EXPERIMENTS

A-04: Parallel Flight Technologies
A-08: Komodo Fire Systems
B-04: HEN Nozzles
B-09: DD Dannar
F-04: Eirene AI
K-03: JuiceBar
K-04: Beam Global
L-01: Arcimoto

PROJECT INFORMATION

Organization Name:	Naval Postgraduate School
Principal Investigator:	Benjamin Cohen
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
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Project Vesta is exploring the feasibility of 5G-enabled, autonomous "system of systems" that can not only identify and respond to wildfires on military installations, but also collect micro-climate data (local atmospherics) that enable modeling of potential wildfires. The Project Vesta team includes nine commercial companies attempting to integrate their technologies to meet the goal of the following:
1) Provide an 8-digit grid location to a fire that starts anywhere in a 5-acre area in less than 2 minutes
2) Initial engagement begun in less than 6 minutes by air and/or ground system
3) Exposure control begun in less than 8 minutes
4) Fire is declared under control in less than 15 mins

SYSTEM DESCRIPTION

Project Vesta brings together nine commercially developed technologies to solve a wicked problem. The core technology of this effort is autonomy. However, this autonomy is enabled by a variety of AI/ML systems, autonomous air and ground vehicles, and advances in fire prevention and suppression materials.

Unmanned, electric air and ground systems, communicating through ad-hoc 5G mesh networks, will advance their ability to address more complex fire threats via the JIFX forum. This entire system is intended to operate independently of current electrical infrastructure, utilizing stand-alone alternative energy sources.

PROJECT INFORMATION

Organization Name:	Parallel Flight Technologies
Principal Investigator:	Greg Bringedahl
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Demonstration event with Project Vesta wherein the Parallel Flight Technologies Serenity aircraft will provide imaging and large payload demonstrations.

SYSTEM DESCRIPTION

Serenity is a nearly 1 meter cubed sized quad-style electric multirotor UAS that can caryy up to 100 pounds.

Our autonomous drone (KAD) spraying Komodo across a specific programmed path in a field, May 12, 2020

One of a dozen pumper trucks from our NGO owner, committed to disburse Komodo

Komodo sprayed on a piece of cardboard; blow torch fire causes an insulation to form on the cardboard; cardboard is not affected by the fire.

PROJECT INFORMATION

Organization Name:	Komodo Fire Systems, Inc.
Principal Investigator:	Ed Bless
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Question: What may be the most effective method for forming a barrier against wildfires?

Hypothesis, or testable explanation: Dispense Komodo Fire Shield in front of a actual simulated wildfire.

Prediction based on the hypothesis: Komodo is the most effective environmentally friendly material to form a fire barricade. See videos on https://komodo-fire.com/

Test the prediction: Via drone disbursement, test the KAD system and Komodo material at Camp Roberts

SYSTEM DESCRIPTION

A Drone carrying 8 gallons of Komodo material, and ground equipment will be dispensed in front of or around a fire ignited at Camp Roberts. The drone and vehicle dispensed Komodo material will both extinguish the fire and form a super "hulk type" barricade to stop the fire from spreading beyond the Komodo treated barrier.

Komodo is not a retardant, it is a material that when subjected to fire, grows an insulated prophylactic barrier against the fire.

HEN Nozzle allows Precise Attack allowing *Fast Suppression* with *Less Water* usage.

PROJECT INFORMATION

Organization Name:	HEN Nozzles Inc.
Principal Investigator:	Sunny Sethi
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

The key objective of the experiments is to evaluate the feasibility of using unmanned vehicles for effective and precise vegetation fire suppression. The specific experiments being conducted by HEN Nozzles would be to evaluate fire suppression efficiency of water streams and optimize nozzle design for autonomous vehicles.

A key technical challenge in autonomous fire-suppression systems is limited payload capacity. As an example, a drone may carry maximum of 10 Gallons of water and an unmanned ground vehicle may be able to carry a maximum 100 Gallons of water. Typical vegetation nozzle may have a flow-rate of 10 Gallons per minute (GPM) to 30 GPM. At those flow rates, these systems will need to reload every few minutes.

SYSTEM DESCRIPTION

The high-efficiency nozzles for fire suppression were developed as part of a multi-year National Science Foundation project. The nozzles are designed to create water streams that have high wind stability, long-range, and wide coverage. This allows these water streams to reach the target precisely and absorb heat effectively.

The fundamental principle for these nozzles is derived from the high-efficiency nozzles for handline fire nozzles. It was demonstrated experimentally that water streams from these high efficiency nozzles can suppress fire 2-3 times faster using half the water.

