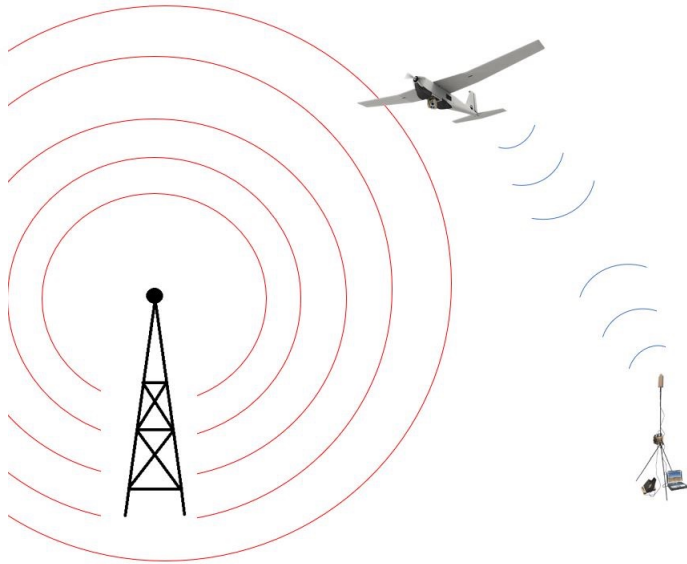




# A-03: Horizon



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Advanced Unmanned Aerospace
<b>Principal Investigator:</b>	Dillon Nelson
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military

## PROPOSED EXPERIMENT OVERVIEW

AUA will perform a simulated contested/denied C2 experiment utilizing a frequency hopping radio integrated with a modified RQ-20b Puma. AUA will coordinate with JVAB in a crawl-walk-run progression of C2 denial. The progression will include increased radiating power from simulated denial source, and increased complexity of denial approaches, such as spot, barrage, and coordinated spectrum analysis.

AUA will measure and collect data by verifying C2 through the GCS link to the UAV, while coordinating with JVAB assessors the radiating power and type.

## SYSTEM DESCRIPTION

AUA will use interference avoidance software on a dual band frequency hopping radio to autonomously switch frequencies away from frequencies that are being targeted by adversarial forces. For this specific application, AUA is using the frequency hopping radio for a robust C2 in UAS operations.





# A-10: AARISS+ Automated Aerial Runway Intelligence and Safety Scan System w/ Vegetation Management

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	GreenSight
<b>Principal Investigator:</b>	Andrew Delollis
<b>Funding Source:</b>	Both Internal and Federal.
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military, Private Industry

## PROPOSED EXPERIMENT OVERVIEW

We intend to test improvements made to our Automated Aerial Runway Intelligence and Safety Scan (AARISS) system, originally developed at JIFX and subsequently developed into a fully usable system for detecting foreign object debris (FOD). We have significantly improved its speed and capabilities since the last event:

1. Adding live retraining of the system's deep learning networks to reduce occurrences of false negatives and positives, which was a challenge at the Macmillan airfield due to its excessive weeds
2. Training to ignore UAS shadows (a regular source of false positives when the sun is high)
3. Relay the size of detected FOD to the user as an automated metric
4. Separately classify cracks and asphalt damage for programmed maintenance and landing suitability assessment.
5. Add vegetation management to the system (a GreenSight area of expertise). Conduct quantitative experiments to assess efficiency improvements from using AARISS vs human only.

## SYSTEM DESCRIPTION

AARISS is a system for rapidly scanning asphalt areas using a low flying UAS for FOD and safety issues. It is operated in tandem with human crews, greatly increasing the speed of airfield safety inspections and alerting crews to issues in real time during the flight.

AARISS consists of a few integrated components:

- The GreenSight Dreamer UAS - A 2kg, NDAA compliant, fully compliant VTOL UAS capable of flights up to 60 minutes. It is equipped with a specialized multispectral camera payload designed for high quality, rapid imaging. Dreamer was vetted by the US Army ERDC for NDAA compliance and recently operated at Butts AAF, Fort Carson.
- ATAK Tablet - A COTS tablet, running ATAK, is used as the systems user interface and ground control station.
- GreenSight AI powered image processing - Computer vision software running on the UAS can detect issues in realtime.





# A-12: Multi-Ducted Angled Rotors (MDAR) SUAS



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

SpyDar



CAV-10

SpyDar



Wyvern UAS

## PROJECT INFORMATION

<b>Organization Name:</b>	Spydar Sensors, Inc
<b>Principal Investigator:</b>	Jorge Jimenez
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Private Industry; The capabilities being explored are not yet fielded

## PROPOSED EXPERIMENT OVERVIEW

Multi-Ducted Angled Rotors (M-DAR) SUAS in a mission, assembly, VTOL launch and recovery, climb and loiter. Gather image and video for real time situational awareness. This test will be autonomous waypoint control.

Test Operation of Hover and Low speed flight characteristics for the Wyvern in an enclosed or semi-enclosed Environment. This test will focus on vehicle stability and ruggedness of the design possibly including bumping walls or ceilings going through soft objects. This test will be BVLOS analog control.

All-up speed test: Deploy vehicle in VTOL configuration, transition to forward flight mode and conduct observations at full throttle speed for a minimum of 15 seconds. Log data with FC for speed, altitude, barometer, etc.

Noise profile and visibility at 600-700 feet as measured at 50ft intervals. Capture subjective pilot impression information.

## SYSTEM DESCRIPTION

The Multi-Ducted Angled Rotors are at the core of our system. They are mounted on the port and starboard sides of the vehicle, in a linear 3 or 4 configuration. This propulsion system allows for Vertical Takeoff and Landing (VTOL), loiter and transition, and forward flight and cruise. The vehicle relies on the M-DAR system for forward and vertical thrust. At lower speeds below the wing's stall speed, the M-DAR system will contribute to the required lift and extra control authority needed in order to keep the vehicle in the air and on mission. This capability dramatically expands the vehicle's mission capabilities.

The Wyvern model breaks down into 3 pieces and can be assembled and launched in less than a minute. The Wyvern is also backpackable thanks to its rugged design.





# A-13: GreenSight/USDA Vineyard Monitoring Service



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	GreenSight
<b>Principal Investigator:</b>	Andrew DeLollis
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	Other Federal Entities (Non-Military and Non-First Responder), Private Industry

## PROPOSED EXPERIMENT OVERVIEW

GreenSight is working with multiple leading vineyards to apply drone remote sensing data and artificial intelligence to generate actionable insights for viticulturalists. We are developing best practices to apply these advanced tools to reduce water consumption and precisely apply agricultural chemicals. Ultimately, the project will quantify these results, assessing the measurable benefits to the vineyard industry and the state of Rhode Island environment, as well as develop best practices that can be applied generally to the national wine industry. To achieve project goals, GreenSight is leveraging our Dreamer drone and intelligence platform, already proven to enable dramatic savings in water and chemical usage to the US golf and turf industry. We plan to demonstrate the system during JIFX by conducting a flight at a vineyard adjacent to Camp Roberts. Developed with USDA funding, this project represents an agricultural application of the same drone intelligence platform used in the AARISS experiment.

## SYSTEM DESCRIPTION

The Vineyard Monitoring Service represents a new commercial business for GreenSight, focused on imagery and analytics specifically tailored to the needs of vineyard operators. It features the following components:

- The GreenSight Dreamer UAS - A 2kg, NDAA compliant, fully compliant VTOL UAS capable of flights up to 60 minutes. It is equipped with a specialized multispectral (RGB, NIR, thermal) camera payload designed for high quality, rapid imaging.
- GreenSight AI powered image processing running in the cloud automatically segments vines from surrounding soil and ground cover so that relevant analytics can be applied.
- Row-by-row and block-wise comparative analytics between vines, uses NDVI and Thermal imaging to compare vitality, water usage, and approximate harvest yields.
- Computer-vision-based early disease detection for pests such as Grapevine Leafroll Disease





# A-14: Autonomous Exploration and Mapping in Complex Environments (Persistent Communications)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Exyn Technologies
<b>Principal Investigator:</b>	Joseph Snodgrass
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military

## PROPOSED EXPERIMENT OVERVIEW

Exyn Technologies will demonstrate its autonomous navigation and mapping capabilities on its Asylon (US Made) platform. This platform will be equipped with a mesh network to provide persistent communications. Exyn's platforms operate without GPS, so areas with degraded/denied GPS or outdoor-to-indoor areas would be optimal to show its capabilities, but are not needed. We will demonstrate multiple mission modes including Scoutonomy, autonomous exploration of a given volume of area. This area can be as big as a town or as small as an individual area of interest. The only limitation is battery life. Exyn will demonstrate the use of persistent communications using a mesh network, this will allow for live-stream video, dynamic retasking/second look capabilities, and live PNT(Position, Navigation, Tracking) information.

## SYSTEM DESCRIPTION

ExynAI is a modular software solution that can seamlessly integrate onto various different vehicles supported by different sensor types. ExynAI enables fully pilot-out-of-the-loop flight in GPS-denied environments without need of persistent communications. The result is a 3D geometric map that serves as a representation of the environment. Our multi-sensor fusion capability fuses data from various sensor streams (EO/IR, LiDAR, CBRNE, etc.) onto the map for complete situational awareness. Our systems are tasked using the ExynView tablet, that allows users to simply drag a box around an AOI and press go for complete sensor coverage of the area.

For this experiment, Exyn will utilize a drone made by Asylon Robotics, a US company, headquartered in Pennsylvania. This platform will be equipped with a Velodyne lidar, live stream FPV, a mesh radio, and lighting.





# A-15: GPS-Denied Autonomous Navigation & Mapping



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Exyn Technologies
<b>Principal Investigator:</b>	Joseph Snodgrass
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	The capabilities being explored are not yet fielded

## PROPOSED EXPERIMENT OVERVIEW

Exyn Technologies is providing fully autonomous aerial systems for GPS-denied navigation and mapping in complex environments. Exyn's software stack is hardware agnostic and can enable autonomous navigation on various vehicle types (both aerial and ground systems). For the purpose of this experiment, Exyn will demonstrate its ability to autonomously navigate a coaxial airframe, the Ascent AeroSystems 'Spirit' to successfully create 3D geometric maps of complex environments. Exyn's aerial system will dynamically navigate and avoid obstacles in a complex AOI, storing or streaming data in real-time from a standoff distance. Exyn will output high resolution, high precision 3D maps of the AOI, and achieve survey-grade accuracy with minimal post processing.

## SYSTEM DESCRIPTION

ExynAI is a modular software solution that can seamlessly integrate onto various different vehicles supported by different sensor types. ExynAI enables fully pilot-out-of-the-loop flight in GPS-denied environments without need of persistent communications. The result is a 3D geometric map that serves as a representation of the environment. Our multi-sensor fusion capability fuses data from various sensor streams (EO/IR, LiDAR, CBRNE, etc.) onto the map for complete situational awareness. Our systems are tasked using the ExynView tablet that allows users to simply drag a box around an AOI and press go for complete sensor coverage of the area. For this experiment, ExynAI will be configured with a Velodyne LiDAR for the Ascent AeroSystems Spirit, a COTS coaxial aerial vehicle.





