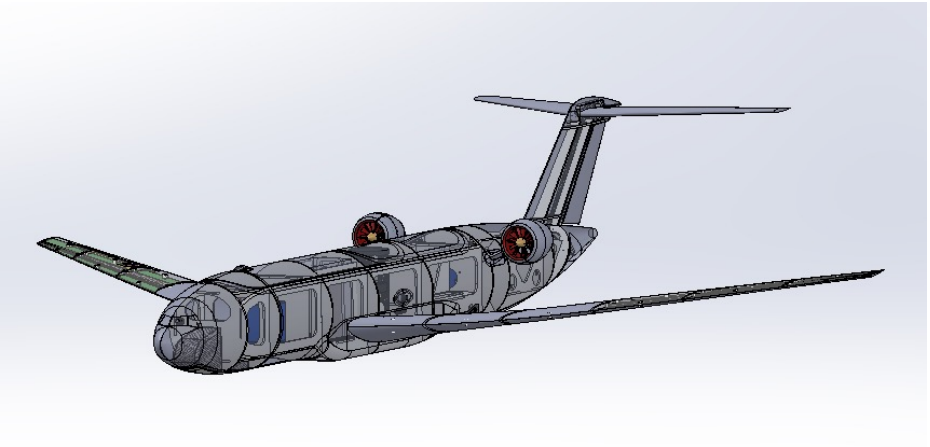
A-01: Novel Aeroservoelastic Scaled Model Demonstrator

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	M4 Engineering, Inc.
Principal Investigator:	Myles Baker
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

Demonstrate the integration of embedded instrumentation (pressure, acceleration, and fiber optic strain measurements), embedded data acquisition and logging, scaled model design approaches for aeroservoelasticity, and scaled model fabrication approaches tailored to wing structures using a 150lb, 15% scale model of the 737-900 with a wing span of 12ft.

In these flight tests, we will demonstrate basic manual-control functionality with a safety pilot. If successful with sufficient time and budget remaining, we will also demonstrate stabilized flight with the autopilot and waypoint navigation using the QGC ground control system and fully autonomous flight (other than takeoff and landing).

SYSTEM DESCRIPTION

To carry out the experimental test plan, a subscale remotely piloted flight test vehicle will be utilized. The configuration is based on a commercial transport (737-900), and is sized to carry 50 lb of payload, which will include a FOSS interrogator needed for shape measurement and control. The vehicle is an all-electric configuration with TOGW of 150 lb (50 lb payload, 50 lb airframe, 50 lb batteries), with a wing span of 12 feet.

A-02: Phalanx Shield Multi-Domain

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 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-03: AZ Flyer

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	University of Arizona
Principal Investigator:	Sergey Shkarayev
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

The main goal of the proposed testing campaigns is to verify the ability of a UAV glider to harvest energy from wind gradients in high-altitude jet streams via dynamic soaring for prolonging flight. This will involve a 12ft wingspan off-the-shelf electric glider UAV (RC Glider) with two key missions:

1. Testing of the communication systems and the autopilots capabilities with conventional powered flight up to 10,000ft.
2. Endurance testing: Flying fully autonomously with both gliding and powered flight sections. The UIAV is constrained to a designated area and is navigating fully autonomously with this area attempting to exploit energy available in the environment to maximize flight endurance.

SYSTEM DESCRIPTION

Aircraft: the Diana 3.7m. An off the shelf glider scale model with 3.7m wind span manufactured by Icarus. Includes an electric motor propulsion system. Pixhawk Cube autopilot and sensors with the ardupilot flight firmware (Stable release versions only). Along with an onboard computer: Raspberry pi 4, responsible for experimental dynamic soaring flight planning and data collection using in house software.

Multiple backup position reporting systems available: APRS and Global-star Launch system:

Ground station and communications:

Dedicated ground station with a live video link (2.4Ghz) and a flight control and telemetry link (433Mhz). Developed in house using laptops with the Mission Planner software for flight monitoring.

A-04: Multi-Agent UAS Teaming for Extended ISTAR and Autonomous Resupply

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3

1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	University of Nebraska-Lincoln
Principal Investigator:	Justin Bradley
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Federally (Army Research Laboratory)

PROPOSED EXPERIMENT OVERVIEW

We plan to evaluate the effectiveness of an autonomous swarm of unmanned aircraft systems consisting of up to 8 agents in the conduct of intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) tasks against static and moving targets. Half of the multiagent system will be launched from the ground with the other half deployed in flight from a transporting aircraft. Telemetry data from the agents and visual observations from cameras on board the transporting aircraft will be used to assess the effectiveness of the overall system.

SYSTEM DESCRIPTION

An implementation of an experimental hierarchical reinforcement learning (HRL) algorithm is used for position and velocity control of the agents within the swarm. The HRL algorithm controls also the three dimensional separation of the aircraft from each other while they are flying.

Additionally, we have developed a unique deployment mechanism that is used to transport the smaller swarm agents on board a larger UAS and then release (i.e. drop) them into a flying state where they can then integrate themselves into the swarm's formation.

A-05: Transpacific Flight of an Additive Manufactured Group 3 UAS - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	RapidFlight Holdings, LLC.
Principal Investigator:	Brandon Smith
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

RapidFlight intends to prove that a 3D printed UAS can perform autonomous long range ISR missions with a transit of the Pacific Ocean from California to Hawaii. This mission has never been done with an aircraft this small. The UAS is built using novel materials and construction methods. This experiment tests new command, control, and communications architectures, paths, and handoff procedures between ground-based antennas and satellite communications.

The test will begin with demonstrating the communications infrastructure and the handoff procedures between UAS ground-based Line of Sight communications to satellite communications. The UAS will transit from Camp Roberts into international airspace over the Pacific Ocean, then in transit to Hawaii it will link with a second GCS site via Line of Sight (LOS) communications. After LOS communications are established, the air vehicle will transit out of international airspace through a COA to restricted airspace where the aircraft will be recovered.

SYSTEM DESCRIPTION

The RapidFlight M2 is a single-engine fixed wing Group III UAS. The airframe is composed of a semi-monocoque modular main fuselage, one pair of wings, and one pair of aft stabilators in a V-tail pusher configuration. The M2 weighs 175lbs, is approximately 7 ft long with a 14ft wingspan.

M2 is launched by an electric winch which accelerates a launch cradle along the launch rail to takeoff velocity, whereon the UAS escapes the launch cradle and continues in powered flight.

The M2 is controlled throughout flight by an external pilot and an internal pilot at a Ground Control Station. The GCS consists of laptops and monitors communicating via a serial connection over a Silvus telemetry radio for LOS or a NAL Research A3LA-RM Satellite Communication radio for Beyond LOS (BLOS) operations. The aircraft is recovered by executing an autonomous approach into a portable recovery system.

A-06: Endurance Fixed Wing Drone - CANCELLED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	UAVita
Principal Investigator:	Rachel Hor
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

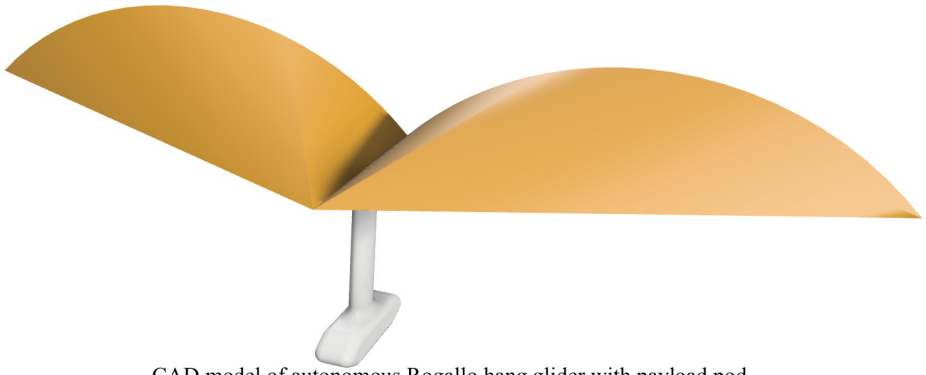
The experiment involves flying the drone under different environmental conditions and recording its flight characteristics, such as speed, stability, and battery life. By analyzing the data, you could determine how different environmental factors affect the drone's performance, and identify any patterns or trends.
For more comprehensive experiment, varying the drone's weight or payload, and test different flight modes or maneuvers. This investigates how environmental factors affect different types of drone flights, such as aerial photography or package delivery.
This experiment would provide valuable insights into how drones perform under different environmental conditions, and could be useful for optimizing drone designs and flight strategies in various applications.