PROJECT INFORMATION

Organization Name:	DD Dannar, LLC
Principal Investigator:	Gary Dannar
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Project Vesta is exploring the feasibility of 5G-enabled, autonomous "system of systems" that can not only identify and respond to wildfires on military installations, but also collect micro-climate data (local atmospherics) that enable modeling of potential wildfires.

SYSTEM DESCRIPTION

DANNAR's mission is to maximize the innovation and integration of intelligent technology to transform mobile work and resilient power systems. DANNAR's heavy-duty, off-road platforms are designed to power hydraulic and electric work attachments – for off-road autonomous and semi-autonomous work; to transport and export power for increased energy resiliency through mobile micro-grids; to improve emergency response; and to accelerate public and private infrastructure development. DANNAR integrates Safe-man® work controls for increased worker safety and is the new industry leader in battery and renewable energy production, storage and software systems. DANNAR is changing the way we work, build, repair, and use electricity.

PROJECT INFORMATION

Organization Name:	Eirene AI, LLC
Principal Investigator:	Sukhmeet Singh
Technology Readiness Level:	TRL 4: Component and/or breadboard validation in laboratory environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Utilize pole mounted hill side cameras and a computer processor running Eirene.AI onboard to analyze video and recognize the presence or signs of fire. Once found, communicate general GPS coordinate ground control, selected technologies, and to drone running Eirene.AI Ariel along with waypoints so that it may navigate to fire. Once above the fire, analyze imagery to find perimeter and precise location of fire and once again communicate to ground control and selected technologies.

SYSTEM DESCRIPTION

Computer vision model that's trained to locate fire using imagery only. Model is designed to be camera agnostic, supports multi-stream analysis, and can process imagery via the cloud or on the edge through computer chip running the model and communicating out alerts as needed. We may be testing out an additional computer vision model that can use infrared imagery to capture the perimeter and growth of a fire over time using an infrared camera.

PROJECT INFORMATION

Organization Name:	Oasis Charger Corporation, dba JuiceBar
Principal Investigator:	Paul Vosper
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	K) Infrastructure and Power
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Project Vesta

SYSTEM DESCRIPTION

JuiceBar Gen 3 EV Charging Station.
Voltage: 208/240 VAC
Breaker: Rating 40A 48A 80A
Single Connector: 3 Wire (L1, L2 & G)
Double Connector: 5 Wire (L1, L1, L2, L2 & G) (or)
Voltage: 208/240 VAC
Breaker: Rating 80A
Double Connector: 3 Wire (L1, L2 & G)
Cellular communication enabled
DIMENSIONS
71.25" Total Height with Pedestal, 36.5" Total Height w/out
Pedestal, 16" Width Without Connectors, 12" Depth

PROJECT INFORMATION

Organization Name:	Beam Global LLC
Principal Investigator:	Sandra Peterson
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	K) Infrastructure and Power
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Project Vesta is exploring the feasibility of 5G-enabled, autonomous "system of systems" that can not only identify and respond to wildfires on military installations, but also collect micro-climate data (local atmospherics) that enable modeling of potential wildfires.

SYSTEM DESCRIPTION

EV ARC™ 2020 is the only 100% renewable, transportable, off-grid EV charging option on the market. Each EV ARC makes and stores all its own electricity to deliver clean, renewable energy so EV drivers can charge directly from solar output. Solar Array 4.3 kW

Battery Storage Options - 22,32,43 kWh
Total EV Charger Power 2 - Up to 4.3 kW
EV Charger Type 3, 4 - Any brand; 1-6 plugs; type J1772
Certified Wind Load -120 mph
Array Dimensions (LxW)
21 x 10.6 ft

PROJECT INFORMATION

Organization Name:	Arcimoto
Principal Investigator:	Jesse Fittipaldi
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	L) Mobility and Transportation
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Project Vesta is exploring the feasibility of 5G-enabled, autonomous "system of systems" that can not only identify and respond to wildfires on military installations, but also collect micro-climate data (local atmospherics) that enable modeling of potential wildfires.

SYSTEM DESCRIPTION

The Arcimoto FUV is a three wheeled, fully electric, ultra efficient, lower cost, and capable of integrating autonomous/unmanned systems vehicle platform. This project will use our autonomous technology team Faction. The vehicle average weight is 1,300 pounds, carries two people, is in market, compliant on all roadways, 80mph top speed, a range of 100 miles at 35 mph and has a 173 city MPGe efficiency. The base platform can be up-fitted for delivery, emergency response, including fire response, or flatbed. The drivetrain is an independent, duel electric front wheel drive. The vehicle approximate 20kw/hr battery can be fully charged within 6 hours on a level two off-grid charger powered by the sun.