# B-02: Network Extension and UxS Control Using Commercial Off The Shelf Hardware



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

## PROJECT INFORMATION

<b>Organization Name:</b>	California State University Bakersfield
<b>Principal Investigator:</b>	Robert Hartsock
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
<b>Capability Currently Used By:</b>	US Military

## PROPOSED EXPERIMENT OVERVIEW

This experiment tests the ability of UxS systems constructed with "COTS" components and open source technologies to simultaneously be controlled via, and expand coverage of, existing emergency networks commonly found throughout various parts of the US, especially in urban population centers.

## SYSTEM DESCRIPTION

The system makes use of "COTS" microwave radio equipment for mesh networking, as well as "COTS" and open source hardware for UxS operation and control. A PC running ground control software linked to the mesh network connects to the UxS and allows for positive control or updating of autonomous mission data. The mesh network allows for control around environmental obstacles that would obstruct conventional point-to-point networks, and the UxS itself functions as a member of the mesh allowing for greater network coverage, including coverage for increasingly distant UxS platforms.





# B-03: Ground Vehicle Autonomy

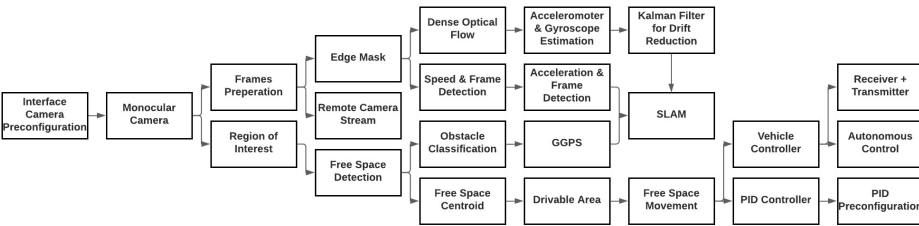


Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

## PROJECT INFORMATION

<b>Organization Name:</b>	DropDrone
<b>Principal Investigator:</b>	Daniel Campbell
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
<b>Capability Currently Used By:</b>	Private Industry



## PROPOSED EXPERIMENT OVERVIEW

Enable ground vehicle autonomy in desired area.

## SYSTEM DESCRIPTION

Freespace detection algorithm capable of: multi-lane detection, lane keeping, road intersection detection, off-road navigation, and off-road intersection detection following intersection entry points detection.

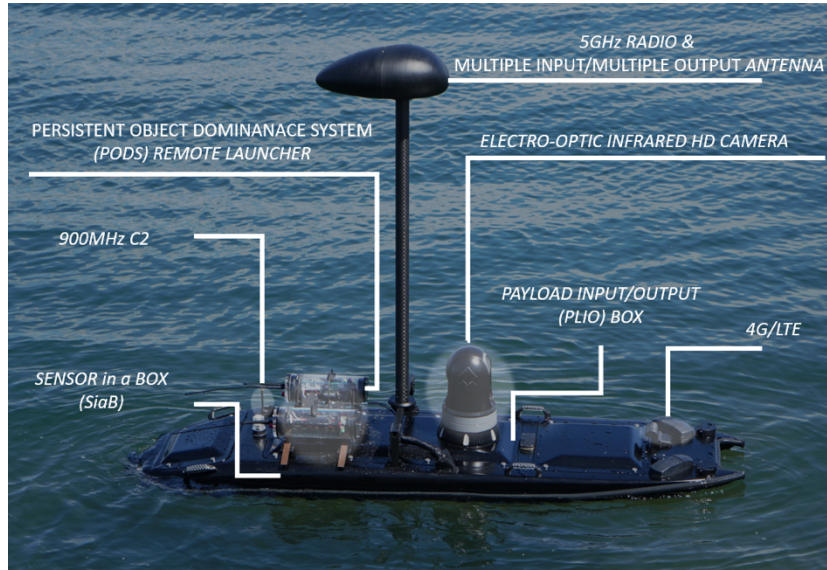




# B-04: Rapid Expeditionary Security Surveillance System (RES3) Sensor in a Box (SiaB)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	Booz Allen Hamilton
<b>Principal Investigator:</b>	Alan Kolackovsky
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Private Industry

## PROPOSED EXPERIMENT OVERVIEW

Booz Allen RES3 SiaB will be deployed aboard an 8ft man-portable, manually launched COTS USV conducting RF wideband (1MHz-6GHz) frequency scanning and detection along with WIFI Bluetooth sniffing to provide early warning and identification of maritime threats. USV onboard integrated EO/IR camera will provide visual confirmation and tracking of targets of interest. Potential threats will be tagged using the SiaB User Interface to support persistent surveillance and tracking. Employment of the USVs pre-programmed autonomous waypoint capability and low profile in the water will provide low probability of detection during transit operations, through minimal RF electromagnetic signature emissions. NIWC PAC TSP will provide additional surface radar and visual surveillance capabilities which will be integrated with SiaB C2/SA information for distribution using private 4G/LTE, MANET mesh and Kongsberg Maritime Broadband Radios to provide multi-spectral robust and resilient distribution of Command and Control (C2) / Situational Awareness for forces ashore and afloat.

## SYSTEM DESCRIPTION

Booz Allen Hamilton, Inc. developed a platform agnostic patent pending capability addressing research priorities and additional areas of interest: Command, Control and Communications, Maritime Domain Awareness, Maritime Common Operating Picture (COP), MANET UxS Control, Persistent ISR, Remote Sensing. Our Rapid Expeditionary Security Surveillance System (RES3) Sensor-in-a-Box" (SiaB) TRL-7 capability participated in Naval Integration In Contested Environments/Advanced Naval Technology Exercise 2021 at Camp Lejeune. The SiaB is a modular multi-platform capability, configured for stand-alone, vehicular, fixed site, or aboard an all-weather, sea state 3 man-portable Unmanned Surface Vessel (USV). RES3 SiaB previously integrated with NIWC PAC Code 567 Trailer Sensor Platform (TSP) under our CRADA, extending TSPs radar and visual search Beyond Line Of Sight, Over The Horizon via RES3's 4G/LTE and MANET communications providing Command and Control, Situational Awareness and remote USV control of the USV through NIWC PACs Near Shore Unified Tactical Response tablets to ashore and afloat forces.





# C-01: "Sally" Radar



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Eikon Research, Inc.
<b>Principal Investigator:</b>	Jason Cunningham
<b>Funding Source:</b>	Both Federally and Internal
<b>Research Area of Interest:</b>	C) Countering Unmanned Systems
<b>Capability Currently Used By:</b>	US Military

## PROPOSED EXPERIMENT OVERVIEW

Eikon intends to demonstrate the capabilities of our radar, nicknamed Sally, against unmanned aerial systems (UAS). Eikon will demonstrate the acquisition and tracking performance of our radar, as well as the Eikon intuitive user interface for radar operation and data management. If necessary, Eikon can also demonstrate the handover of the radar acquisition and tracking data for use by another sensor or target engagement system.

## SYSTEM DESCRIPTION

Eikon Research has developed our own lightweight, low-cost, S-Band Active Electronically Scanned Array (AESA) radar. Sally is a single face, 90-120 degree FOV AESA radar built on a modular open systems architecture making it cost-competitive as well high performance. Sally can be deployed on a tripod in under 30 minutes: simply deploy the tripod, unpack the antenna from the transit case and mount on the tripod adapters. Connect the antennas to the Electronics box with their respective cables and apply power, and Sally is ready for operation.



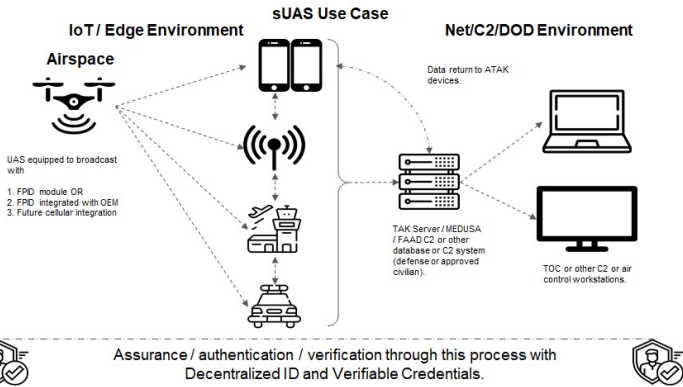


# C-02: Counter UAS Remote ID and Tracking



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Pierce Aerospace
<b>Principal Investigator:</b>	Aaron Pierce
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	C) Countering Unmanned Systems
<b>Capability Currently Used By:</b>	The capabilities being explored are not yet fielded

## PROPOSED EXPERIMENT OVERVIEW

Pierce Aerospace (PA) Flight Portal ID is a suite of ASTM standard-based technologies for providing secure authenticated identification of cooperating sUAS in the battlespace. PA will affix retrofit broadcast beacons to blueforce sUAS-of-opportunity and to potential "friendly" non-government sUAS. PA will also deploy ground-based receivers and FPID-enabled apps to ATAK equipment. The ground-based receivers and ATAK will establish a self-organizing network for communications. In c-UAS scenarios, the remote ID beacons will provide cooperating identity and tracking data to the C-UAS C2 systems, providing increased situational awareness to countering unfriendly, rogue, or hostile sUAS, thereby reducing the likelihood of fratricide.

PA records the beacon data packets, data packets sent to the C2, and the network data such as bandwidth, throughput, jitter, packet loss, etc. PA will also record beacon track data for after-exercise analysis, using actual ground-truth track data.

## SYSTEM DESCRIPTION

PA's FPID retrofit beacons leverage the ASTM Remote ID and Tracking standard BT5 LE beacon technology. The PA receivers rely upon BT5 LE technology as well. The secure identity and authentication for FPID are designed to the Decentralized ID (DID) W3C standards. The high-level mobile ad hoc networking capabilities are based on PA's proprietary networking protocol stacks that allow the network to sit atop any available network.





# E-01: IHM GPS Denied & Subterranean Navigation



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

## PROJECT INFORMATION

<b>Organization Name:</b>	Yotta Navigation
<b>Principal Investigator:</b>	Andrew Hazlett
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	E) Cyber, Cyber Security, and Electronic Warfare
<b>Capability Currently Used By:</b>	US Military



## PROPOSED EXPERIMENT OVERVIEW

Yotta Navigation plans to experiment testing alternative navigation systems in GPS denied environments. GPS denied navigation will be conducted in mock operational environments at Camp Roberts training facilities. Subterranean, tunnel, indoors and GPS RF denied positioning tests will be conducted.

## SYSTEM DESCRIPTION

Intelligent Human Motion is Yotta Navigation Corporation’s latest advancement in real-time dismounted human motion tracking and positioning. IHM provides real-time human motion event profiles for both time series and spacial analysis. The IHM Nav based positioning engine fuses motion sensors, radio frequency (RF) positioning and geographical data to provide an accurate and robust navigation system. IHM Nav provides continuous positioning in GPS denied conditions, including indoor and subterranean environments, and GPS jamming/spoofing attacks. IHM Nav also enables GPS duty cycling power saving, providing a critical solution to battery longevity and heat generation reduction for M-Code receiver handheld integration.