SYSTEM DESCRIPTION

A drone core experiment could involve testing the stability and control of a drone under varying flight conditions. This experiment would require a drone with a flight controller and sensors to measure its orientation and position.
To make the experiment more comprehensive, the drone's weight and payload could be varied, and different flight control algorithms could be tested. This would allow for a more thorough investigation of the drone's flight capabilities and limitations.
Overall, a drone core experiment provides valuable insights into the flight dynamics of drones and could be used to optimize their design and performance in various applications, such as search and rescue, surveillance, and aerial photography."

A-07: High-Altitude Experimental Rogallo Mission to Escort Safely (HERMES) - CANCELLED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



CAD model of autonomous Rogallo hang glider with payload pod

PROJECT INFORMATION

Organization Name:	Human/Robotics/Vehicle Integration & Performance Lab at the University of California - Davis
Principal Investigator:	Stephen Robinson
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally & Federally (NASA)

PROPOSED EXPERIMENT OVERVIEW

Our system will consist of a weather balloon and flight termination system to carry our payload (a high-altitude hang glider) and deployment system. We will first launch the balloon by hand. At the top of the regulated airspace or before the balloon drifts outside of the lateral confines of the airspace, whichever comes first, we will remotely deploy the glider from its housing for maximum flight time. The glider will then autonomously navigate to predetermined navigation points within the regulated airspace. Finally, it will navigate to the landing site and we will recover the glider and experiment data including the collected flight performance. A camera will be mounted on the aircraft to capture the wing in flight to observe the aerodynamics and wing behavior. The glider will also house an array of sensors including GPS, barometers, and Inertial Measurement Units to capture the flight performance.

SYSTEM DESCRIPTION

The system is an autonomous Rogallo-wing aircraft with a 2 meter wingspan designed to safely deliver data storage devices from high-altitude balloons with scientific payloads. This design was selected as a finalist in NASAs FLOATing DRAGON competition. This experiment will be an intermediate test before the final test flight in August 2023. Our return-to-site vehicle capable of deploying from 120k feet will enable collection of data that is prohibitively large to be transmitted wirelessly. This will be the first drop exceeding 400 feet above ground level for our system, so we will analyze the performance of the flight controller and autonomous navigation. Inertial Measurement Unit, GPS, temperature, and actuator data will be saved onboard to be analyzed after recovery. A Long Range (LoRa) radio will beacon health data mid-flight to aid in recovery in the event of anomaly, and provide basic flight data for analysis if recovery is not possible.

A-08: Autonomous Logistics and Reconnaissance in GPS Denied Environments

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 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	Internally

PROPOSED EXPERIMENT OVERVIEW

Rhoman Aerospace will collaborate with Workhorse and through the deployment, testing, data collection, and autonomous sample resupply flight operations using machine-vision GPS denied and degraded navigation and autonomy solutions.

In collaboration with Workhorse and using a Workhorse UAV platform, as well as using a Rhoman R&D Platform, sample autonomous logistics and reconnaissance mission routes will be tested employing a vision-based position and navigation solution for active positioning and/or data capture and testing.

SYSTEM DESCRIPTION

The core of the technology being deployed is a vision-navigation solution that enables autonomous operations without GPS, and without an electronic emitted signal in order to provide no-emit autonomy for GPS denied and degraded airspace. The solution uses visual feature tracking to maintain UAV heading and to enable the UAV to return to launch following a successful logistics/renaissance mission.

A-09: GreenSight SA4 - Secure Advanced Aerial Attributable Asset - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3

1 - 5 May 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-10: Visual Positioning for Autonomous Missions in Degraded/Denied PNT Areas

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Vermeer
Principal Investigator:	Austin Denhardt
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

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

We hypothesize that increasing the altitude of our sensors will provide more reference points to the algorithm and will thus improve position accuracy. Therefore, we intend to collect data at various altitudes as high as the drone will fly to compare position estimates to GPS location.

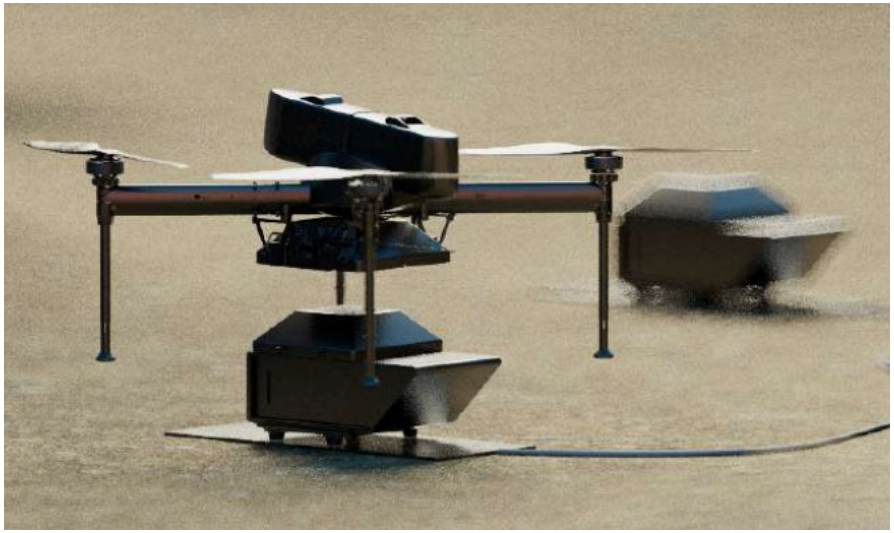
SYSTEM DESCRIPTION

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.

This product can be used to enable missions either in degraded or denied GPS environments or allow fully autonomous missions without any communications devices.

B-01: DROPs Drone Agnostic Cargo PODs

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	TB2 Aerospace
Principal Investigator:	Hank Scott
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

We wish to test our UAV PODs in a field setting to receive data and operator feedback. Our PODs for this experiment would carry an ISR payload. The ISR PODs can be deployed from a UAV for persistent sentry/sensor operations. More importantly the PODs can be recovered, and/or relocated to a new location completely autonomously.

We expect to gather data on successful deployments, and recoveries. In addition we would like to obtain Marine/warfighter input on the overall system.

SYSTEM DESCRIPTION

Our DROPs system is a drone-agnostic external POD. The PODs are available in Group sizes 1 through 5 and the system allows for completely autonomous alignment and capture by the UAV. No warfighters are required to attach the PODs to the UAV at take-off or landing. The PODs also provide supplemental power to the UAV in flight reducing the UAV charging time. The PODs can contain standard military cargo such as ammunitions or an ISR POD with a select range of ground or ocean sensors (acoustic, radar, seismic, motion etc..).

B-02: Tactical Mixed Reality FPV Drone and Robotic Goggles

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 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.

B-03: Drone Amplified Block 1.5 Medium Lift Delivery Platform Flyoff

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Drone Amplified
Principal Investigator:	Carrick Detweiler
Technology Readiness Level:	TRL 3: Analytical and experimental critical function and/or characteristic proof of concept.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

The proposed experiment will evaluate the effectiveness of an AI-based software system that can autonomously analyze all traffic passing through the UAS system. A successful test will demonstrate the AI's ability to detect and notify the end-user of any cybersecurity threats, including unauthorized traffic and potential system vulnerabilities. Additionally, the software will monitor overall system health and notify the end-user of any issues that could impact the UAS's mission. This experiment will emphasize the importance of cybersecurity in UAS operations and demonstrate the capabilities of AI in detecting and mitigating threats in real-time.

SYSTEM DESCRIPTION

The Drone Amplified MAVLink Router is designed to allow the interface of many MAVLink devices on a UAS that otherwise could not interface with the required number of MAVLink devices. The board supports up to 6 serial MAVLink ports, MAVLink over Ethernet (UDP), and has a number of additional features. It was designed for integration with the Freefly Alta X, but can be used on most PX4, Ardupilot, or MAVLink based systems.
The Drone Amplified MAVLink Router is already employed on UAS platforms for the Department of Interior, Department of Agriculture, and Department of Defense.