A-03: Safety, Stability, and Performance Optimization for UAV with Off-Center & Ad Hoc Payload

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

PROJECT INFORMATION

Organization Name:	Rhoman Aerospace
Principal Investigator:	Thomas Youmans
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

We are building a 5ft x 9ft 6-propeller VTOL multi-rotorcraft to test our 'Variable Center of Gravity Auto-Adapt Control System' and to generate data around safety and stability with shifting cargo, non-optimal payload placement, and variable system CG.

We have power sensors integrated into the vehicle to measure the power used per motor and propeller RPM, and we have a system of sensors to measure payload center of gravity and payload movement. We will perform test flights with payloads placed in various non-centered locations, and measure power system stressors through our embedded sensors as well as IMU data to examine vehicle instabilities.

SYSTEM DESCRIPTION

We create custom VTOL UAV control systems for unique flight vehicles - and we're building an adaptive UAV control system that accounts for live and shifting system center of gravity. We're building live, in-flight auto-tune systems to account for and adjust to variable system CG. This can 1) account for non-optimal payload placement, so a UAV will work with any ad hoc payload, and 2) accounts for shifting payloads, including cargo that shifts, liquids that slosh - and tethered payloads to allow for no-land cargo delivery.

PROJECT INFORMATION

Organization Name:	Aerovironment Inc.
Principal Investigator:	Paul Trist
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

The PARK payload allows continued navigation flight in a GPS compromised or denied environment. AV will fly a PUMA AE by turning off the GPS receiver and continue to navigate to area waypoints.

SYSTEM DESCRIPTION

The PUMA UAS system is an Aircraft (battery powered) and one Ground Control Station GCS with Laptop computer with FalconView using AV software(s) for waypoint navigation. The PARK payload is integrated to the PUMA fuselage and communicates with the GCS. The PUMA is hand or Bungee launched and deep stall recovered
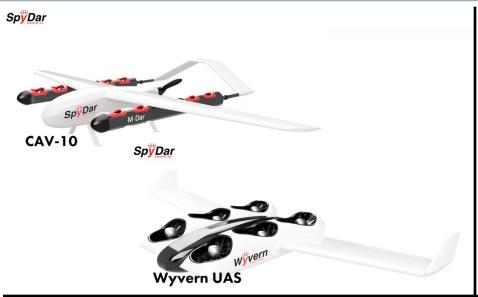
CAV-10

Wyvern UAS

PROJECT INFORMATION

Organization Name:	Spydar Sensors, Inc
Principal Investigator:	Jorge Jimenez
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Experiment Location:	NPS Field Laboratory at Camp Roberts

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.
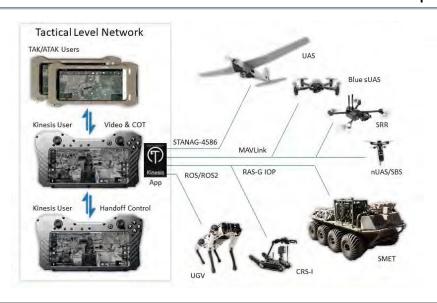
B-07: AI-Enhanced Common Control for Multi-Domain Manned-Unmanned Teaming

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

Tactical Level Network

PROJECT INFORMATION

Organization Name:	Tomahawk Robotics
Principal Investigator:	Tom Kennedy
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
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

The experiment would demonstrate simultaneous multi-domain control from a single end user device (EUD), while interrogating data feeds from the UxV's systems by AI algorithms hosted on a soldier-worn edge processor. Our current plan would have a user team a UAV (Teal or Skydio) with a UGV (SPUR) to navigate to a point of interest (POI), with the UAV providing a "God's eye view." The UAV video feed would also be used to perform object or threat identification for increased situational awareness. The UGV would perform a task at the POI and then return to home. Throughout the experiment, the AI-augmented video and data feeds would be shared real-time with the ATAK network.

SYSTEM DESCRIPTION

The system is a soldier-worn kit for common control of UxV's with edge compute capability. The foundation is our common control software, Kinesis, which allows for simultaneous multi-domain command & control, implementation of AI algorithms, and networking with TAK/ATAK. The hardware includes our Grip controller (wrap-around controller case for Samsung S20 TE EUD), MxC-Mini datalink, and Kinesis Expansion Module (network hub / edge processor). Tactical radio will be Persistent Systems' MPU5, but any MANET radio is feasible. The Grip controller adds physical buttons/joysticks to the S20 TE. Kinesis is loaded onto the S20 TE to control the UxV's and perform mission planning, etc.