# E-02: RF Signal Detection and Classification System using Edge AI Analytics and Low-Cost Commodity Hardware

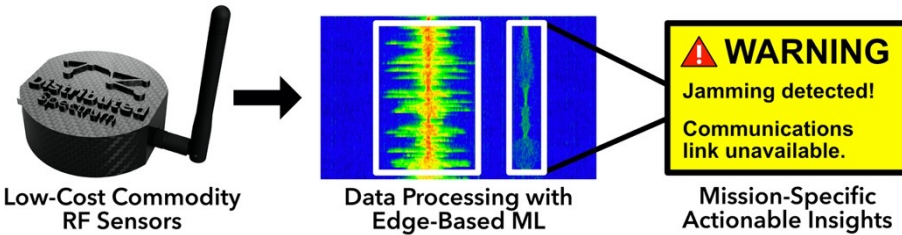
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Distributed Spectrum LLC
<b>Principal Investigator:</b>	Alexander Wulff
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	E) Cyber, Cyber Security, Electronic Warfare
<b>Capability Currently Used By:</b>	Private Industry



## PROPOSED EXPERIMENT OVERVIEW

Distributed Spectrum plans to field-test its RF signal detection/classification and threat modeling algorithms in operational environments throughout the experimentation event. Distributed Spectrum will use its RF sensing hardware and low-cost compute platform to sample data, interpret it in real time, and generate actionable outputs about the local RF environment. This experiment will leverage the complicated RF environment of the testing grounds to operationally validate algorithms that can detect friendly/enemy signals and classify their likely origin.

## SYSTEM DESCRIPTION

Distributed Spectrum develops a modular software framework that integrates low-cost commodity software-defined radio (SDR) hardware with machine learning (ML)-based RF analytics algorithms. This platform enables real-time, interoperable RF situational awareness on resource-constrained systems through low SWaP-C commercial hardware and novel signal processing techniques. Distributed Spectrum’s platform can integrate with new or existing RF hardware, and process collected data locally to characterize the RF environment and detect any anomalies that might impact operations, including immediate detection of suspected jamming, identification of malfunctioning or underperforming RF equipment, and characterization of unknown transmitters.





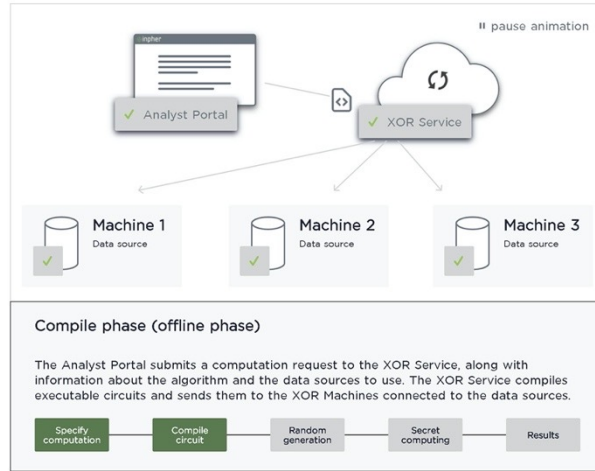
# E-03: Privacy-Preserving Machine Learning



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | SLAMR

## Components & Requirements

### Product Architecture



## PROJECT INFORMATION

<b>Organization Name:</b>	Inpher, Inc.
<b>Principal Investigator:</b>	Conor Moran
<b>Funding Source:</b>	Industry and VC.
<b>Research Area of Interest:</b>	E) Cyber, Cyber Security, Electronic Warfare
<b>Capability Currently Used By:</b>	Private Industry, International Non-Governmental Organizations (INGOs)

## PROPOSED EXPERIMENT OVERVIEW

The experiment we would plan to conduct would be tackling a machine learning problem submitted by the organizers where they want to protect sensitive data inputs while keeping data local and only revealing the output.

## SYSTEM DESCRIPTION

Inpher has pioneered cryptographic Secret Computing<sup>®</sup> technology for secure, privacy-preserving analytics and machine learning. Their platform allows for ML/AI model training across data silos, ensuring that the privacy and security of data is maintained while delivering the benefit of more precise models from that data.





# F-01: Smart Surveillance with Behavior Analysis at the Edge



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Gantz-Mountain Intelligence Automation Systems, Inc.
<b>Principal Investigator:</b>	Greg Wilson
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	F) Intelligence, Surveillance, and Reconnaissance (ISR)
<b>Capability Currently Used By:</b>	US Military, Government First Responder Organizations (Federal, State, or Local), Other Federal Entities (Non-Military and Non-First Responder), The capabilities being explored are not yet fielded

## PROPOSED EXPERIMENT OVERVIEW

The MT-5-BoT will be used in the experiment to provide real-time alerts at the tactical edge on Advanced Threat Behaviors using Gantz-Mountain’s family of intelligence sensor nodes. Threat Behaviors will include real-time alerts for Gun Trucks, RPGs, Long Guns, IED and VBIED emplacements etc.

- Data will be collected on various ranges threat behavior analysis can be determined and alerted on
- Data will be collected to determine accuracy and robustness
- Feedback will be collected on the user interface
- Alerts will be pushed to COPERS

## SYSTEM DESCRIPTION

Expeditionary multi-mission smart tactical surveillance systems featuring AI-enabled advanced behavior analysis and threat determination at the tactical edge that saves manpower, bandwidth, reduces the cognitive load on the operator and improves decision making



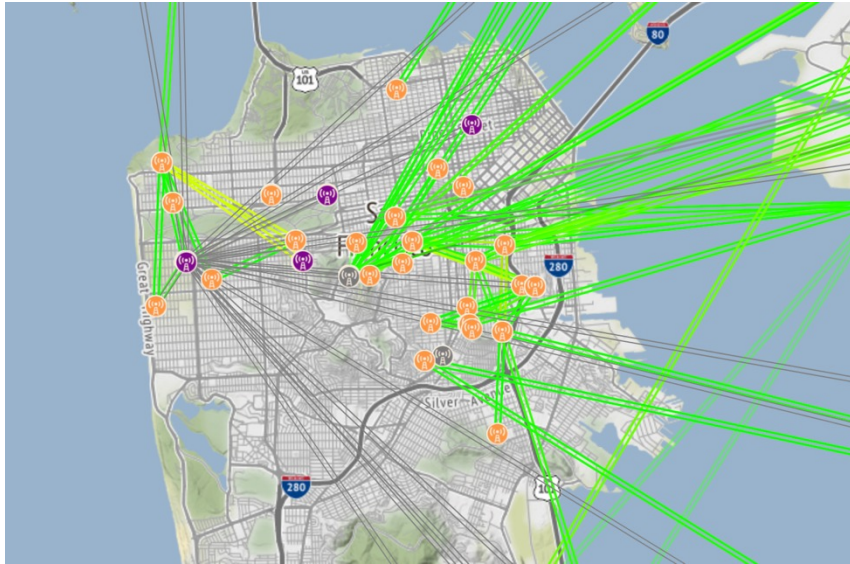


# F-02: Beyond Line of Site Situational Awareness



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	San Francisco Wireless Emergency Mesh
<b>Principal Investigator:</b>	Greg Albrecht
<b>Funding Source:</b>	Non-Profit
<b>Research Area of Interest:</b>	F) Intelligence, Surveillance and Reconnaissance
<b>Capability Currently Used By:</b>	Government First Responder Organizations (Federal, State, or Local), Nonprofit Organizations (NPOs), Non-Governmental Organizations (NGOs)

## PROPOSED EXPERIMENT OVERVIEW

Solutions that field this capability today tend to rely on proprietary "GOTS" technology. This experiment tests the ability to replicate this capability for a wider audience, including Civil Authorities and Partner Organizations, using "COTS" components and Open Source technologies.

## SYSTEM DESCRIPTION

The system under test will utilize commercial-off-the-shelf "COTS" radios in both the HF and Microwave radio-bands to bridge last-mile and long-haul connections between an End-User Device "EUD" and another EUD, or an EUD with a Situational Awareness sharing platform. Primarily the software utilized in each of these roles is one of ATAK, WinTAK, TAK Server or other similar "Cursor-on-Target"-based products.







# G-01: Maritime Situational Awareness

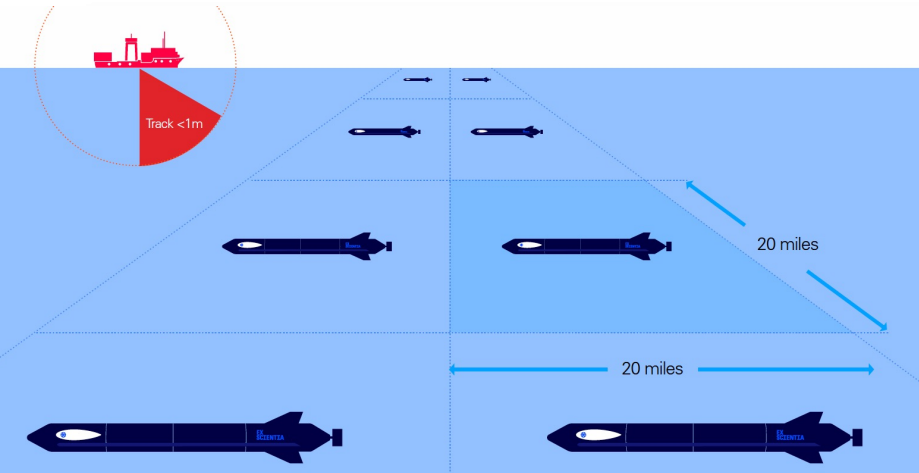


Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | SLAMR

## PROJECT INFORMATION

<b>Organization Name:</b>	Ex Scientia
<b>Principal Investigator:</b>	Matthew Gialich
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	US Military, Government First Responder Organizations, Other Federal Entities, Private Industry, Nonprofit Organizations, Non-Governmental Organizations, Other



## PROPOSED EXPERIMENT OVERVIEW

We would like to test a series of still station-keeping maneuvers. These would include the following:

- Surface Pogo with 2ft of above water for 10 minutes
- Station keeping for 1 hour at a depth of 2ft
- Station keeping for 1 hour at a depth of 10ft

## SYSTEM DESCRIPTION

Ex Scientia would like to test the capability of our modified commercial off the shelf autopilot technology. This would include the integrations with our control laws, and the ability to maintain navigation at different depths.





# G-03: Enabling Real-Time Artificial Intelligence & Machine Learning Through Mobile Connected High-Performance Compute at the Tactical Edge



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Remote



## PROJECT INFORMATION

<b>Organization Name:</b>	TMGcore LLC
<b>Principal Investigator:</b>	Seamus Egan
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	Private Industry

## PROPOSED EXPERIMENT OVERVIEW

At JIFX 21-3 TMGcore successfully tested the portability and mobility of our EdgeBox HPC platform. For 21-4 TMGcore is building a ISU 90 expeditionary containerized version of our HPC platform while materially increasing the compute deployed from our EdgeBox 4.5kW platform to our EdgeBox 30kW system. The system will be fully contained with its own generator, chiller, UPS, HPC compute platform and network connectivity. We will test for compute performance, operating and environmental temperatures and any related impacts, remote network management, and continual system health while deployed. If feasible we will test for a rapid redeployment scenario.