The technology being tested is AI running on the board to enhance cybersecurity, and safety of the vehicle.

B-04: GPS Denied Autonomy - Cancelled

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Workhorse Group
Principal Investigator:	Elaina Weingartner
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	Internally

PROPOSED EXPERIMENT OVERVIEW

Workhorse is collaborating with Rhoman Aerospace to integrate a GPS-denied navigation capability. The experiment will integrate Rhoman Aerospace's AI processing onto a Workhorse drone and perform a data collection to analyze and determine the overall performance of the system. In addition, the experiment will help determine the feasibility of integrating the AI processing with commercial off-the-shelf sensors.

SYSTEM DESCRIPTION

The WA4-200 is a heavy-duty, uncrewed aerial system (UAS) designed for high-volume operations in rugged field environments, including humanitarian assistance logistics operations (HALO). When equipped with the proprietary universal mounting plate, Falcon can carry additional sensor payloads for applications such as dynamic data collection, surveillance, and reconnaissance.
The WA4-100 is a rugged, all-electric, multipurpose uncrewed aerial system (UAS) designed for a wide range of commercial applications. Capable of automatic flight once launched, Horsefly provides safe, reliable, and precise last-mile delivery in various conditions using a winch delivery system. When equipped with the proprietary universal mounting plate, Horsefly can easily swap to a servo delivery system or carry sensor payloads for alternate commercial applications.

B-05: USV Performance Evaluation with AIRMADE Fuel

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Air Company
Principal Investigator:	Stafford Sheehan
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	Internal & Federal

PROPOSED EXPERIMENT OVERVIEW

We propose to race SeaFox USVs, one with Jet-A derived from fossil fuels, and one with Jet-A produced by Air Company's process from carbon dioxide and water. We propose to collect comparative data between the two USVs, such as acceleration rate and amount of fuel consumed over a set duration at maximum speed. The hypothesis is that Air Company's fuel has identical performance for marine vehicles as the current Jet-A being utilized. This will help to enable further testing with the ultimate goal of generating fuel on-site for marine operations.

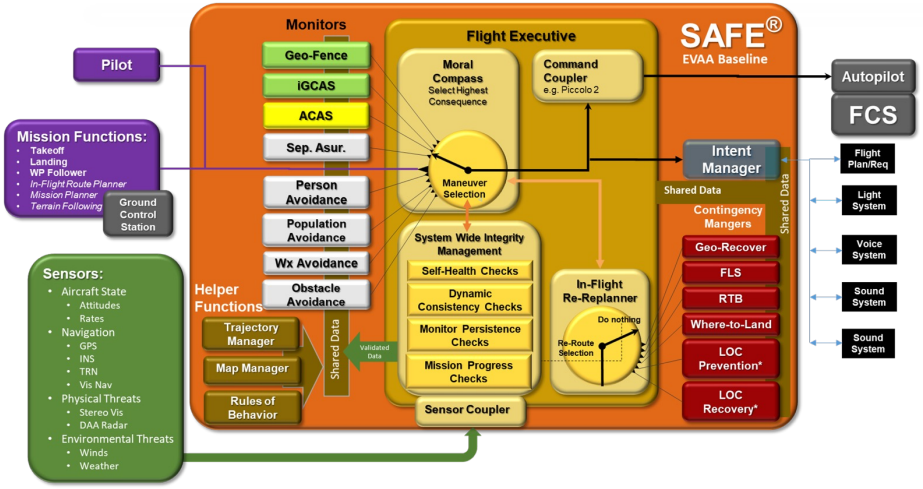
SYSTEM DESCRIPTION

Air Company is a contractor of the Defense Innovation Unit's Project SynCE. We have developed technology that produces fuel on-site from carbon dioxide (which can be captured from the air or water), water, and electricity that meets the chemical specifications as a drop-in Jet-A. The fuel is currently produced in a pilot plant situated in Brooklyn, New York, and would be transported to the SLAMR site beforehand. Previously, fuel produced from this system successfully flew a UAV as part of the Air Force's Project FIERCE.

B-06: Supervised Autonomous Function Executive: An Autonomous Operation Enabler - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3

1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Modern Technology Solutions, Inc
Principal Investigator:	Dean Barten
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

The MTSI team will demonstrate automatic aircraft and ground collision avoidance using a Zeta FX-79 sUAS enabled with the Supervised Autonomous Function Executive (SAFE) software architecture. For this demonstration, simulated terrain may be virtually inserted before the flight if suitable terrain is not available near Camp Roberts. Aircraft collision avoidance will be demonstrated using a DJI Phantom 4 Quadcopter squawking ADSB from a hover as a target for the FX-79 to automatically avoid.

SYSTEM DESCRIPTION

SAFE is an instantiation of a multi-monitor runtime assurance (MM-RTA) architecture that provides the ability to constrain, regulate, and mitigate unsafe autonomous behaviors. SAFE builds upon NASA's Expandable Variable Autonomy Architecture (EVAA) software which is a government developed and owned. SAFE a simple and deterministic MM-RTA software that consisted of three major components: monitors, moral compass, and map manager. As the name implies, monitors monitor the aircraft behavior and determine if unsafe conditions are projected to occur. Two of the monitors that have been developed to date are the Ground Collision Avoidance Systems (GCAS) monitor and the Airborne Collision Avoidance Systems (ACAS) monitor. Once one or more unsafe conditions have been detected, the moral compass selects a recovery command with the lowest consequence and sends the command to the aircraft autopilot to avoid the hazard to the aircraft.

B-07: Weather Hive: Automated wind and Meteorological Sensing for Atmospheric Modeling and Situational Awareness

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Greensight
Principal Investigator:	James Peverill
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

GreenSight plans to test software, sensors, and algorithms onboard their Dreamer UAS platform for autonomous operations and measuring of wind and meteorological conditions. Accurate measurement of current and forecast weather conditions can improve the effectiveness and safety of defense and civil aviation operations. Accurate current and historical wind and meteorological measurements are not always available for current and future areas of interest. This experiment will provide essential data for development and validation of current and developmental algorithms and platforms.

SYSTEM DESCRIPTION

The Dreamer UAS is an established platform utilized primarily for GreenSight's commercial operations. The system has been proven through continuous development, production, and operations. This platform will be used to gather control, state, and sensor data for real-time and post processed wind and meteorological measurements from surface to high elevations. In addition, our nano drone uses a miniaturized version of the avionics and will be used to collect the same data.

C-01: Low-cost Threat Detection and Automated Deconfliction

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
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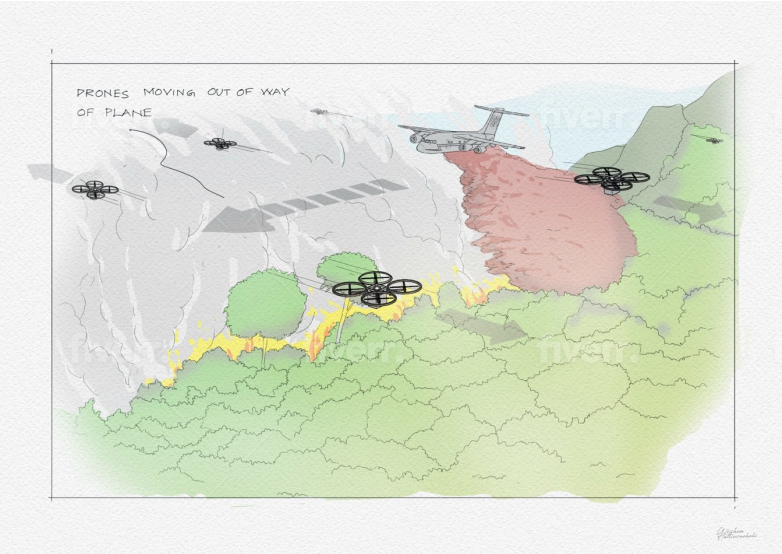


PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Kyle Cantrell
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	C) Countering Unmanned Systems
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