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

VOXL CAM CORE DEV KIT

PROJECT INFORMATION

Organization Name:	Lumenier
Principal Investigator:	Chris Beckman
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
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

A demonstration of the 3D Mapping Capabilities on an unmanned ground vehicle as a proof of concept demonstration for integration into future sUAS systems.

SYSTEM DESCRIPTION

An unmanned ground vehicle designed and manufactured by Lumenier with an Analog Control link via Handheld Controller carrying ModalAI's VOXL CAM payload generating a 3D Map of its environment.
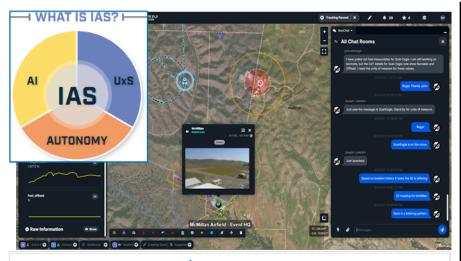
B-12: Multi-Institution All Domain C2 for IAS

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | Feb 2022| NPS, Camp Roberts

Common, Relevant Operating Picture

PROJECT INFORMATION

Organization:	Naval Postgraduate School
PI	Steve Mullins, IS Dept, NPS
Funded by	CRUSER
Research Area of Interest	Empower the NR&DE/DoDRE by conducting robust, collaborative, real-time, distributed field experiments using the approach called for in the DoN S&T Strategy for IAS, to instantiate a COP that integrates multiple IAS data feeds to support SA and control of IAS systems.
WFX Capability gap addressed	DASN RDT&E and the CNR: "Integrating IAS will not be effective … if performed in silos. High levels of collaboration, communication, and knowledge sharing both within the DoN and external, joint, allied partners are essential…" (DoN, 2021, p.10.)

EXPERIMENT OVERVIEW

Objective: Conduct robust AIS-oriented experiments at 4ea JIFXs by exploring w/our partners how to share R&D data, information, knowledge across multiple USG, DoD, industry, academia, partners, allies to foster IAS innovation in all domains. Identify & solve technical or other barriers to info sharing in the context of integrated SA and control of multiple IAS.

Approach: Integrate simultaneous data inputs/feeds from multiple types of IAS, other sensor nodes to a tailorable COP in real-time (web-based) that enables active participation among geo-distributed partners by supporting situation awareness and decision-making. Employ a realistic, dynamic tactical maritime operations scenario which leads to changes in system tasks and priorities, including eventual hand-off of control of systems.

TECHNICAL INFORMATION

We will take iterative steps toward developing the right physical, data/digital, and process infrastructure to accelerate how we mature, integrate, test & evaluate, refine our command & control of IAS. Experimentation will include approximately seven separate systems, including UAS, surface and underwater devices, communication systems and a GOTS Common Operating Picture software tool. Most or all of the systems will be geographically distributed, operating simultaneously, feeding data to a remote server that will populate the COP and distribute the information as a web-served tool.

as of: 220201

D-01: HPC for Emergency Services, AI and Intelligence Modeling in support of Humanitarian and Emergency Services.

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

PROJECT INFORMATION

Organization Name:	TMGCore
Principal Investigator:	Edward Silva
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	D) Communication and Networking
Experiment Location:	SLAMR Facility at the Naval Postgraduate School

PROPOSED EXPERIMENT OVERVIEW

For JIFX 22-2 TMGcore has built an ISU-90 expeditionary containerized version of our HPC platform while materially increasing the compute deployed from our EdgeBox 30kW system. The systems will be fully contained with its own generator, chiller, UPS, HPC compute platform and network connectivity. We will test for performance, operating and environmental temperatures and any related impacts, remote network management, and continual system health while deployed cross country.