## SYSTEM DESCRIPTION

The TMGcore OTTO platform has been designed from the ground up to provide groundbreaking improvements in equipment densities, ease of use, reliability, and resiliency. Offering substantial saving in both CapEx and OpEx, TMGcore's High Performance Compute platform provides the tools to simplify, centralize, and automate the administration of all aspects of the platform, while maintaining compatibility with existing commercially available computing, power distribution, and networking technologies. For JIFX 21-4 our system will deliver a mix of high performance CPU and GPU architectures designed to support taxing AI and ML workloads enabling to ability to deliver real-time decisioning to the Operator at the Tactical Edge.





# G-04: Asset Tracking and Off-Grid Communications



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	3amInnovations
<b>Principal Investigator:</b>	Bruce Arvizu
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	US Military, Government First Responder Organizations (Federal, State, or Local), Other Federal Entities (Non-Military and Non-First Responder)

## PROPOSED EXPERIMENT OVERVIEW

- Tracking assets on 3map overly and share with others in command:
  - Tracking personnel signature in big share with command and measure distance
- Test off grid peer to peer comms phone. Integrate UAS as repeater to measure effective distances in field or large fire setting in flat or mtn. terrain

## SYSTEM DESCRIPTION

- Leverage location services cell, MDC, tablet Wi-Fi UAS and legacy systems
- Advance IMU Inertia Measurement Units
- All advanced algorithm based





# G-06: Abnormality Detection, Recognition, and Trust Assessment

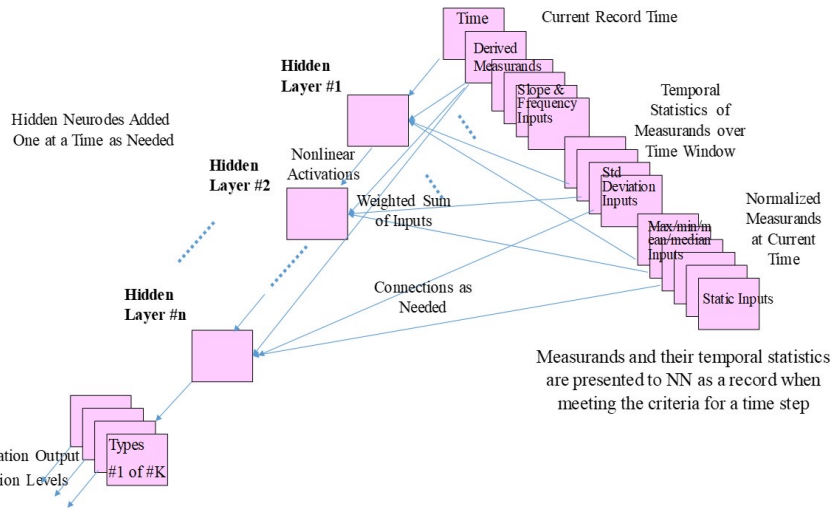


Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Remote

## PROJECT INFORMATION

<b>Organization Name:</b>	Data Fusion & Neural Networks
<b>Principal Investigator:</b>	Christopher Bowman
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	US Military, Other Federal Entities (Non-Military and Non-First Responder), Private Industry, Nonprofit Organizations (NPOs)



## PROPOSED EXPERIMENT OVERVIEW

You provide the historical data for which we will learn normal patterns of life. Then we will find unknown abnormal behaviors in new data, recognize reoccurrence of historical patterns of interest, and provide a trust score for our products.

## SYSTEM DESCRIPTION

Unique Deep Multi-Start Residual Training (D-MSRT) neural nets (NNs) that grow to sufficiently learn the given historical patterns developed over the last 40 years.





# G-07: Conversational AI Technology for Rapid, Effective Decision Making



## Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



**Company:**  
 Web: [www.humaxa.com](http://www.humaxa.com)  
 Email: [info@humaxa.com](mailto:info@humaxa.com)  
 Twitter: @HumaxaInc  
 Address: 3700 Sheridan Rd.,  
 Cammeron Park, CA USA 95662  
 Phone: +1 530 676 5416

**Industry:** Future of Work

**Full-time Employees:** 5

**Financing Sought:** \$750,000

**Use of Funds:** Sales, Marketing, Client Support

**Executive Leadership:**  
**Carolyn Utasler Peer** (CEO), Award-winning industry leader, early employee of ProBusiness, Acquired by ADP in 2003  
**Guillermo Borges** (CTO), Fluent in artificial intelligence, data science, nine different programming languages  
**Jennifer Gargulinski** (CRO), 2x company founder + over \$1 Billion USD in strategic enterprise sales

**Mission:** Predict and prevent workforce issues.

**Business Description:** It's almost impossible to predict and prevent workforce issues - until now. Humaxa's "early warning system" gets employees to open up and it sends alerts while there is still time to do something about it. How? By using "Max" - the digital assistant that asks employees for feedback and arranges solutions, right in Slack or Microsoft Teams.

**Company Background:** According to Forbes and Statista (2019), employee disengagement and underperformance cost more than \$1.6 trillion dollars in 2019. Humaxa's patent-pending suggested activity engine is based on data science + the CEO's 17+ years of experience in the HR Tech industry, talking with clients and employees.

**Products/Services:** Our AI Assistant talks, listens, and offers to take action based on ongoing conversations. It predicts which actions have the highest probability of improving engagement and performance. Here's an example:  
*Humaxa Assistant:* "Hi Carolyn Peer! You know, bots have a lot of options to grow professionally, I've always looked up to those bots at the big tech companies for help. @ But what about you? Do you feel like you're getting the professional help you're looking for at work?"  
*Carolyn:* "Hey there - No, I really don't. My manager is just too busy. Can you help?"  
*Humaxa Assistant:* "I could try to arrange a mentoring activity for you so you could get some of the professional development you're looking for. What do you say?"

**Technologies:** Our software architecture is robust and horizontally scalable. It makes use of Microsoft Azure for Cloud technologies, React/JavaScript, C#, Node, Amazon Comprehend, Microsoft Graph integration, and Slack Technologies. API, Humaxa trains its data models using Python and TensorFlow to predict the best solution for the right person at the right time. All data and messaging services utilize end-to-end encryption and adhere to the highest security standards.

**Markets:** The Global Strategic HR Technology Market is about \$490 billion (includes talent management, talent acquisition, employee engagement, learning, and human performance). The US Market is about \$62 billion and within the US, the Tech sector is about \$1.2 billion. (Source: HR Newswire, 2017)

**Competition:** Humaxa's competitors generally either focus on surveys (Survey Monkey - <https://www.surveymonkey.com>) or Trynpuise - <https://www.trynpuise.com>), HR data analytics (Visier - <https://www.visier.com>) or Quantum Workplace - <https://www.quantumworkplace.com>) or both (Glint, recently acquired by LinkedIn for \$400m - <https://www.glint.com>). Humaxa sits at this intersection. Competitors who use predictive analytics in the Strategic HR Technology space are relatively new; this opens up opportunities to compete.

**Financial Projections:**

	FY 2020	FY 2021	FY 2022
Annual Recurring Revenue	\$429	\$1,600,000	\$1,242,000
EBITDA	-\$73,039	\$487,287	\$6,661,000

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## PROJECT INFORMATION

<b>Organization Name:</b>	Humaxa
<b>Principal Investigator:</b>	Carolyn Peer
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	Private Industry

## PROPOSED EXPERIMENT OVERVIEW

For more than 50 years, employers across the world have been using anonymous surveys to hear from employees directly. Surveys used to be paper-based and unless an employer could recognize someone's handwriting, anonymity was virtually guaranteed.

We at Humaxa, have pondered the quality of data gathered in such surveys. Anecdotaly, employees would regularly talk about how they completed such surveys just to get HR to stop bothering them. We knew there had to be a better way.

1. Decide on a group size
2. Divide the group in half randomly
3. Group 1: Receives a traditional employee feedback survey
4. Group 2: Receives access to a digital assistant
5. Both groups are asked the same questions using the two different methods
6. The digital assistant used ONLY in Group 2 offers to take immediate action based feedback
7. Use 12 commonly-asked employee engagement questions.

## SYSTEM DESCRIPTION

Humaxa uses data science to predict what resources are needed to help individuals improve performance. Our AI Assistant software platform integrates directly with existing communications systems throughout the DoD, i.e. Microsoft Teams/Office. Therefore, it's easy to install and customize. The End users would access the AI Assistant using their mobile phones or their computers. The AI Assistant proactively contacts people to initiate anonymous conversations about their work issues and can instantaneously connect airmen to training resources and solutions to help. The Admins of the system and/or the DoD Decision Makers can follow up with personnel regarding concerns through live, anonymous conversations. This is possible without either party needing to identify themselves.





# G-09: Ground-based Accuracy - Post-processed



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

## PROJECT INFORMATION

<b>Organization Name:</b>	Xona Space Systems
<b>Principal Investigator:</b>	Paul Tarantino
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	Private Industry



## PROPOSED EXPERIMENT OVERVIEW

This experiment will test the early development of Xona’s position, navigation, and timing technology by comparing the Xona derived position solution to a GNSS / INS truth system. Xona will transmit its navigation signal over ISM bands via 5 separate beacons placed along the perimeter of the test area. The Xona receiver and truth system will be mounted to a vehicle which will drive through the test area while logging data. Position error is a key metric we will use to determine the system’s sensitivity to changes in the beacon software. The experiment is considered a success if system's parameters can be tuned to produce a post-processed position to be within decimeters of the true position.

## SYSTEM DESCRIPTION

Xona is building a constellation of Low Earth Orbit (LEO) satellites to deliver a resilient, secure, and precise navigation service. The beacons set up along the perimeter of the test area can be thought of as stationary satellites that transmit the navigation signal to the Xona receiver. They main components of the beacons are: GNSS antenna and receiver, processor, clock, software defined radio (SDR), and transmit antenna. The GNSS reported position is used as part of the satellite orbit / clock determination. This information is sent to the processor where the navigation algorithms produce satellite state information. The state information and clock data are processed by the SDR to generate the navigation message, which is then transmitted out of the antenna. The Xona receiver will receive and log this message as well as GNSS data.





# H-01: Applying real-time Operational Intelligence to DSCA



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts

## PROJECT INFORMATION

<b>Organization Name:</b>	Splunk & Orion Labs
<b>Principal Investigator:</b>	Greg Albrecht
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	H) Defense Support to Civil Authorities (DSCA)
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry; Nonprofit Organizations (NPOs); Non-Governmental Organizations (NGOs); International Non-Governmental Organizations (INGOs); Intergovernmental Organizations (IGOs)

splunk > turn data into doing™



## PROPOSED EXPERIMENT OVERVIEW

This experiment tests the ability to provide Operational Intelligence / Situational Awareness to organizations participating in DSCA missions using real-time analysis of communication channels and active feedback from ongoing collection of data. Edge devices will provide ‘end-user’ input while the central compute will organize and display data for operational overview and control.