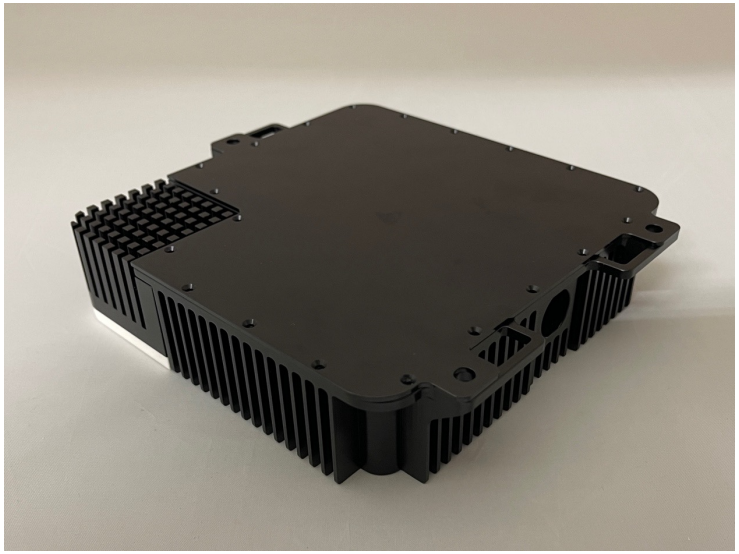
We are planning to run a multi-modal AI system with acoustic array and 360 degree imagery to continuously analyze and track threats in the air. Our main experiment is in accuracy of detection. To quantify our experiment we will manually annotate threats in the air during the test and count how many there should be detected. We will compare this to a detection count output from the system for measurement. This will be further quantified by measuring detection counts in both the visual and acoustic subsystems. And further again by Direction of Arrival accuracy.

SYSTEM DESCRIPTION

The system is a fused AI model with inputs from two fisheye lenses and an acoustic MEMS array. It is a stand-alone (through solar power), single board computer continuously running a deep learning model over sensory inputs.

D-01: Whisper - Secure Wireless WiGig Intra-Boat Communication

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Asymmetric Technologies
Principal Investigator:	Adam Renner
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	D) Communication and Networking
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

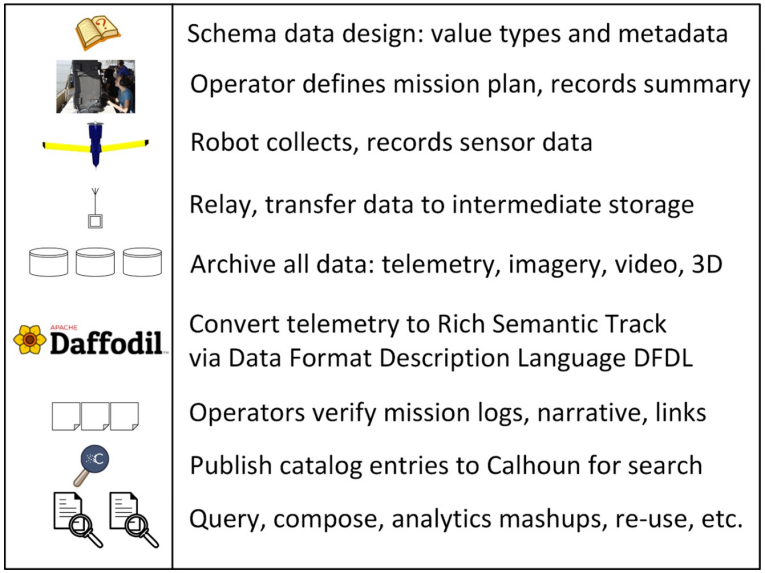
We will be experimenting with a WiGig 60GHz wireless network to simulate an intra-boat capability to provide combat craft a very high-speed wireless data/comms capability that has limited (<100m) detection range. Data will either be from camera feeds or a local TAK server providing everyone in the network the same common operational picture (COP). Experiments will take place in different environments. Data transmission speeds will be tested along with any drops or interferences occurring due to signals being shielded.

SYSTEM DESCRIPTION

Whisper Wireless Vehicle is an intra-boat wireless communication capability that is high-bandwidth, secure, and has a low probability of intercept/detect (LPI/LPD). Additionally, this technology development effort could be leveraged to facilitate high-speed wireless communications between dismounted soldiers and/or boats, boat-to-boat (short range) and wireless "dead-drop" scenarios (e.g., sensors emplaced on buoys) Whisper uses COTS wireless communication modules (based on the 60GHz WiGig standard) that have been customized, secured and ruggedized for SOF and other niche applications - the use of COTS devices avoids reliance on proprietary, expensive solutions that may not be supported in the future. All data transmissions are protected via AES 256 encryption and the Whisper system provides sufficient computational horsepower to perform full motion video processing/compression as well as support other computationally intensive applications.

D-02: Data Strategy for Unmanned Systems

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 – 5 May 2023



PROJECT INFORMATION

Organization Name:	Naval Postgraduate School (NPS)
Principal Investigator:	Don Brutzman
Technology Readiness Level:	D) Communication and Networking
Research Area of Interest:	TRL 5: Component and/or breadboard validation in relevant environment.
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

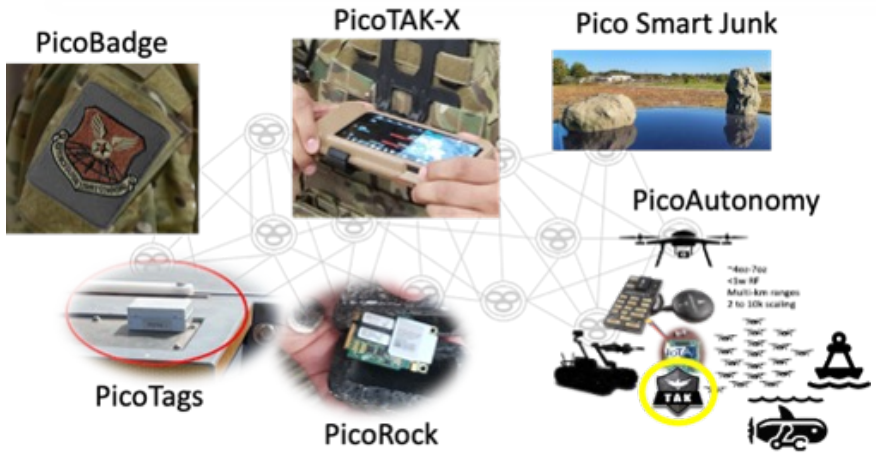
Data Strategy for Unmanned Systems Field Experimentation (FX), Simulation and Analysis: Abstract. Data collection and analysis techniques for robot experiments are haphazard and incomplete. Building best-practice workflows for data and metadata from unmanned systems can leverage both field experimentation (FX) and simulation to support archival data re-use and repeatable analysis. Reusable end-to-end data workflows are needed. Building on multiple open standards, open-source tools, and authoritative data formats, ongoing NPS CRUSER work is focused on applying Data Format Description Language (DFDL) techniques to archival recording/playback of mission orders, recorded telemetry and sensor streams.

SYSTEM DESCRIPTION

Efforts at JIFX 23-2 will assess previously collected data assets, consider current practices, and plan next-step developments of an NPS Data Archive. Our goal is to support both experimenters and long-term users of their results. This necessary capability may enable an even-larger context, namely a Data Strategy for Unmanned Systems field experimentation (FX), modeling and simulation (M&S) supporting Live-Virtual-Constructive (LVC) synthesis, data repositories, and repeatable analysis. A full end-to-end toolchain built using open capabilities has the potential to address these important needs. Our design memorandum describes component technologies that together can establish such an information infrastructure. Failure to implement a shared data strategy blocks necessary interoperability of human-machine teams.

E-01: Technologies for AI-enabled Logistics in Contested Environments

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	IOT/AI
Principal Investigator:	Kevin Montgomery
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	Federally

PROPOSED EXPERIMENT OVERVIEW

This experiment seeks to deploy and evaluate next-generation technologies relevant for Agile and Autonomous Logistics for contested environments in representative environments (field, urban, building, subterranean). These technologies include LPI/LPD communications for sensors and personnel, EW detection and disruption, non-GPS PNT, and other technologies. Our communications devices utilize a novel LPI/LPD radio technology with TS-level encryption/authentication, along with a highly scalable (1000s of nodes+), self-configuring/healing distributed wireless mesh network algorithm which uses AI/ML techniques to optimize aggregate performance of the network based on traffic, load, RF environment, and other parameters. The goal is to evaluate several applications of these technologies in real-world conditions for Agile and Autonomous Logistics applications to further develop and refine these technologies and transition these technologies to usage by military and other communities.