SYSTEM DESCRIPTION

TMGCore is a platform development company for High-Performance Computing (HPC) with Two Phase Liquid Immersion Cooling (2PLIC) "HPC 2PLIC" using the OTTO Platform which if fully deployable & mobile. Our systems allows for tactical Edge computing in support of C4ISR needs for big data analytics, AI, and provide large data storage capabilities while reducing targetability through reduced RF transmission, alleviate latency and data link bottlenecks of cloud computing, and reduced costs related to traditional logistics footprints of air-cooled data centers. This capability is achieved through the HPC 2PLIC system built into each customizable EdgeBox or OTTO Platform which can be operated out of an ISU-90 or on the back of of moving vehicle while in operation.
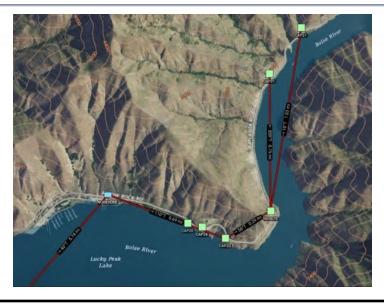
D-02: Extend Communications Beyond the Edge for Wildland Firefighting

PROJECT INFORMATION

Organization Name:	Hypha by Wireless Innovation Inc.
Principal Investigator:	Andrew Delaney
Technology Readiness Level:	TRL 8: Actual system completed and qualified through test and demonstration.
Research Area of Interest:	D) Communication and Networking
Experiment Location:	NPS Field Laboratory at Camp Roberts & SLAMR Facility at the Naval Postgraduate School

PROPOSED EXPERIMENT OVERVIEW

We plan to test the network range extension capabilities of our HyphaMESH nodes. We will measure the distance between mesh nodes, and the data throughput capacity at various distances. We plan to measure these distances in various environments, line of sight, through dense foliage, and in-building.

SYSTEM DESCRIPTION

The HyphaMESH solution can extend the range of cellular and satellite backhaul IP connections miles into areas with limited to no cellular and radio coverage. The HyphaMESH devices create a self-healing, self-forming mobile ad-hoc mesh network that can operate independently or connect back to the internet via cellular, satellite or any other IP connection. The solution is rapidly deployable, requires no infrastructure, and can significantly enhance the value of existing communications equipment. With HyphaMESH, emergency responders can continue to use their Wi-Fi devices and access the applications and software they rely on in areas not capable before (ex: dense forests or canyons for wildland firefighting).
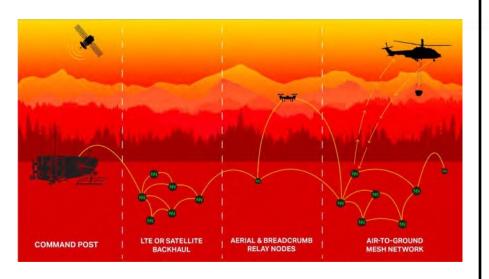
D-03: goTenna: Off Grid Mesh Networking

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

PROJECT INFORMATION

Organization Name:	goTenna
Principal Investigator:	Nathan Havens
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	D) Communication and Networking
Experiment Location:	NPS Field Laboratory at Camp Roberts & SLAMR Facility at the Naval Postgraduate School

PROPOSED EXPERIMENT OVERVIEW

1: Utilize commercial off the shelf products such as goTenna and TRX to test user's ability to gather position location information and relay via mesh network that data to a command post in a cell, radio and GPS denied environment. Collect data on lat/long collected vs true lat long and use diagnostics logs to measure overall effective comms range. Environment: Tunnels, buildings and basements.

2: Measure the efficiency of the goTenna mesh network by testing the limitation of each user device, while broadcasting position location information at a specific interval. Compare the delivery rate percentage by user count, number of channels and rate of broadcasts.

3: Using 3rd party RF hardware, test the goTenna mesh network's ability to avoid detection and defeat jamming technologies.

SYSTEM DESCRIPTION

Software: ATAK is a government mobile and desktop application used for situational awareness and personnel tracking. ATAK hosts a variety of plugins to add additional capability beyond the base software. The core of the application revolves around offline imagery to provide users with geospatial awareness.

goTenna: Lightweight mesh networking radio that when paired to smart devices, creates an offline communications system. goTenna only shares small-burst-data packets, not voice or video. The packets contain position information, texts, and map objects sent via the secured network and managed on the smart device. The network is decentralized and requires no server or IT overhead.