## SYSTEM DESCRIPTION

The system will utilize smartphone end-user devices “EUDs” at the edge connected to regular commercial cellular networks or via Wi-Fi to a backend system running software to analyze responses in real-time. The end-to-end last-mile and long-haul network segments are considered a black-box but can utilize any IP technology, including mesh & 5G. Edge devices will run client software developed either internally or open source.





# I-02: Surface & Air Germ Elimination (S.A.G.E.)



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Violet Defense, LLC
<b>Principal Investigator:</b>	Henry Wang
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	I) Health and Safety
<b>Capability Currently Used By:</b>	Government First Responder Organizations (Federal, State, or Local); Private Industry; International Non-Governmental Organizations (INGOs)

## PROPOSED EXPERIMENT OVERVIEW

S.A.G.E. experiment entails performing approximately four (4) individual decontamination deployments in various onsite environments (police station, jail, command post, infirmary, etc.) along with various equipment (electronics, protective gear, medical equipment, etc.) at the NPS Field Laboratory to simulate real-world scenarios where biological threats may be present and require disinfection.

Data would be gathered around concept of operations and optimal positioning to minimize shadowing. UV dosing levels can be monitored using specialized dosimeter strips as a qualitative gauge for localized UV photonic energy exposure.

Controlled laboratory testing against actual pathogen samples has already been conducted by independent, FDA & EPA-accredited laboratories to validate actual device efficacy. Therefore, the overall experiment objective is to gather situational user feedback data to better understand the concept of operations around actual, in-scenario environments, and utilize this data to develop a mission-built system for successful deployment. Independent lab data will be provided at later date.

## SYSTEM DESCRIPTION

The S.A.G.E. is an in-production, UV Light Engine which emits high-intensity, full spectrum UV light clinically proven to kill up to 99%+ of both viruses and bacteria from surfaces & air without requiring ongoing chemical consumables or the reliance on chemical supply chains.

Unlike single-spectrum UV-C devices, S.A.G.E. Light Engines emits full spectrum, Pulsed-Xenon UV (PX-UV) to deactivate pathogens at the wavelengths they are most vulnerable. This includes UV-A (320-400nm), UV-B (220-280nm) and UV-C (280-320nm) and germicidal violet blue (405 and 470nm), all from a single light source.

S.A.G.E. can be deployed via the Ruggedized Tripod System for 360° coverage to decontaminate spaces within a 10 ft radius in 30 minutes. S.A.G.E. can also decontaminate equipment via the UV Decon Enclosure Systems which range in size to small, 50" wide locker systems for small electronics up to large, tent enclosures for aircraft and vehicles.







# J-02: Craitor Portable, Ruggedized, Intelligent, 3D Printer



Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	Craitor, Inc.
<b>Principal Investigator:</b>	Eric Shnell
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	J) Expeditionary Operations
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local)

## PROPOSED EXPERIMENT OVERVIEW

The primary goal of this experiment is to engage in contact testing in a realistic transportation conditions and field environmental conditions to refine the expeditionary nature of the system. This experiment also allows for the opportunity to test field manufactured parts (built on Craitor systems) on deployed equipment. The secondary objectives include model generation based on environmental data collected during the demonstration to improve the machine learning models aboard the 3D printer, along with information gathering from the present concerned parties. The core reason for Craitor's participation within our CRADA with the USMC is to refine expeditionary printing technology to the end state user's needs, namely, our service members. By receiving feedback at these demonstrations, Craitor will be able to refine the system further for more use-cases.

## SYSTEM DESCRIPTION

Additive manufacturing/3D Printing, can/will revolutionize the DoD Supply-chain. While an immense selection of commercial off the shelf 3D printers exist, such printers are limited to desktop or laboratory use, and lack the ruggedization and hardening required for reliable expeditionary use and distributed operations. It is with this in mind that a CRADA was formed between the USMC, NIWC Pacific, and Craitor to enable the development of the first truly expeditionary 3D printing systems that meets the needs of the military in the field, by designing it in the field with military users.

Craitor is capable of being used in harsh environments and can print all forms of FDM polymer filament, including advanced materials like composites, nylon, polycarbonate, flexibles, and even PEEK and ULTEM. Craitor is resistant to water, dust, extreme temperatures, temperature cycling, humidity, and can take abuse like drops, shocks, and vibration without taking damage.





**POSTPONED**

# A-01: HoverJet

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Valkyrie Systems Aerospace Inc.
<b>Principal Investigator:</b>	Glenn Dawson
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry



## PROPOSED EXPERIMENT OVERVIEW

1. VSA Eagle HoverJet to successfully take off vertically carrying a payload of 200 pounds in its cargo compartment.
2. Fly a designated route to a predetermined landing zone beyond visual line of site and land vertically.
3. Self deploy the payload module onto ground surface.
4. Have secondary payload module installed manually.
5. Launch vertically and fly at +300NMPH to secondary water landing zone and land vertically.
6. Deploy water rescue payload to simulated vehicle accident victims.
7. Take off in SVTOL and return to original area of operation landing zone.

## SYSTEM DESCRIPTION

- The VSA HoverJets are a NACA 23018 lifting body with top mounted jet turbines.
- The HoverJet has four hybrid lift fans in the wings that are driven by a combination of exhaust mass flow and electric ring motors.
- The lifting body of the HoverJet has three primary flight capabilities, High Speed Jet, Heavy lift Helicopter, and a hovercraft. This allows the HoverJet to take off and land from any surface, Land, sea, snow, mud.
- The HoverJets are equipped with a long list of cameras and sensors capable of collecting a terabyte of data every hour.





**POSTPONED**



**A-02: Lumenier Nighthawk Tactical sUAS Drone**  
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



**PROJECT INFORMATION**

<b>Organization Name:</b>	Lumenier
<b>Principal Investigator:</b>	Jeff Bloch
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military

**PROPOSED EXPERIMENT OVERVIEW**

From outside, fly into structure through open door or window  
Navigate through structure and identify objects  
Key Attributes:

- Doorway Navigation
- Window Navigation
- GPS-Denied Flight
- Indoor Flight Dynamics
- Collision Prevention
- Testing Methodology
- From outside, fly into arena
- Fly into every room and identify 4 objects
- Exit arena

**SYSTEM DESCRIPTION**

The Lumenier Nighthawk is a sUAS that has situational intelligence from 360 degree sensors that allow flying:

- in GPS or GPS-denied environments
- Pitch black and all light conditions
- 360 Collision Prevention that allows flight indoors through small windows and doorways without crashing
- Gimballed thermal camera, day/night camera, green laser and IR laser





**POSTPONED**

**A-04: TBD**

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



**PROJECT INFORMATION**

<b>Organization Name:</b>	AeroVironment Inc
<b>Principal Investigator:</b>	Paul Trist
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military, Other Federal Entities (Non-Military and Non-First Responder)

**PROPOSED EXPERIMENT OVERVIEW**

AeroVironment inc. has been requested to support NSW with Unmanned Ariel Systems UAS during event.

**SYSTEM DESCRIPTION**

AV with support with PUMA AE UAS systems and support gear.





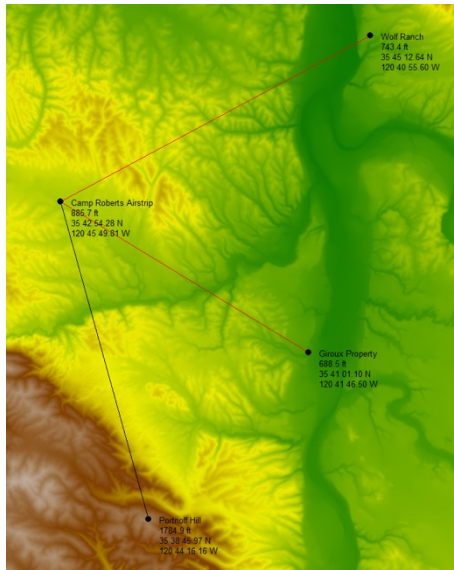
**POSTPONED**



# A-05: Microwave Backhaul Solutions

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	AT&T Drone Operations
<b>Principal Investigator:</b>	Art Pregler
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry

## PROPOSED EXPERIMENT OVERVIEW

AT&T would like to bring our Flying COW out to Camp Roberts and conduct first time experiment with microwave link in an operational environment.

## SYSTEM DESCRIPTION

AT&T Flying COW is a drone used to provide cellular coverage during events, disasters, etc. We will use this experiment to test out a new backhaul solution.





**POSTPONED**

**A-06: Xwing Remotely Piloted Cargo Flight**  
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



**PROJECT INFORMATION**

<b>Organization Name:</b>	Xwing Inc.
<b>Principal Investigator:</b>	Jesse Kallman
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	Private Industry

**PROPOSED EXPERIMENT OVERVIEW**

We plan to experiment with leveraging a modified Cessna Caravan equipped to be flown remotely, and simulate a cargo operation inclusive of landing, taxing to the gate location, loading of cargo, taxi out, takeoff, flight of the patter or quick out and back, and another landing and taxi. To simulate how this operation would work.

**SYSTEM DESCRIPTION**

The system would be a modified Cessna Caravan which has a new auto flight system, auto braking, satcom C2 links, detect and avoid system.





**POSTPONED**

## A-07: sUAS Cargo Drop

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



### PROJECT INFORMATION

Organization Name:	DropDrone
Principal Investigator:	Daniel Campbell
Funding Source:	Federally
Research Area of Interest:	A) Unmanned Aerial Systems
Capability Currently Used By:	Private Industry



### PROPOSED EXPERIMENT OVERVIEW

Release cargo from sUAS at desired ground location.

### SYSTEM DESCRIPTION

Determine if cargo can be dropped from sUAS at desired ground location.





**POSTPONED**

## A-08: sUAS Tethered Solution

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



### PROJECT INFORMATION

<b>Organization Name:</b>	Ascent AeroSystems
<b>Principal Investigator:</b>	Paul Fermo
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry; Nonprofit Organizations (NPOs); Non-Governmental Organizations (NGOs); International Non-Governmental Organizations (INGOs); Intergovernmental Organizations (IGOs)

### PROPOSED EXPERIMENT OVERVIEW

Ascent AeroSystems would like to conduct endurance and range experiments with its "Scout - Short Rang Reconnaissance (SRR)" micro VTOL prototype. Additional experiments may include multi-ship swarm capability with multiple SRR or various Group 1 systems, sensor experimentation using LiDAR for real-time GPS-denied mapping in disaster environments, and tethered UAS experimentation.

### SYSTEM DESCRIPTION

Core technology will be various sized coaxial sUAS and associated payloads including:

1. Scout SRR micro coaxial VTOL (vehicle weight: <1 lbs, diameter: 2.8", length: 10")
2. Group 1 coaxial sUAS with tether module
3. Group 1 coaxial sUAS with LiDAR module







**POSTPONED**

# A-09: Intelligent Aerial Robotics for Constrained Environments

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Airgility Inc
<b>Principal Investigator:</b>	Evandro Valente
<b>Funding Source:</b>	Prior Funding: Initially development funded by DHS S&T for Smart City Initiative
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry

 Intelligent Aerial Robotics for Constrained Environments



DS-1 Minotaur™

• COMPANY  
Airgility, Inc.  
College Park, MD  
www.airgility.co  
evandro@airgility.com  
Evandro Valente CTO

## PROPOSED EXPERIMENT OVERVIEW

This is an open-ended question as we are seeking to understand how and where our system and its on-board algorithms fail. We have fused sensors and algorithms to create a system that has flown in old (dusty) grain silos, and indoors; with/out lighting. Our plan is to observe the drone behavior and uses collected flight data to improve stability, controls, and algorithmic behavior (autonomy/automation) so we can be suit the challenging space.