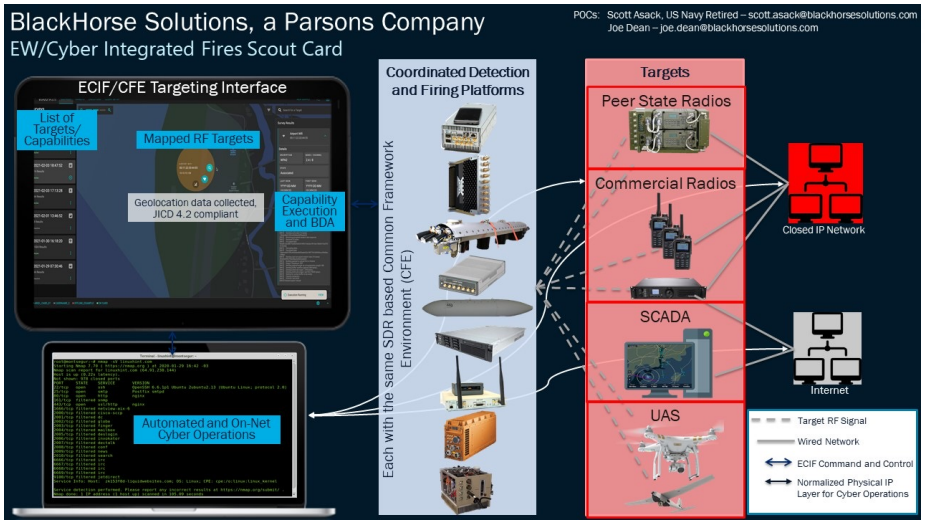
SYSTEM DESCRIPTION

The products and prototypes that we intend to test and evaluate include:

- TAK-X: ATAK communications device providing LPI/LPD communications capability along with logistics-based ATAK plugins, including wearable sensors
- PicoComm: reliable, secure, personnel communications device (ie, Star Trek comm badge)
- PicoTag: Contested logistics asset tracking in contested environments
- PicoUAV: UAV utilizing LPI/LPD communications and swarm meshing technology
- SmartRock/SmartJunk: covert EW detect/disruption device disguised as rock or sea junk
- SmartCam: AI-enabled UAV/aircraft detection perimeter security device

E-02: EW-Cyber Integrated Fires - CANCELLED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	BlackHorse, a Parsons Company
Principal Investigator:	Joseph Dean
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	E) Cyber, Cyber Security, and Electronic Warfare
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

BlackHorse a Parsons Company, experiment will consist of its Electronic Warfare Cyber Integrated Fires (ECIF) platform supported by its Threat Representative Environment (TReX) SOI emulator. Experiment will consist of sensing, identification, and execution of Electronic Attack on a variety of UNCLAS peer-state SOI emulations ranging from tactical radios, UAS signals, data links and radars, as well as Cyber malware inject on three SOIs: digital mobile radio, VSAT, Freewave Radio. ECIF is a TRL 7 RF-enabled Cyber capability that has been integrated with TRL 9 GOTS ES/EA software architecture known as Collaborative Framework Environment (CFE) which BlackHorse maintains updates and new SOI development. This experiment will flex the exquisite CEMA capabilities of ECIF and highlight the open-framework architecture and hardware-agnostic agility.

SYSTEM DESCRIPTION

ECIF is a software mission management framework which operates on a standard laptop computer connected to a software-defined radio with a variety of directional and omni-directional antenna kits to integrate EW, Cyber, and CEMA capabilities to sense, identify, locate and affect signals of interest (SOI) in a user-friendly, agile platform designed for tactical units and all the way up to mission commanders and decision makers. EW-Cyber SOIs, threats and friendly forces status and vulnerabilities are clearly displayed on an intuitive user interface, allowing an operator at any skill level to understand and execute CONOPS with minimal training. ECIF offers automation with man-on-the-loop and man-in-the-loop options to control kill chain processing and execution at a variety of levels.

F-01: The Frontline Perception System (FPS) - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	TurbineOne
Principal Investigator:	Ardin Lo
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internal & Federal (SBIR)

PROPOSED EXPERIMENT OVERVIEW

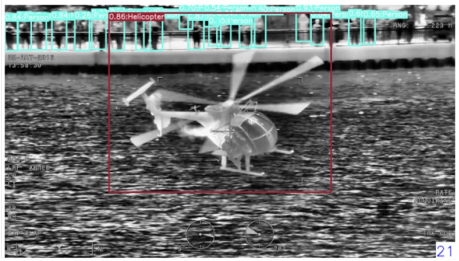
TurbineOne will experiment with applying multiple edge-deployed machine learning models with the Frontline Perception System (FPS) analyzing disparate video and SIGINT sensor feeds showing that users can harness ML even in comms-contested environments. The FPS is currently able to build and apply one 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.

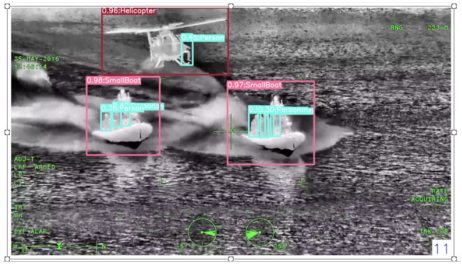
SYSTEM DESCRIPTION

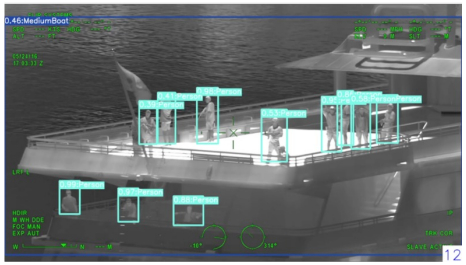
The first of its kind, the Frontline Perception System (FPS) is an Artificial Intelligence/Machine Learning (AI/ML) software platform that monitors all sensors and cues decision-makers based on ML detections, even in a comms-contested environment. The FPS identifies, classifies, and labels threats, and 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 Modular Open System Approach (MOSA) enables integration of any sensor feed and any ML algorithm, avoiding vendor lock. The FPS's interoperability and automatic, no-code ML labeling and tuning technology makes it the ideal platform for quickly building, refining, and deploying new AI/ML models in the field a necessity to deliver information advantage at the speed of relevance.

F-02: AIPED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023







PROJECT INFORMATION

Organization Name:	Phelps2020 Inc.
Principal Investigator:	Besma Abidi
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internal and Federal

PROPOSED EXPERIMENT OVERVIEW

Phelps2020 will bring live cameras and pre-recorded maritime video sequences and can also ingest other available cameras at the venue. if any. Our hypothesis is that AIPED enhances degraded video (contrast, shadows, fog, mist, atmospheric distortions, etc.) , detects people, weapons, small, medium, and large boats (among other objects), identifies faces and writing in the scene, and disseminates via several channels, i.e., via smart compression in constrained bandwidth of as low as 64kbps. For enhancement, measures of success include visual interpretability as well as higher ML object detectibility. For the AI/ML detection, the hypothesis is that 100% of the objects in the scene will be detected and accuracies will be highest for the larger boats and the less cluttered scenes. Much higher quality video will be shown via streaming in low bandwidth, compared to traditional H264 compression. All outputs are still compatible with H264 and H265.

SYSTEM DESCRIPTION

Phelps2020's AIPED was selected by Kraken Challenge of NSWG4 to participate in the present event. AIPED is a sensor-agnostic edge platform capable of ingesting compressed and uncompressed raw video from multiple sensors of up to 4K60 each. It processes, exploits, and disseminates actionable information even in low constrained bandwidth. The edge devices are networkable via WiFi and 5G and can be used on manned platforms, USVs, UAVs, for teaming to help with "sense, make sense, and act," and provide a real-time, low latency, low SWaP, autonomous solution to the Navy.