TRX: Hardware that when paired to ATAK, provides the phone with position information in GPS denied environments. It utilized a reference point, barometric pressure and a step counter to accurately display the phone's position in tunnels and buildings.
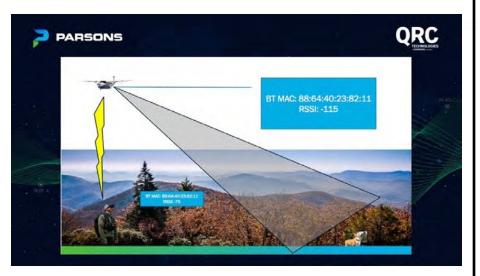
Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

PROJECT INFORMATION

Organization Name:	QRC Technologies
Principal Investigator:	David Casas
Technology Readiness Level:	TRL 8: Actual system completed and qualified through test and demonstration.
Research Area of Interest:	E) Cyber, Cyber Security, and Electronic Warfare
Experiment Location:	NPS Field Laboratory at Camp Roberts & SLAMR Facility at the Naval Postgraduate School

PROPOSED EXPERIMENT OVERVIEW

Identify and locate Bluetooth devices in a Search & Recovery situation by identifying the subject MAC address, stimulating that device, and walking down the device based on RSSI. The BlueFi system can locate a known or unknown device ID from distance and stimulate that device in order to "walk-down" that device based on RSSI value; the experiment will focus on nano devices such as Apple AirTag & Tile devices.

SYSTEM DESCRIPTION

QRC's BlueFi system is a simplified approach to Bluetooth and Wi-Fi MAC address detection and identification. BlueFi enables a user to collect Bluetooth and Wi-Fi MAC addresses and other broadcasted metadata which allows operators to gain a more complete picture of the device's associations. BlueFi surveys Bluetooth 2.1, 4.0, 4.1, and 5.0 devices as well as 802.11 a/b/g/n access points and clients. The output data allows the operator to obtain MAC addresses, Over the Air (OTA) names, device relationships, signal strength, and a list of current device connections.
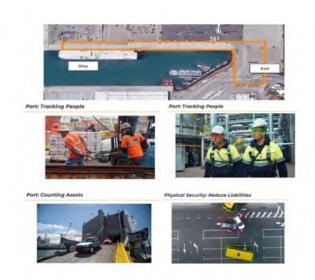
F-01: Early Detection, Response and Extinguishing of Wildfires using Computer Vision, Artificial Intelligence and Long Range Communication

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

Port: Tracking People
Port: Tracking People
Port: Counting Assets
Physical Security: Reduce Liabilities

PROJECT INFORMATION

Organization Name:	Future Labs
Principal Investigator:	Bryan Went
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

The experiment would prove that assets and areas that are extremely remote can be assessed, monitored and managed effectively. The experiment would provide data how to mitigate, monitor and responded to wildfires. This data and technology puts less lives at risk for both fire fighters and residents. It will save lives, save key assets, reduce costs and reduce impact climate change.

SYSTEM DESCRIPTION

The system is a combination of two innovative breakthroughs.
1) A camera and sensor array that combines computer vision, artificial intelligence, localized sensing to be able to analyze and make decisions real time at the location instead of needing to connect to the cloud.
2) A proprietary data handling method that packetizes, compresses, encrypts and distributes data so that it can send efficiently over networks. Increasing the amount of data that can be sent. It can on any frequency, but our wildfire units can send ten to twenty miles. Its extremely secure and quick. This allows us to keep a human in the loop to train our AI and let personnel make key decisions.

F-03: Expeditionary Artificial Intelligence and Behavior Analysis at-the-edg for Tactical Surveillance and Humanitarian Response

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

PROJECT INFORMATION

Organization Name:	Gantz-Mountain Intelligence Automation Systems, Inc
Principal Investigator:	Greg Wilson
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Gantz-Mountain is continuing to experiment with its tactical intelligence automation system with smart unattended ground surveillance systems that feature artificial intelligence and behavior analysis at-the-edge for expeditionary surveillance and Humanitarian Response applications.

Data will be collected on the following metrics
- Stand-off distances in meters
- Look angles
- Pixels on target thresholds
- Expeditionary power sources - with Ascent Solar
- Communications backhaul platforms

SYSTEM DESCRIPTION

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 surveillance, security and force protection applications during Humanitarian Response. Additionally, Gantz-Mountain is using this revolutionary technology to make legacy sensors smart by developing Intelligence Automation Systems Adaptors for PTZ cameras along with other camera systems. This technology has received sponsorship and is in use by a variety of USG organizations.

G-01: Intelligent Human Motion GPS Denied Trials

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

GPS Denied Navigation During Jamming

PROJECT INFORMATION

Organization Name:	Yotta Navigation
Principal Investigator:	Andrew Hazlett
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	G) Situational Awareness
Experiment Location:	NPS Field Laboratory at Camp Roberts

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.