## SYSTEM DESCRIPTION

Airgility specializes in GPS-denied aerial robotics whereby the on-board sensor fusion and algorithm fusion allows for numerous levels of survivability tactics, operator ease of use, and autonomy/automation to happen at the edge. AI-based anomaly detection is also available on-board and is tied to robotic behavior.





**POSTPONED**



## A-11: SPEAR Containerized UAS

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



### PROJECT INFORMATION

<b>Organization Name:</b>	Naval Special Warfare Group 2
<b>Principal Investigator:</b>	Rafael Duyos
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	Israeli Defense Forces

### PROPOSED EXPERIMENT OVERVIEW

Experiment is in two phases:

1. Land testing:
  - Comparison between stowage, launch and reuse of UAV compared to a similar, non-containerized, UAS
2. Water testing:
  - Does waterproofing support a 4 hour dive profile?
  - Does waterproofing support 20ft transit and launch?
  - Does UAS launch is SS-4 or less?

### SYSTEM DESCRIPTION

The SPEAR UAS is a containerized UAS that reportedly ( and advertised to support) submerged release and surface launch. After launch, depending on programming, perform as well as equivalent UASs.





**POSTPONED**

**A-16: Skydio X2D ISR & AISUM Experiments**  
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



**PROJECT INFORMATION**

<b>Organization Name:</b>	Skydio
<b>Principal Investigator:</b>	Joe Enke
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	A) Unmanned Aerial Systems
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry; Nonprofit Organizations (NPOs); Non-Governmental Organizations (NGOs); International Non-Governmental Organizations (INGOs); Intergovernmental Organizations (IGOs)

**PROPOSED EXPERIMENT OVERVIEW**

- UAS autonomous short range reconnaissance and ISR missions
- Demonstrate AI and computer vision enabled advanced autonomous flight and obstacle avoidance
- Automated subject tracking (people and vehicles)
- 3D mapping mission experiments and photogrammetry collection (structures and terrain)
- Data to be collected on UAS memory to be analyzed and measured against target performance specifications

**SYSTEM DESCRIPTION**

- Skydio X2D aircraft
  - Dimensions: Folded 15.1" X 11.9" X 4.21"; unfolded 10.86" X 4.17" X 2.0"; 2.75 LBS
  - Camera: 4K60P HDR Camera with 16x zoom; 320p LWIR Thermal Imager with 8x zoom
- Controller
  - Dimensions: 10.5" x 5" x 2.5", 1.5lbs
  - OS Android 9
  - QGC Ground control
  - 1.8GHz - Max Range up to 10km LOS; 6km urban
  - AES-256 encryption





**POSTPONED**

**B-01: Enabling predictive analytics by automating data preparation for operational data**  
**Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)**  
**NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts**



### Case Studies

**DEFENSE**

**Background:** Sentenai is working with Army's Redstone Test Center (RTC) for over 2.5 years to accelerate data analysis for testing and evaluation of the Army's newest rotary aircraft and sensor packages. Sentenai enables Army RTC to optimize its test programs with the ability to rapidly analyze test data in real-time as its collected instead of relying on lengthy labor-intensive data engineering processes.

<b>Challenge</b>	<b>Result</b>
<b>5 DAYS PER TEST</b> Average amount of time spent on manual data engineering.	<b>REAL-TIME</b> Automated data engineering process powered by Sentenai.
<b>HIGH ERROR RATE AND WASTE</b> Caused by relying on long manual data processing after tests.	<b>REDUCED ERRORS</b> By providing realtime testing feedback.
<b>POOR ANALYSIS</b> Unable to uncover deep insights or understand trends.	<b>ANOMALY DETECTION</b> Able to determine anomalies and trends in realtime.

Army RTC will deploy Sentenai in an operational trailer environment this summer and plans to scale the solution **enterprise wide** for other related use cases.

**Background:** Sentenai accelerated data engineering and analysis for a services firm in oil and gas analyzing drill failure predictions for exploratory rigs.

<b>Challenge</b>	<b>Result</b>
<b>6 DAYS</b> Time taken to batch process data set to extract new features.	<b>INTERACTIVE</b> Batch data processing eliminated in favor of interactive feature evaluation.
<b>9000 LINES OF ETL CODE</b> Code required to combine domain knowledge with raw data.	<b>15 LINES OF SENTENAI</b> Sentenai eliminated 9000 lines of ETL code in favor of a 15 line description.
<b>6 MONTHS</b> Time taken to train and test each drill failure model before deployment.	<b>3 MONTHS SAVED</b> On a five-person team of data scientists and data engineers.

Customer can now **rapidly train** accurate drill failure prediction models.

**COMMERCIAL**

**PROJECT INFORMATION**

<b>Organization Name:</b>	Sentenai Inc.
<b>Principal Investigator:</b>	Rohit Gupta
<b>Funding Source:</b>	VC's and private investors
<b>Research Area of Interest:</b>	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
<b>Capability Currently Used By:</b>	US Military, Private Industry

**PROPOSED EXPERIMENT OVERVIEW**

Sentenai would like to adapt its technology solution of automating data preparation to determine if it can be used to more quickly deploy and effectively utilize unmanned systems.

Sentenai's existing solution enables predictive analysis and anomaly detection by applying AI/ML the data preparation typically required. Our capability eliminates manual data preparation, provides real-time intelligence, and increases situational awareness for decision makers. Our customers and their systems can focus on deriving value directly from their data – perform data fusion across sources, find behaviors, and output insights.

For the experiment, Sentenai would leverage sample / simulated or even public data sources, ingest it, and demo visualizations and data science outputs that would further enhance the mission capabilities.

**SYSTEM DESCRIPTION**

Sentenai's solution automates the process of unifying disparate data sources into a common, virtualized representation suited to temporal data fusion activities like multi-source temporal pattern detection for predictive maintenance analytics. Sentenai makes complex data topologies rapidly available for analysis — Sentenai does not require manual data engineering processes to organize or manage new and historical data, making it possible to decrease latency between data acquisition and availability to analysts, while also keeping historical context across large data sets as they change over time. Sentenai's key value proposition is that it provides purpose-built pattern detection and data fusion engines that leverage these virtualized data representations to rapidly process and transform large, disparate data sets in an interactive, analyst-driven manner. Sentenai provides its complete functionality via a REST API, interfaces designed to work with common data science and analytical toolkits, and analyst-centered user interfaces and visualizations.





**POSTPONED**

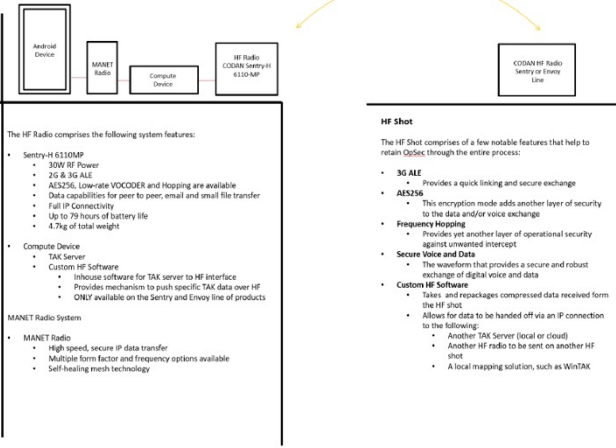
# D-01: Seamless Integration of HF/VHF/LTE/Satcom

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	NVIS Communications LLC
<b>Principal Investigator:</b>	Graham Kyle
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	D) Communication and Networking
<b>Capability Currently Used By:</b>	US Military, Government First Responder Organizations (Federal, State, or Local), Other Federal Entities (Non-Military and Non-First Responder), Private Industry, On-Governmental Organizations (NGOs)



- Tactical Edge Services**
- ATAK
  - Codan Xtends
- Tactical Edge:**  
At the tactical edge, the following services are available to the warfighter:
- ATAK (Android Tactical Awareness Kit)**
    - CDI/PLI Data
    - Soldier to Soldier Voice, Data and Messaging
    - Tactical map display (cached to device)
    - Team Tracking
  - Codan Xtends**
    - HF Voice calling
      - Secure and Digital
      - Low VOCCODER rates, AES256 encryption and hopping are available
    - HF Text Messaging
      - Secure and Digital
      - HF to HF messaging platform

## PROPOSED EXPERIMENT OVERVIEW

NVIS Communications principal goal is to show the efficacy of blending multiple RF pathways (using both COTS and MIL-STD equipment) into a scalable system design that is easy to use.

This design will accomplish three goals:

1. Act as a gateway for a “bring your own device” paradigm, where foreign military, various; Federal, State & Local entities, and even various military services branches can come together in commonality. This gateway will provide voice, data, limited NIPR network and ATAK data capabilities, locally. As well as multi-pathway, long distance back-haul solution.
2. Provide the ability to drop, restrict or remote kill device access when OpSec has been compromised.
3. Be seamless and easy to use to the end user so that they may concentrate on the mission and/or task at hand.

## SYSTEM DESCRIPTION

This integrated solution contains multiple RF platforms that are interconnected via IP. The following pathways have been integrated to reinforce the idea of scalability: MANET mesh, Private LTE, NIPR, V/UHF (P25), HF (3G ALE, Digital Data & Voice) and SATCOM (Iridium Certus).

The key is that each device provides secured voice & data products and TAK integration.