F-03: Multi-Domain Expeditionary Artificial Intelligence and Behavior Analysis at-the-edge for Tactical Surveillance Application

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

MT-5 Autonomous Surveillance System

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	Internally

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 logistical applications for expeditionary AI and behavior analysis

-Edge computing to decrease communications bandwidth requirements

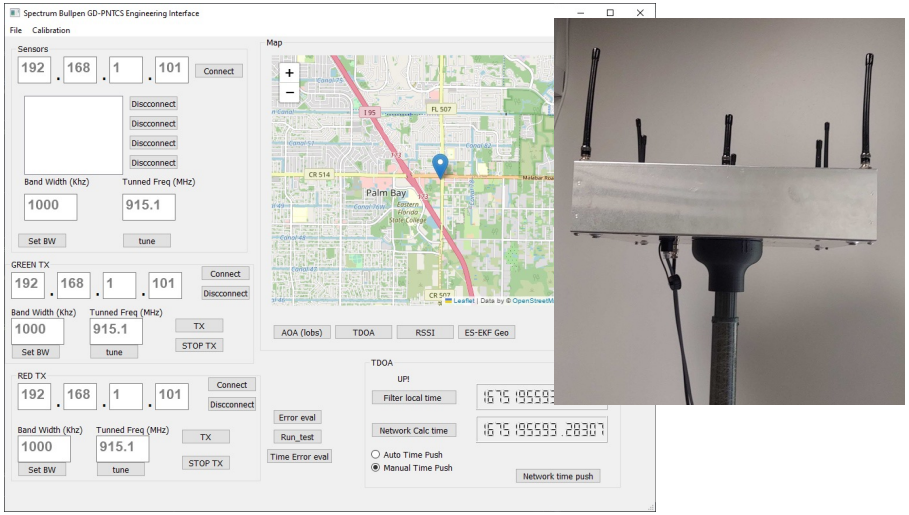
-Extended Communications backhaul with IP radios

SYSTEM DESCRIPTION

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. This rapidly deployable technology pushes Artificial Intelligence and Behavior Analysis to the tactical edge to provide manpower savings, improve decision making and enhance early warning during multi-domain operations.

F-04: GD-PNTCS - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Spectrum Bullpen
Principal Investigator:	Steven Sharp
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Spectrum Bullpen aims to test the GPS-Denied Position Navigation Timing and Communications System (GD-PNTCS), specifically its ability to locate itself given only emitter locations. accuracy measurements will be achieved by comparing our calculated location to a commercial GPS solution. We will also test a smaller, single-antenna sensor solution to compare the accuracy of using RSSI. The testing will involve a series of collections of location outputs, and a direct comparison to GPS output (targeting the NEMA83 standard). Other signals of opportunity, such as satellite signals, will also be considered.

To test the effectiveness of the system we will need an unobstructed space to set up to receive emitters (we plan to use NOAA weather stations and other signals of opportunity, specifically the NOAA station KIH31 162.550Mhz, airport beacon (Paso Airport), FM stations, and local TV broadcast stations). Measurements will be taken over several days to generate statistics on accuracy.

SYSTEM DESCRIPTION

The heart of the system is an Extended Kalman filter that combines two or more methods of localization to resolve position of the system. We use Radio direction finding techniques to correct drift of the state frame of a vehicle from noisy IMU data.

G-01: Stitch-Free 360-Degree Video Capture - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Circle Optics Inc
Principal Investigator:	Zakariya Niazi
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

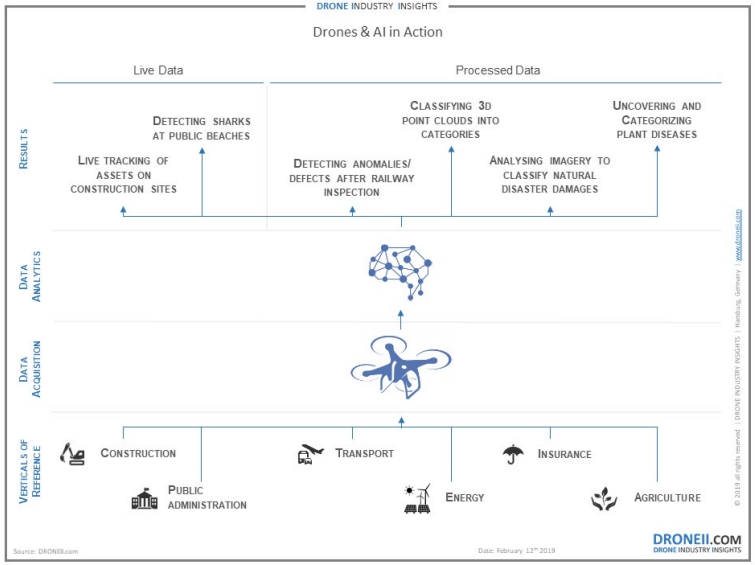
We intend to equip a mobile ground vehicle with our novel 360-degree camera and beam the video feed over the local 5G network for real-time display on a VR headset.

SYSTEM DESCRIPTION

World's first stitch-free 360-degree camera.

G-02: Situational Awareness using Streetlight Camera on NEMA Socket for Rapid Deployment - CANCELLED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Navio International, Inc.
Principal Investigator:	Ernest Brown
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

Our product is best described in these videos.

We would like to learn the effectiveness of our units in detecting stealth military units and tactical drones.

https://youtu.be/_3lj3G-vhzw Utility Security

https://youtu.be/S0fDMrqshMM Hyperlocal Weather (e.g. Heliports)

SYSTEM DESCRIPTION

Our system instantly plugs into the NEMA socket at the top of streetlights.

Our four cameras are analyzed by Intel Movius Vision Processors.

That data, along with other sensor data (e.g. WeatherStation) is sent via wifi, Lora, cellular, or Globalstar satellite to our Cloud Alert Platform and Customer API's.

G-03: Command and Control Situational Awareness in Denied Comms Area - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

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

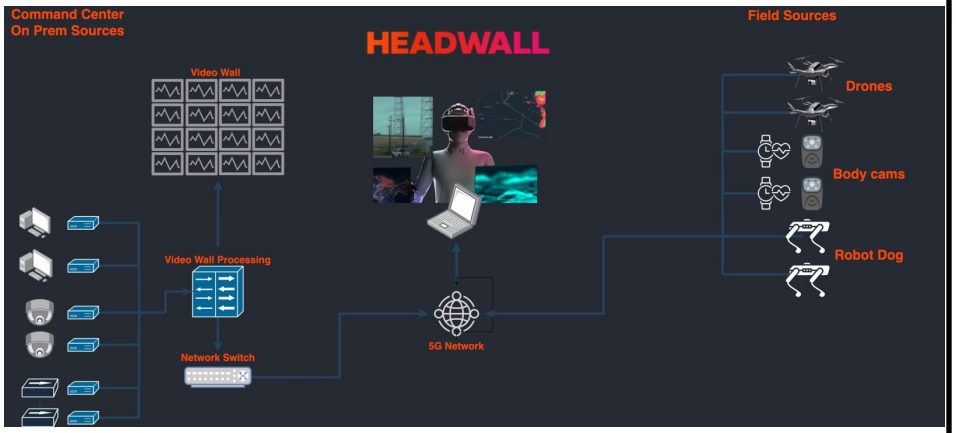
Experiment will put in a series of exercises in which to expend resilience and reliability of tracking and mapping off line. Integrate small android phone to capture satellite signal for messaging, mapping and encrypted micro messages. We will measure how far signals can be transmitted or received in 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-04: Headwall for Autonomy - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Headwall, Inc
Principal Investigator:	Geoffrey Bund
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

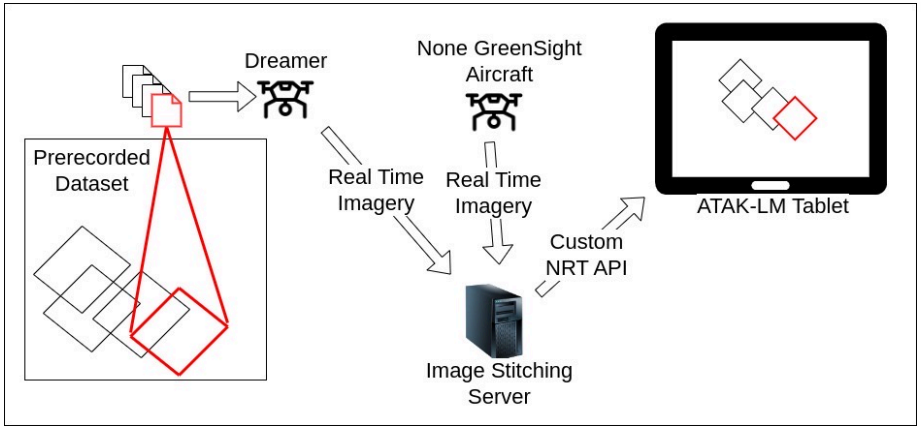
Headwall instantiates a command center and networked video streams in an extended reality headset.
We propose deploying a Headwall VR command center to test video quality and latency over 5G networks using combinations and quantities of sources. For example we would test the minimum viable bandwidth for inspection level detail and arrive at rough amounts of sources. Essentially, how many drones can you have and meaningfully monitor their video feeds at a practical amount of 5G bandwidth.
We would also like to observe and test latency in these situations. We believe Headwall is currently low enough latency to provide meaningful observational capability but we also think with some tuning it could be made to be low enough to accommodate actual control of drones or other vehicles. We need a practical field deployed 5G environment to measure this accurately.