PROJECT INFORMATION

Organization Name:	Orgo
Principal Investigator:	Joseph Kramer
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Experiment Location:	NPS Field Laboratory at Camp Roberts & SLAMR Facility at the Naval Postgraduate School

PROPOSED EXPERIMENT OVERVIEW

Disaster response operations require collaboration between military, government, private, public, and non-profit organizations - the same organizations that participate in JIFX events.

We'd like to test whether our initial prototype enables enhanced situational awareness, and the ability to contact collaborators across network boundaries faster than what's currently possible.

Throughout the experiment, people will use Orgo, and our built in data collection and analytics suite will collect user behavior data. That data - along with results of surveys, interviews, and discussions - will be used refine Orgo into a platform that is a better tool than what currently exists.

SYSTEM DESCRIPTION

Orgo is a platform that is like Google Maps, but for Organizational Charts: Orgo lets people view organizational hierarchies for entire institutions, search for specific military units (or other government/civilian directorates), pan around to explore, zoom in to individual people, and extract current contact information.

Orgo is especially effective during a crisis: As response efforts develop and network structures evolve, map and directory information stay current in real time, meaning first responders always have access to current information and can more easily navigate constantly changing surroundings. Likewise, commanders have unprecedented situational awareness to make better decisions, faster.

PROJECT INFORMATION

Organization Name:	Naval Postgraduate School
Principal Investigator:	Ernest John Jadloc
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	G) Situational Awareness
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

On the ground, deploy an infrared light device and view it with a night vision goggles. Measure the maximum distance the infrared light device can be visible by the NVG.

SYSTEM DESCRIPTION

Infrared light

The device is designed to be mounted on commonly used quadcopter (under 250 grams). It is intended to be an option for ground forces (who will remain covered and concealed—less exposure to enemy) to mount the device on any drone, and deploy it above the foliage of vegetated areas at night, thereby increasing the situation awareness of pilots of incoming friendly aircrafts.
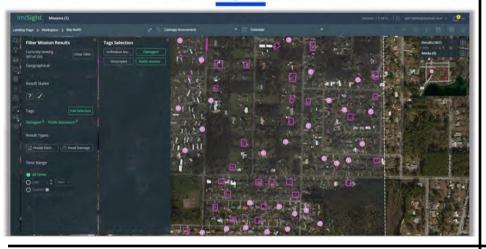
H-01: ImiSight: Virtual Damage Assessment

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 22-2 | 14 – 18 February 2022

Filtering Results

PROJECT INFORMATION

Organization Name:	Rafael Systems Global Sustainment, LLC
Principal Investigator:	Brian Jones
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	H) Defense Support to Civil Authorities (DSCA)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

We will select a recent wildland fire and compare with fused data from both pre-disaster satellite imagery and post disaster high resolution aerial photography (including drone generated video streams). We will apply AI algorithms to detect road blocks or road damage, burned buildings, classify structures (houses and building), determine severity level of damages and generate a report that details these findings.

SYSTEM DESCRIPTION

ImiSight is a cloud based platform that fuses data from various remote sensing sources. It runs both AI and machine learning algorthms on top of various data sets from satellites to drone (high and low resolution). Imisight generates actionable insights for first reposnders, provides headquarters with near real time damage assessment, and ensures recovery planners have both a foundation for the way ahead and the ability to monitor response efforts.

OVERWATCH IMAGING – Wildfire Response

PROJECT INFORMATION

Organization Name:	Overwatch Imaging
Principal Investigator:	Matt Lynaugh
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	H) Defense Support to Civil Authorities (DSCA)
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

"Shorted Wildfire Response time through automated fire detection and mapping" – Overwatch Imaging's experiment for Wildfire Response will focus on automated fire detection, location and mapping. We want to see how these data packages can be used by other experiments to condense the time from early fire detection to response. We plan to partner with AeroVironment Jump 20 platform as a primary with a manned surrogate as a backup if needed. This will allow for real time data transmission allowing other resources and assets to perform follow up responses upon a fire detection. Overwatch Imaging will bring a TK-7 wide area, multispectral payload with the latest test software package that is refined to detect small spot fires that should be able to be safely used at this time of year for this experiment period.

SYSTEM DESCRIPTION

The Overwatch Imaging TK series is a multi-camera multispectral step-stare area scanner built into a nadir-oriented roll-pitch gimbal. The images are processed with an advanced embedded GPU for real-time image analytics, onboard cross-cueing, and pre-transmission data reduction.

The TK payload combines simultaneously operating visible band with near, and longwave infrared area scan cameras (RGB-NIR-LWIR) in a co-boresighted tray with a GPS-INS. These cameras are roll-pitch step-stare stabilized and step across the flight track for wide area field of view, enabling coverage with constant imaging, search, and detections.