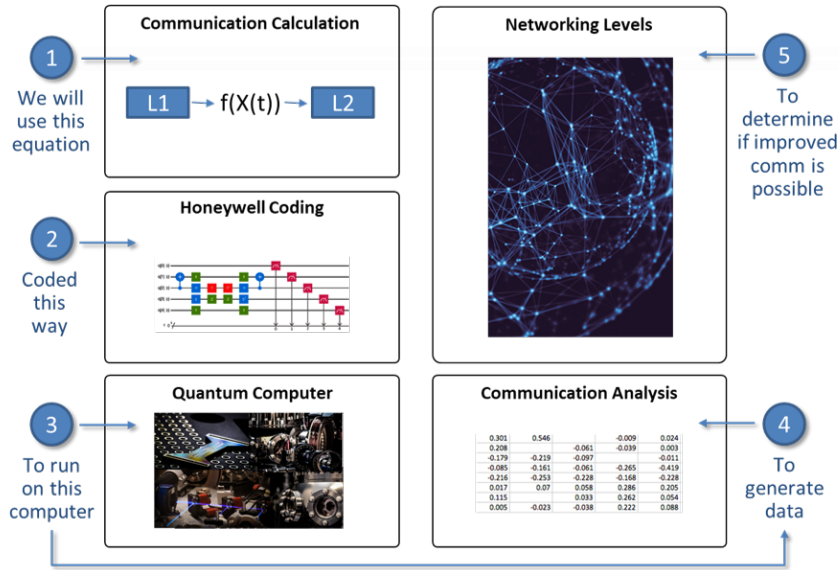
**POSTPONED**



# D-02: Quantum Network Processing

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	Flightprofiler
<b>Principal Investigator:</b>	Ethan Krimins
<b>Funding Source:</b>	Federally
<b>Research Area of Interest:</b>	D) Communications and Networking
<b>Capability Currently Used By:</b>	US Military, Other Federal Entities (Non-Military and Non-First Responder), Private Industry

## PROPOSED EXPERIMENT OVERVIEW

We will design a simple quantum computing networking algorithm to run on a Honeywell or IBM Quantum Computer (we are a computing partner with both orgs). The experiment will involve development of a simple algorithm in terms of mapping and noise level. If time allows, we will utilize classical Machine Learning to boost overall performance and/or establish a “hybrid” solution consisting of pre- and post-processing steps on classical machines. Due to the short time frame of this experimentation program, we should either attempt to deliver a simple working algorithm (to demonstrate future potential) or create a detailed process for delivering a specific and more complex need.

## SYSTEM DESCRIPTION

We are currently working with both the IBM Q's and Honeywell H1 machines. One of these would be the core technology in our experiment. However, although we will be engaging with these powerful computers, a successful process of engagement with the QC is the real goal. The system at the of core of our experiment is coding that delivers repeatable and reproducible quantum networking output.





**POSTPONED**

# D-03: Cloud-Enabled Edge Device for Remote IoT and Sensor Connectivity

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	Infiot
<b>Principal Investigator:</b>	Rizal Tamsil
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	D) Communications and Networking
<b>Capability Currently Used By:</b>	Private Industry

## PROPOSED EXPERIMENT OVERVIEW

Infiot plans to create an extensible wireless edge computing and connectivity environment by deploying one of our thin, wireless edges in the JIFX austere environment scenario. Connected to the Sea Land Air Military Research Naval Postgraduate School 5G node, Infiot's main experiment objective will be to connect to various Naval sensors and devices to create a Naval connectivity network on the edge. Sub-objective 1 will experiment with using the onboard AI-enabled compute capabilities inherent to each Edge to bolster the computational needs of these devices. Sub-Objective 2 will be to ensure that web-based data collection is operational. Sub-objective 3 will be to confirm that all connected devices are compliant by utilizing a Zero-Trust security architecture. Our data collection plan will center around the number, transfer speed, and connection success rate of connected devices.

## SYSTEM DESCRIPTION

Infiot's Intelligent Access brings wireless edge-compute nodes anywhere. Edges are cloud-managed devices with integrated SD-WAN, zero trust security and edge computing with full mobility, that create connectivity bubbles in austere environments enabling data transfer, support edge computing, and manage them from a web-enabled dashboard.

Solution Components:

- Thin, wireless edge with Zero Trust Security, zero-touch provisioned from the cloud. It provides connectivity using built-in 5G/LTE, or WiFi.
- One-click Management. Policy management with AI delivers configuration and visibility into edge and application health, while enabling automated and secure software updates to one or millions of edges. Controller that adheres to Software Defined Networking principles.
- Infiot Controller provides separation of data plane and control plane, ensuring continuity in case of control plane failures, and transparently distributes the routing information and simplifies key management with PKI automation.





**POSTPONED**

# F-03: Expeditionary Live Geo-Registration of Multi-Streams

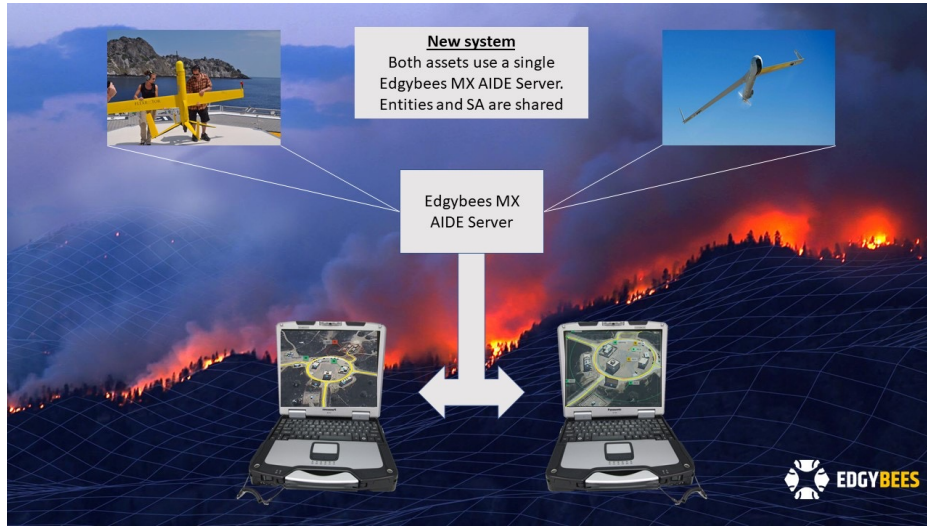
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Edgybees
<b>Principal Investigator:</b>	Sheffy Glassberg
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	F) Intelligence, Surveillance, and Reconnaissance
<b>Capability Currently Used By:</b>	The capabilities being explored are not yet fielded



## PROPOSED EXPERIMENT OVERVIEW

Edgybees will test the real-time geo-registration and enhancement of concurrent electro-optical/infrared Full Motion Video streams being generated by multiple UAS.

## SYSTEM DESCRIPTION

Edgybees will test a new Geo-registration server and software version to support multiple streams.

The system will support the following set-ups:

1. One live stream and one canned stream
2. Two streams from the same a/c type
3. Two streams, each of a different a/c type.







**POSTPONED**

## G-02: Sans Hands

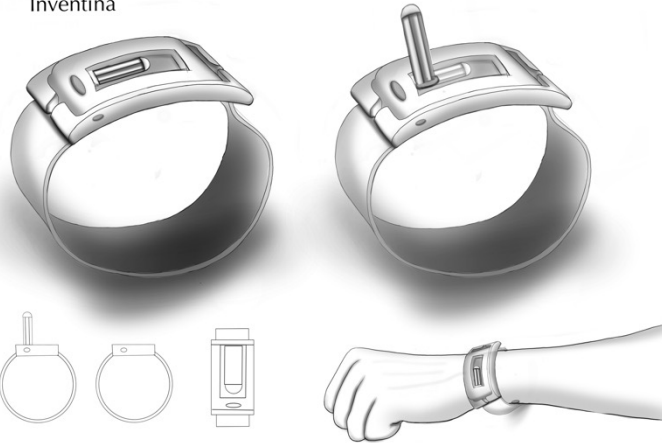
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



### Sans Hands

Inventina



### PROJECT INFORMATION

<b>Organization Name:</b>	Inventina
<b>Principal Investigator:</b>	Tina Provost
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	The capabilities being explored are not yet fielded

### PROPOSED EXPERIMENT OVERVIEW

I intend to test my two prototypes with individuals who use touch screen technology to execute tasks in their day to day. I would also like to target those who may have hand coverings or operate in environments that make the hands dirty or covered.

### SYSTEM DESCRIPTION

Pilots, First Responders, HazMat teams, and other operators in the DoD are put at risk by the need to use touch screen devices in environments where skin exposure could result in injury or death. As such technology becomes more common, operators that must be continuously gloved are faced with disruptions in productivity, the need for ineffective work-arounds, or worst-case bodily harm. Inventina allows gloved users to work without disruptions by providing Sans Hands, a device that allows touch screen technology use, even when hands are covered or occupied.





**POSTPONED**

# G-05: Disrupt Emerging Threats 24/7

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

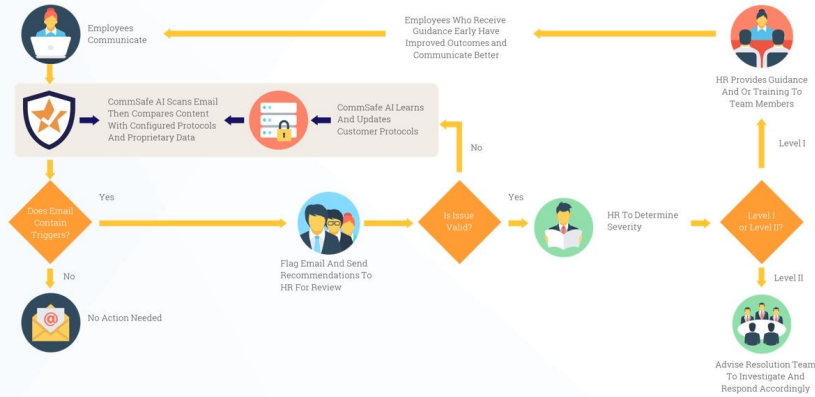
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



COMMUNICATIONS SAFETY ANALYSIS SOFTWARE

05

## HOW OUR TECHNOLOGY WORKS



## PROJECT INFORMATION

<b>Organization Name:</b>	CommSafe AI
<b>Principal Investigator:</b>	Tyrone Smith
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	Private Industry, Non-Governmental Organizations (NGOs)

## PROPOSED EXPERIMENT OVERVIEW

Experimentation Objectives:

- Task 1: Identify and collaborate with DoD/US Government stakeholders to identify areas where CommSafe AI™ would provide value.
- Task 2: Develop a demonstration of applying the CommSafe AI™ to a DoD problem.
- Task 3: Manage, document, and report.

## SYSTEM DESCRIPTION

Using AI algorithms, CommSafe AI analyzes communication in real time and flags toxic messages, similar to the algorithm of an email spam filter, that would threaten the integrity of a safe communication space or violate a company's shared values. In addition to alerting management of an issue, CommSafe AI also provides "next step" recommendations. For example, the system would suggest customized coaching for well-meaning employees to help them increase their communication awareness and sensitivity as well as learn how to get their point across more respectfully. Deterring or capturing toxic interactions early before they further escalate or deepen their harm allows organizations to focus on building a positive, inclusive culture and strong relationships.