SYSTEM DESCRIPTION

Headwall uses extended reality technology to provide a lightweight, mobile, low cost node for situational awareness in expeditionary areas. Headwall allows users to visualize a large format video wall typically found in a command center, in the form factor of a head-mounted-display. Headwall also allows users to control audio-video hardware. Users can make routing and switching decisions from within the headset.
In addition to video wall visualization and control, Headwall brings in 3D, map and sensor data. Users can visualize realtime data about personnel, assets and sensors in an interactive map overlay. For example, a Headwall operator can visualize up to a dozen drones sending 4K video while monitoring and tracking their status and location over an interactive map of the area of operation.

G-05: ATAK Live Mapping

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Gabriel Ladd
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

The ATAK Live Map experiment will be divided into three discrete tests to test datalinks and APIs in real world conditions and user interactions. We will fly with a good data downlink and with poor and/or intermittent data downlinks. The second test is connecting non-GreenSight aircraft to the system and allowing it to push data into ATAK-LM. For tests one and two we will measure the percentage of a known image set transferred from the drone to the ground and out to the ATAK users. The third test is to allow new users to interact with ATAK-LM to gain user feedback and discuss possible CONOPs with them. For this test the number of user interactions and the number of CONOPs discussed will be counted.

SYSTEM DESCRIPTION

GreenSight is a technology firm that markets a full stack intelligence platform which uses automated drones. We are testing a new ATAK plugin called Live Map in conjunction with our prototype Dynamic Tile Service and Dynamic Cache Manager. The system takes images from a drone and adds them in near real time to multiple ATAK users' maps. This living map updates as the drone acquires imagery enhancing the situational awareness of the users connected to the Live Map source. For this experiment we will bring our stock Dreamer UAS and downlink georectified imagery to a ground based server which will then provide it to the ATAK devices running the live map plugin. We will also be looking for other systems to receive georeferenced and/or georectified imagery from and test running that data in our ATAK-LM system.

G-06: WindBorne GSB Floatation - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	WindBorne Systems
Principal Investigator:	John Dean
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	G) Situational Awareness
Funding	Internal and Federal

PROPOSED EXPERIMENT OVERVIEW

WindBorne Systems is a data-as-a-service (DaaS) startup that designs, manufactures, and operates an artificial intelligence-enabled global sounding balloon (GSB) that outperforms legacy weather balloons in performance, endurance, sustainability, and cost. We are already scaling operations to enable a constellation of hundreds of simultaneously aloft GSBs that report real-time weather data comprising a constant, dynamic global weather picture. We plan to prototype a new capability which will enable us to control GSB landings on the ocean surface and maintain sensor operation for weeks, months, or even years on end. Specifically, at JIFX, we intend to test the floatation capability of a GSB as well as the ability of a GSB to launch with floatation apparatus in its payload. Our goal is to develop a perpetual network of remote weather buoys which can dwarf the size of the existing weather buoy fleet and significantly augment ocean surface data and battlespace awareness.

SYSTEM DESCRIPTION

WindBorne's GSB has three main components: a gas-filled envelope, a palm-sized sensor housing, and a ballast envelope. To enable floatation, we will develop a watertight sensor housing and add waterproof coatings to the avionics inside the sensor structure. We will also develop a way for the sensor housing to release the gas and ballast envelopes upon landing and stay upright indefinitely to ensure proper sensor function. Our experiment will be to determine if the GSB can launch with the reconfigured sensor structure, if the sensor housing can float, and if sensor function continues while floating.

G-07: Data Driven Contested Logistics Analytical Modeling

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Premise Data
Principal Investigator:	John Wishart
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internal

PROPOSED EXPERIMENT OVERVIEW

Most analysts face enormous pressures, with an overwhelming amount of information flooding their screens and impatient decision makers demanding insights immediately. In a contested logistics environment, Premise will improve visibility and enhance organizational decision making with risk informed data driven assessments. We will fuse contributor photos and assessments with Dejavu AI's digital media pattern recognition. We will identify ships, cranes, forklifts, and transportation assets at ports, such as Puerto Princessa, Philippines; Odessa, Ukraine; Hudaydah, Yemen; Bossaso, Somalia. Premise contributors will collect approximately 250-500 submissions of POI imagery, qualitative and quantitative surveys on choke points, multimodal transfer nodes, interdependencies, capabilities. Contributors will also assess the business contracting environment, market analysis, services availability, energy, water storage, purification and treatment, and quality, foodstuffs, money transfers location, corruption index, perceptions of illicit activity i.e. IUUF and smuggling whereby boosting supply chain visibility and traceability enabling sustainment of US forces in contested environments.

SYSTEM DESCRIPTION

Premise turns millions of Premise contributors into a network of responsive, thinking sensors. Premise tasks a global network of contributors through a smartphone app. Contributors provide direct observations (high-resolution, geo-tagged smartphone photos), sentiment, and point-of-interest (POI) mapping in response to opportunities on the Premise app, fulfilling information requirements for Premise's customers. Premise subsequently leverages AI/ML modules and computer vision capability, to QC the data and convert contributor submissions into usable information. DejaVuAI is a computer vision image comparison and pattern matching artificial intelligence technology to achieve drastic efficiency and accuracy for image recognition. We can identify image sources, and quickly tell how any why it matches others, leading you to the breadcrumbs that will help you solve cases with efficiency and accuracy. This new algorithm is much faster and offers a new approach to the image recognition problem, saving time, energy, and cost required for image likeness and correlation.

G-08: Drone Droppable Robots for Situational Awareness - POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023

PROJECT INFORMATION

Organization Name:	Squishy Robotics, Inc.
Principal Investigator:	Douglas Hutchings
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

Squishy Robotics' robots are remote sensors that are deployed where it is not safe or practical to send a first responder. In order to improve situational awareness and support decision making, the robot's data must be promptly and reliably communicated to a user interface, and ultimately, first responders. Squishy Robots have three main communications pathways: an analog radio for video, an ISM-band mesh radio for numerical data, and an optional LTE-based accessory for communication through the cellphone network.

In order to better communicate to end-users the capabilities of the Squishy Robots, we propose to conduct a series of communications tests at CACTF and McMilan Airfield. A series of robots will be deployed at the site mimicking robot deployment in a real-life scenario. Tests will characterize throughput, latency, and delivery rate to the user interface laptop. The effect of installing additional robots acting as repeater nodes will be characterized.

SYSTEM DESCRIPTION

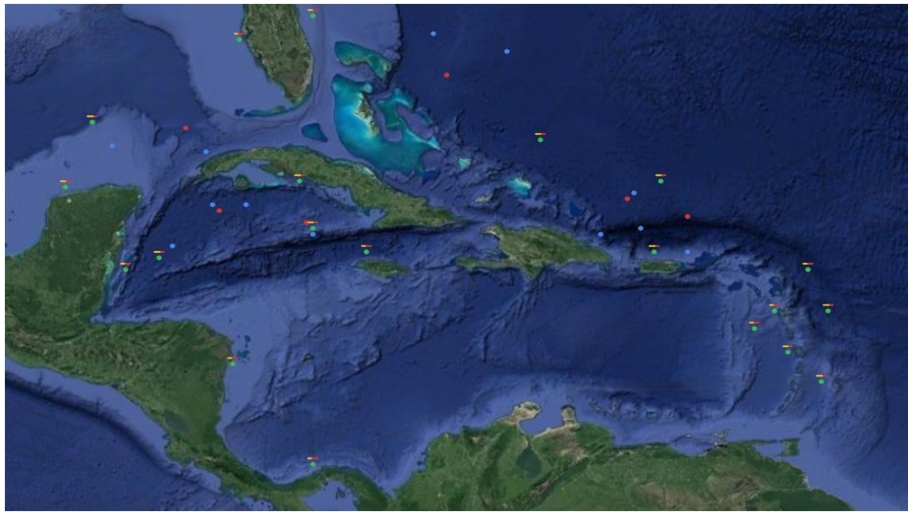
Squishy Robotics, Inc. develops sensor robots that enable the deployment of sensors, cameras, and communication devices in remote, dangerous, or austere environments for Intelligence, Surveillance, Reconnaissance, and Situational Awareness applications.