I-01: Expedited Closure Triage for Wounds and Lacerations

PROJECT INFORMATION

Organization Name:	DermaClip US,, LLC
Principal Investigator:	Charles Darling
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	I) Health and Safety
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Recruit attendees with different levels of skill in wound closure, from no experience to significant experience to make the closure, measuring the time the person takes to make the closure with DermaClip vs. sutures and the quality of the closure. Have each of the recruits fill out a written evaluation comparing and rating their experience and satisfaction with using DermaClip devices versus sutures.

In addition, each recruit will apply the DermaClip device to another of the recruits, with each recruit to wear the device during the event. At the end, each recruit will fill out an evaluation of the device, including pain experienced during application, inconvenience of wearing, and the pain associated with, and ease of, removal.

At the end, prepare a report based on the collected data.

SYSTEM DESCRIPTION

The DermaClip skin closure device is a patented wound closure device that seeks to provide an ubiquitous alternative to closure with sutures in the first instance, and also to staples and, for minor wounds, glues. It is designed to provide a wound closure that accomplishes what some medical textbooks have called the "gold standard of wound closure," a tension free closure that is approximated and everted. The design is to make it easy for any provider to learn to make a high quality closure in minutes, allowing effective, on-site triage in seconds or a minute or two that otherwise would take much longer.
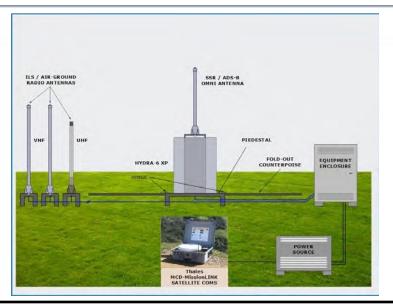
PROJECT INFORMATION

Organization Name:	L3Harris
Principal Investigator:	Joshua Powell
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	J) Expeditionary Operations
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

Proof concept on TRL 6 mono-pole 3D AESA radar for Primary Surveillance, Secondary Surveillance, Instrument Landing System, Direction Measurement Equipment, and Tactical Air Navigation (TACAN) in a single system. We will measure the AOA accuracy of the system against the Instrument Landing Systems in participating aircraft. This will be cross referenced against available ADS-B and telemetry data.

SYSTEM DESCRIPTION

The Hydra-6 radar will be the core technology. The H6 is a low-cost, static, circular, sectored antenna designed for Monopulse Processing. This allows for an accurate AOA to be obtained from aircraft. It also allows for in-band Navigational Aids signals to be synthesized (e.g., VOR, ILS, TACAN and VHF Omni-directional Range TACAN (VORTAC) and transmitted to the aircraft. The H6 will be augmented by a RAILS software suite that provides the UHF/VHF signals in space for the cockpit.

PROJECT INFORMATION

Organization Name:	Solar Electric Technology
Principal Investigator:	Jerrold Karmin
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	K) Infrastructure and Power
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

This is a solar powered light tower and generator with a battery powered inverter of 10 kilowatts with four 400Watt LED lights that put out as much as 320,000 lumens of light in total.

SYSTEM DESCRIPTION

This is a portable solar powered trailer that can be folded for transportation and easily deployed on location in less than 5 minutes It has 2,500 watts in solar panels and 40 kilowatts of batteries and ten kilowatt sine wave invertersIt is a light wave.

PROJECT INFORMATION

Organization Name:	Texas Motorcycle & Automotive, inc.
Principal Investigator:	Gabriel Cavazos
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	L) Mobility and Transportation
Experiment Location:	NPS Field Laboratory at Camp Roberts

PROPOSED EXPERIMENT OVERVIEW

We purpose our device be included in target vehicles being tested at JIFX. Our device collects telemetry data to determine significant events experienced by a vehicle. The data is transmitted over the Iridium satellite network. We can then investigate the feasibility of use of our device in military applications other than the target vehicles we have assessed to date. Currently, our device can detect crashes in and rollovers in powersports vehicles. We're interested in expanding our system into land and sea base vehicles.

SYSTEM DESCRIPTION

The Wrexx Automated Crash Response system uses mounted hardware in the target vehicle to collect telemetry data that is constantly analyzed to detect significant events. If a crash or rollover criteria has been met, a signal containing the riders personal, demographic, health information and geographic coordinates is sent over the Iridium Satellite network to a call center that handles the response from that point. We intend to tailor our core capabilities for the Defense space.