture able to deliver and manage energy for both advanced and legacy systems and weapons on the modern battlefield. Chariot's prototype for experiment combines a proven high-density, DC battery with a high-efficiency generator and inverter, and flexible output ports. Our power-management software maximizes performance of each component and captures data to disseminate usage metrics for the fleet and across echelon for the force. Chariot's battery system handles peak-output requirements so its generator may run intermittently at an optimum rate to recharge the battery ‚Äì ultimately reducing fuel and logistics requirements. It is intended to be operated independently for long periods of time with minimal training, including during silent watch operations where tactical generators would produce an unacceptable signature.

K-08: Ground Vehicle Equipped with Hybrid Electric Power System



PROJECT INFORMATION

Organization Name:	Burgess Aerospace Innovations
Principal Investigator:	Johnathan Burgess
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	K) Infrastructure and Power
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

We aim to evaluate the performance and resilience of our hybrid electric power system integrated into a manned ground vehicle under dynamic operating conditions. The experiment will assess the chemical engine's throttle response to varying power demands, its behavior under terrain-induced pitch changes, centrifugal forces from turning, and jarring motions. Additionally, we will measure the performance of the electrical power system during high power demand intervals and assess the system's capability to operate in silent and low infrared visibility mode with the chemical engine powered down and its ability to resume normal hybrid operation when needed. Data we intend to collect includes power output, system efficiency, thermal profiles, and responsiveness metrics, gathered via onboard sensors and data loggers. This data will be analyzed to inform design refinements and ensure robust operation in diverse environments.

SYSTEM DESCRIPTION

The focus of this experiment is BAI's proprietary hybrid electric propulsion technology designed for long-endurance UAV applications. It integrates traditional power sources, such as turboelectric, rotary, or piston engines, with electric propulsion to create a system that balances endurance with efficiency. By combining different propulsion methods, our system offers a flexible solution that can be adapted for various mission profiles and environmental conditions. As part of our phased approach to developing this technology as well as for identifying additional applications of the technology, this experiment utilizes a manned ground vehicle equipped with the turboelectric power system. Though the current power system is designed for use in a UAV, this simple ground vehicle integration will allow us to easily monitor and evaluate the system at this stage. The radio and hazardous materials we intend to bring include a 2.4G wireless remote controller, Starlink and lithium batteries.

L-03: Reactionless electromagnetic propulsion

A Sektet Engine

Figure 1 shows a functioning Sektet engine which produced a maximum of 8.65 N net force. The engine consists of two solenoid coils, connected to two separate power supplies and a 99.7% pure iron momentum and magnetic conductor.

PROJECT INFORMATION

Organization Name:	Em sektet
Principal Investigator:	Ite Chen
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	L) Mobility and Transportation
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Objective: To evaluate the Sektet Engine's performance, efficiency, and maneuverability on water under various operational conditions.

Procedure: (1) Install the Sektet Engine on a test vessel equipped with data acquisition systems. (2) Conduct trials at various speeds and maneuvering patterns (e.g., linear, angular). (3) Test under different conditions and loading conditions (empty, half-load, full-load).

Data Collection: Thrust output (N), Power consumption (W), Vessel speed (knots), Directional control and stability, Acoustic signature (dB), Environmental data (temperature, wave height)

Analysis: Compare performance metrics against baseline data from conventional propulsion systems to assess efficiency, stealth, and control.

SYSTEM DESCRIPTION

The Sektet Engine, an advanced reactionless propulsion system, represents a breakthrough in naval technology by enabling efficient, versatile movement without reliance on traditional fuel sources or propellers. Utilizing electromagnetic solenoids and a specialized momentum harness system, the Sektet Engine creates net thrust internally, allowing vessels to navigate with reduced hydrodynamic resistance and minimal environmental impact. This unique design minimizes mechanical complexity, thus enhancing reliability and lowering maintenance demands. It operates silently and with significant energy efficiency, which is particularly advantageous for naval applications, including stealth operations and remote patrolling. Unlike conventional thrusters, the Sektet Engine does not require a reaction mass, enabling continuous operation without refueling. By integrating the Sektet Engine into naval fleets, the potential for fuel independence, long-range endurance, and tactical maneuverability is greatly enhanced, positioning this innovation as a transformative technology for future naval and maritime operations.

M-01: Pikeman: Low Cost Electric Loitering Munition

PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Mitch Jones
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	Federally (DARPA)

PROPOSED EXPERIMENT OVERVIEW

GreenSight plans to continue testing on our modular Pikeman aerial platform. This is an electric loitering munition designed to be rocket launched and operate autonomously or with human-in-the-loop. We plan to test our terminal seeker on surrogate targets with an inert warhead in missions with a strike abort, and a terminal strike.

SYSTEM DESCRIPTION

GreenSight's Pikeman is a low cost, fully electric, long range, precision strike loitering munition. It is rocket launched with minimal infrastructure. 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.