These robot platforms have the unique ability to be deployed by dropping from drones or aircraft into mission-relevant locations. The unique pairing of ground-based sensor robots and aerial vehicles ensures rapid deployment to sites of interest and persistent monitoring beyond the battery lifetime of the drone to, effectively multiplying the effect of a drone.

Robots carry and protect a customizable, mission-specific payload. The 4-GasPLUS sensor payload is optimized for situational awareness in local, county, and state-level Hazardous Materials (HazMat) operations and contains gas sensors (LEL, O2, CO, and H2S), six camera, GPS, and communications capabilities. The CamsPLUS sensor payload contains a range of daylight, thermal, and zoom cameras, optimized for explosive ordnance disposal and security applications.

G-09: Maritime Operation Reach Tool

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 23-3
1 - 5 May 2023



PROJECT INFORMATION

Organization Name:	Naval Information Warfare Center Atlantic
Principal Investigator:	Darleen Perez-Lavin
Technology Readiness Level:	TRL 3: Analytical and experimental critical function and/or characteristic proof of concept.
Research Area of Interest:	G) Situational Awareness
Funding	Federally

PROPOSED EXPERIMENT OVERVIEW

The Maritime Operational Reach Tool (MORT, effort funded by MARFORPAC) provides a suite of decision aid algorithms that helps paint the picture of the stress and necessities to maintain sustainment at the battle front. This effort includes applying machine learning algorithms for pathway implementation that incorporates cooperation between agents for distribution and also includes side payments to entice players working together for execution.

SYSTEM DESCRIPTION

We are using reinforcement learning models that are trained to work through a MARFORPAC / PACFLT application of logistics distribution. These algorithms have been tested on navy and marine corp networks and are in the process of being demonstrated with SIPR data.

I-01: Wearable Brain Health Monitoring

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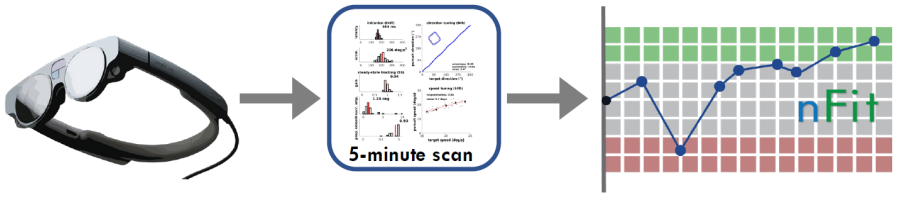

PROJECT INFORMATION

Organization Name:	neuroFit
Principal Investigator:	Dorion Liston
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	I) Health and Safety
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

The FY23 NDAA (Sec. 770) describes the Warfighter Brain Health Initiative, a pan-branch effort to assess the current set of DoD tools for detection of acute brain insults, human performance optimization, as well as brain health monitoring over the lifespan. In partnership with NPS, neuroFit was selected for a US Army SBIR project to compare two form factors of our oculometric technology (oculometrics is the use of eye-movement-based measurements to quantify functional neurocognitive performance), our desktop product neuroFit ONE which resembles traditional clinical equipment one would see in an optometry office and a wearable headset form factor (Magic Leap 2). Our experiment plan is to collect a 5-minute scan using each form factor from a sample (n=20-50) of JIFX participants and collect feedback on operational use for both form factors.

SYSTEM DESCRIPTION

Oculometrics is an applied physiological technology that uses eye-movement-based metrics. The most traditional use case would be a discrete-trial task that requires the participant to fixate, make eye movements to, or track a moving stimulus with some visual attributes (e.g., timing, velocity, direction). The output motor response then reflects the perceptual encoding of the input stimulus, and standard signal-processing techniques allow quantification of small misperceptions which can predict operational performance and, when large, are associated with brain pathology. Oculometric systems contain three components, an eyetracking module consisting of both software and hardware, a stimulus protocol, and metrics that quantify sensorimotor behavior. Whereas the behavioral protocol and analysis components can be held constant between clinical-grade and wearable oculometric systems, the performance of wearable eyetracking (e.g., noise, frame rate, API signals) can be degraded. If oculometric technologies fill DoD brain health gaps, our results can inform requirements for medical-grade eyetracking on wearables.

J-01: Foreign Object Debris Detection & Retrieval

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PROJECT INFORMATION

Organization Name:	DropDrone
Principal Investigator:	Daniel Campbell
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	J) Expeditionary Operations
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

The experiment involves an unmanned ground vehicle (UGV) equipped with sensors and manipulators designed to detect and retrieve debris from military runways. The UGV will be tested in a controlled environment simulating a military runway with various types of debris, such as broken parts of aircraft, equipment, and tools.

The UGV will use its sensors to detect the debris and its manipulators to retrieve the debris from the runway. The sensors will include a combination of cameras, LIDAR, and radar to detect and locate the debris accurately.

The experiment's success will be measured based on the UGV's accuracy in detecting and retrieving the debris and its speed in completing the task.

Overall, the experiment aims to demonstrate the potential of UGVs in improving the safety and efficiency of military runway operations by reducing the time required to clear debris and reducing the risk of injury to personnel.

SYSTEM DESCRIPTION

The core of the experiment is to autonomously detect & retrieve debris with other experimenters that specialize in areas including but not limited situational awareness & unmanned vehicles.

An Unmanned Ground Vehicle can be equipped with FOD retrieval equipment and controlled via GPS waypoints from the LFOD vehicle. By using the existing geotagging system, the system operator on the LFOD crew can also operate the UGV, eliminating the need for a third crew member.

Airfield maintenance is the primary military requirement for the FOD Retriever. Military airfields require constant maintenance to ensure they are operational and safe for aircraft operations. The FOD Retriever can be used to quickly clear the runway surface of foreign object debris including but not limited to rocks, debris from tire blowouts & trash carried by the wind. This helps to prevent damage to aircraft and reduces the risk of accidents during takeoff and landing.

L-01: Aerial Logistics

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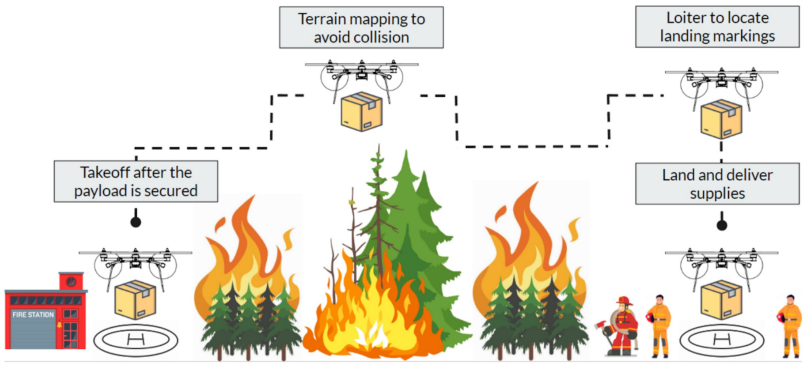

PROJECT INFORMATION

Organization Name:	Toofon, Inc.
Principal Investigator:	Amir Emadi
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	L) Mobility and Transportation
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

In addition to standardized aviation protocols in post production check, pre-flight, and post-flight operations, we will gather other operational data such as speed, distance, height, wind, and technical data such as temperatures of various electronics, batteries, and FMU measurements.

SYSTEM DESCRIPTION

Our vehicle's control algorithms ensure stability, but we seek to test collision prevention while carrying situational awareness sensors and stability while releasing payloads outweighing the unladen airframe.