**POSTPONED**

# G-08: Tactical Artificial Intelligence Force Protection and Surveillance

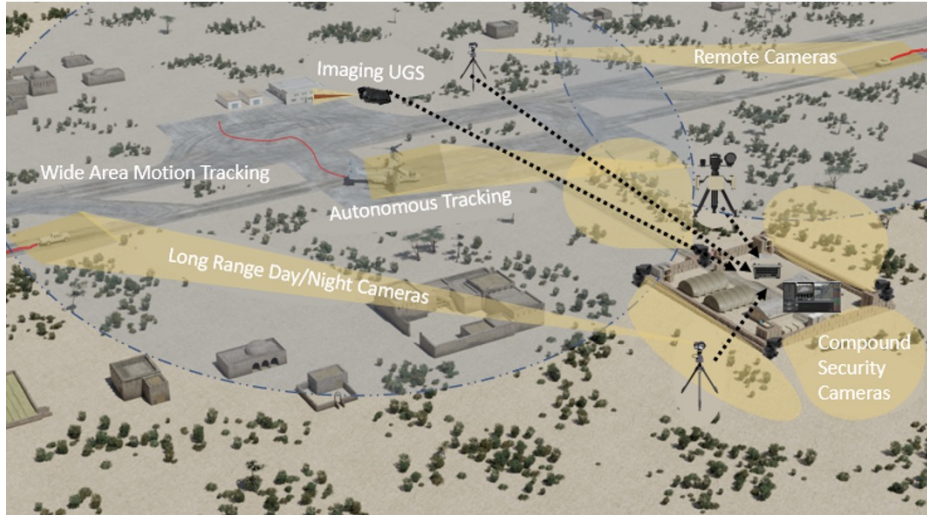
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Digital Force Technologies
<b>Principal Investigator:</b>	Andy Narusewicz
<b>Funding Source:</b>	Both internal funds and federally funded R&D
<b>Research Area of Interest:</b>	G) Situational Awareness
<b>Capability Currently Used By:</b>	US Military, Other Federal Entities (Non-Military and Non-First Responder)



## PROPOSED EXPERIMENT OVERVIEW

Digital Force Technologies (DFT) would conduct an experiment to test our AI/ML multi-modal threat authentication framework against long-range intrusion threats at Camp Roberts and McMillan Airfield. The purpose of this experiment would be to measure threat identification speed, accuracy, and decision-point facilitation in the context of multiple unknown and uncategorized threats with minimal operator involvement. The DFT sensor fusion engine would allow standards-based sensors to integrate onto a unified platform that would feed data through our AI/ML framework, allowing the sensor field to interoperate with minimal operator input and independently categorize and identify threats, and filter only critical information to decision-makers. The system would be tested against multiple vehicle, human, and unmanned threats. DFT would measure the time to threat acquisition, identification, and decision execution, as well as the rate of system accuracy compared to traditional non-AI/ML force protection methodologies.

## SYSTEM DESCRIPTION

The experiment would include a DFT Odin force protection solution deployed at Camp Roberts with ground radar, optical sensors, license plate recognition, and facial recognition technology. The system would be deployed on small, man-portable masts placed near strategic vulnerabilities and connected wirelessly, over a military-grade MANET system that is JF12 and DD1494 compliant, into our Seraphim AI/ML sensor fusion core. The Seraphim core would be co-located with a control terminal in a temporary operations center.





**POSTPONED**

# I-01: Rapid Pain Relief Using Neuro Capacitive Coupling

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	nCap Medical LLC
<b>Principal Investigator:</b>	Rhett Spencer
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	I) Health and Safety
<b>Capability Currently Used By:</b>	Private Industry

## PROPOSED EXPERIMENT OVERVIEW

We will demonstrate the rapid pain relief properties of the drug free technology on volunteers with chronic pain such as frozen shoulders, knee pain etc.. by simply holding the technology over the area of pain.

## SYSTEM DESCRIPTION

The technology is non invasive, drug free and reusable until misplaced or physically worn out. The technology interacts with the tiny electrical fields generated by the users own body. There is no external power source or wired connection with the users body. The technology can be separated by clothing and does not need direct skin contact.





**POSTPONED**

# I-03: ecoCUBE Water Treatment System

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	ecoSPEARS
<b>Principal Investigator:</b>	Sergie Albino
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	I) Health and Safety
<b>Capability Currently Used By:</b>	Private Industry

## PROPOSED EXPERIMENT OVERVIEW

ecoSPEARS will conduct two experiments using our 5 GPM ecoCUBE Water Treatment System to remediate synthesized water samples from local sources to achieve a potable water standard for reuse on base. For Experiment #1, we will process and treat 40 gallons of supply water from CACTF.

For Experiment #2, we will process 40 gallons of surface water from a nearby accessible stream at Camp Roberts. The surface water will be tested pretreatment for presence of microbial materials in the water for decontamination through the ecoCUBE system to achieve potable water standards. If microbial levels are low, water will be synthesized to create a stock solution of pre-treated water for the design of experiment.

Data will be analyzed using commercial off-the-shelf potable water test kits to process the results onsite. ecoSPEARS will provide pre- & post- samples to a third-party laboratory to verify our onsite results.

## SYSTEM DESCRIPTION

The ecoCUBE is a mobile and modular, clean water remediation system to degrade PCBs, 1,4-dioxane, Active Pharmaceutical Ingredients (APIs), microbials, and bacteria from contaminated groundwater, bilge water, and drinking water without creating a secondary waste stream requiring landfilling, incineration, or specialized disposal. The ecoCUBE incorporates a patented Water Vortex Design to maximize influent UV exposure for maximum contaminant destruction, even during high flow rate operation. In addition, the ecoCUBE utilizes our patented Anti-Fouling Polymer Lens Technology to protect the UV source against lens deterioration or overheating for years of reliable operation without operational downtime or costly maintenance. The ecoCUBE is a continuous batch flow system capable of being deployed as a primary treatment system or in-line with other complementary treatment systems. The ecoCUBE is purpose-built to eliminate harmful toxins, bacteria, and microbials from contaminated groundwater, bilge water, and drinking water.



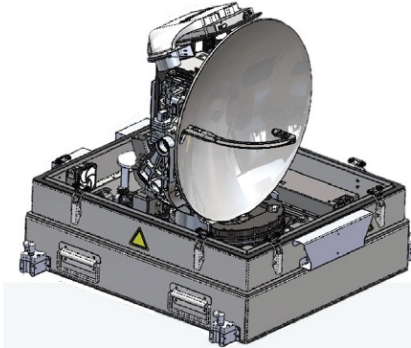


**POSTPONED**

# J-01: Resilient Expeditionary Communications on the Move

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



## PROJECT INFORMATION

<b>Organization Name:</b>	Viasat
<b>Principal Investigator:</b>	Brian Heatherman
<b>Funding Source:</b>	Internally
<b>Research Area of Interest:</b>	J) Expeditionary Operations
<b>Capability Currently Used By:</b>	US Military, Other Federal Entities (Non-Military and Non-First Responder), Private Industry

## PROPOSED EXPERIMENT OVERVIEW

Viasat plans to bring our G18KUKA and NMR1000 solution to demonstrate support for the LOCE mission. Viasat will demonstrate the systems ability to auto switch through different Satcom and WAN connections to show automatic PACE. The setup will mimic the G18KUKA aboard an offshore vessel acting as a TOC while connected to landing forces ashore.

## SYSTEM DESCRIPTION

The G18 KUKA is an IRAD funded carry on/carry off platform designed for Littoral Operations. It operates on the full KU and KA spectrums and is designed to auto acquire, auto track, and auto switch to alternate satellites in a contested environment. The system is paired with Viasats NMR1000 SDWan platform that manages and controls available networks for automatic network changes between multiple satcom, LOS, and LTE connections. The combined system will provide a resilient and capable automatic pace solution that is ideal for the EABO environment.





**POSTPONED**

**M-01: Additive Manufacturing of hybrid ceramic-refractory metal hypersonic thermal protection system**  
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)  
NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts & SLAMR



**PROJECT INFORMATION**



<b>Organization Name:</b>	SHEPRA
<b>Principal Investigator:</b>	Fred Herman
<b>Funding Source:</b>	Both Federal and Internal
<b>Research Area of Interest:</b>	M) Precision strike, Non-Lethal Weapons, Information Operations
<b>Capability Currently Used By:</b>	The capabilities being explored are not yet fielded

**PROPOSED EXPERIMENT OVERVIEW**

Use of Additive Manufacture (AM) to create a tile composed of a Haynes 230 / carbon nanotube metal matrix (CNMMC) that is infused with a Silicon Carbide (SiC) polymer precursor. The SiC will be the outer mold line and heat shield. The Haynes 230 CNMMC is stronger than conventional Haynes 230 and the use of AM allows for the low cost fabrication of any geometry. (3D curvature) This CNMMC will act as carrier for the SiC and can be fabricate with attachment feature to allow for easy attachment and removal to an airframe. (Think Space Shuttle Tile) Key components of this effort have been demonstrated under phase II SBIR/ STTR and AFOSR grants.

**SYSTEM DESCRIPTION**

This experiment is the combination of three distinct technologies. The use of metal Additive Manufacturing (AM) to make complex components cost effectively. The use of carbon nanotubes to improve the mechanical properties of metal and improve their manufacturability for use in AM processes (SBIR/STTR programs). The integration of a polymer precursor that can be used in an AM process to produce Silicon Carbide components (AFOSR Grant). A concept demonstration is underway and expected to be complete by the end of July 2021





**POSTPONED**

# M-02: Emotion AI to Measure, Predict, and Shape Decision Making

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021 | Camp Roberts



## PROJECT INFORMATION

<b>Organization Name:</b>	Cognovi Labs
<b>Principal Investigator:</b>	Zach Levy
<b>Funding Source:</b>	Internal, Federal (SBIR/STTR), and Venture funding
<b>Research Area of Interest:</b>	M) Precision strike, Non-Lethal Weapons, Information Operations
<b>Capability Currently Used By:</b>	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non-First Responder); Private Industry

## PROPOSED EXPERIMENT OVERVIEW

Within the provided exercise and operational environment, we seek to use our Emotion AI technology to measure, predict, and shape human decision making and resulting behaviors. We will build a tailored use case and dashboard to ensure both proper demonstration and measurement of our experiment within the provided operational environment. To achieve optimal results, Cognovi will need access to SMEs within the represented organizations in order to focus the technology for maximum effect. We need to know the specific problems the client is trying to address, and which data sources would be most likely to provide an effective point of reference. Performance can be measured anecdotally, based on running the system vs known outcomes, or statistically based on correlations or predictive power to specific KPIs.

## SYSTEM DESCRIPTION

Over 50 years of research in behavioral psychology tells us that as much as 70-90% of decisions are made based on emotions. Cognovi’s advanced psychological Artificial Intelligence (AI) technology, called Emotion AI, is situated at the intersection of behavioral psychology and machine learning. Cognovi Emotion AI measures & interprets the emotional signatures extracted from textual/transcribable data, at scale & in real-time. This patented technology provides a unique advantage in the tasks of isolating narratives in large text datasets, measuring the emotional responses by different individuals/groups, predicting their behavior, & shaping outcomes.

**COGNIVI**  
EMOTION AI™  
Proprietary Psychological AI Engine

**INFORMATION ADVANTAGE AND FORCE PROTECTION**

*Emotions drive decisions.*  
We EXTRACT today's emotions to PREDICT tomorrow's decisions.  
And then we help you SHAPE the outcome.

We predict from the emotions what decisions people will make and uncover the level of action readiness and intent towards any topic or event.

We identify the exact words, phrases and narratives to evoke those precise emotions to shape the outcome.

Prepare for the unexpected – receive real-time alerts when your target populations changes its decisions.

We extract 10 topic- and geo-specific emotions from any textual or transcribable data natively in 18 languages across the globe without the shortfalls of translations.

Capture emotional trends in real time to proactively adjust for changes in decisions and behavior.

Compare a foreign population's emotional signature by topic towards the US vs China.

