JOINT INTERAGENCY FIELD EXPERIMENTATION (JIFX)

NAVAL POSTGRADUATE SCHOOL

Agenda

- JIFX Overview
- Events
- Success Stories
- Participation

What is JIFX?

- An experiment in alternative methods to enable rapid technological development.
- Community of Innovators in dialogue with DoD, USG, and Allied technology developers to identify, influence, and accelerate early-stage technology that address national and collective security challenges.
- Provides government, academic, and industry researchers a turn-key solution for safe, secure, legal, and collaborative experimentation on a quarterly basis.

We provide a realistic field environment

Experimenters provide an emerging technology

Together we collaborate and learn!

Culture: Principles

- Austere by Design
- Bounded, Not Controlled
- Inclusive
- ‘Develop Now’ mantra
- Collaboration is Expected
- Failure is Acceptable

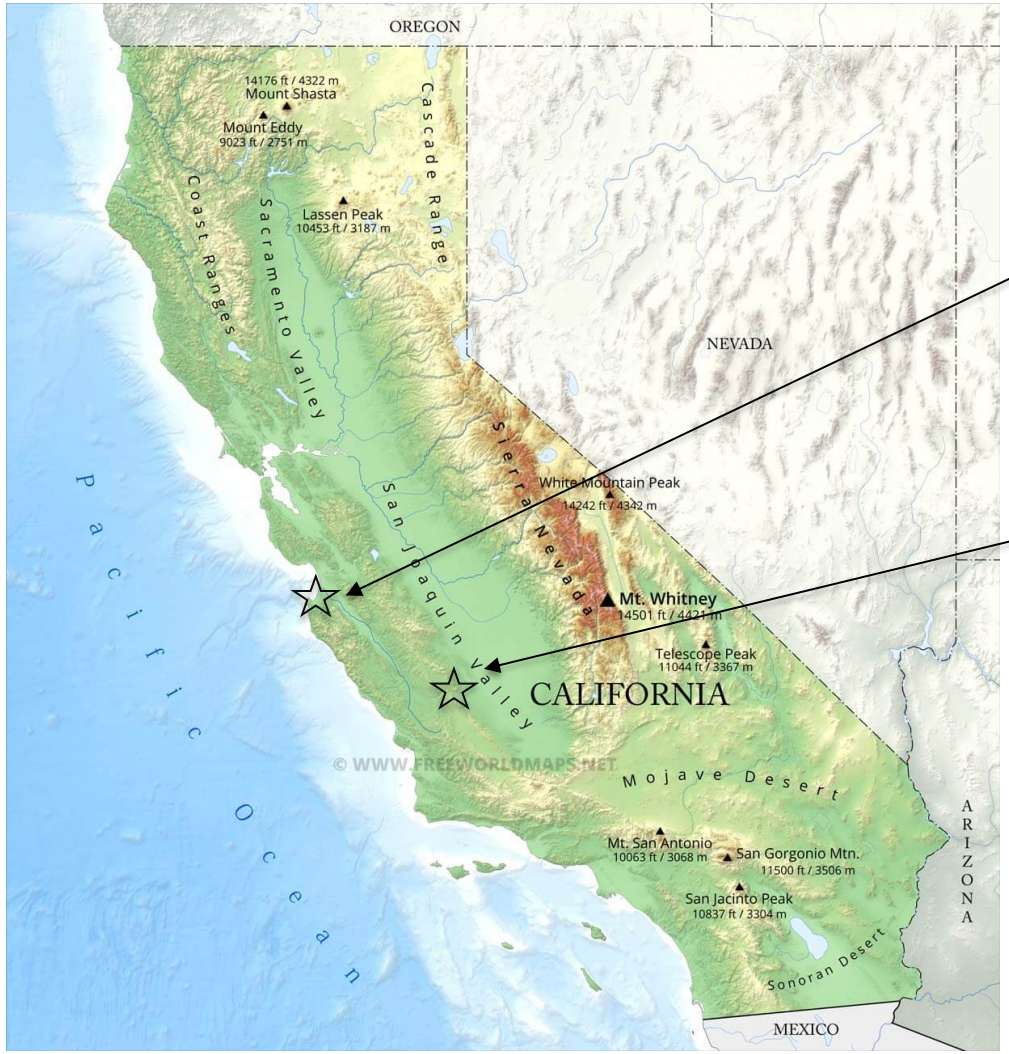
Culture: A Continuous Cycle

- Annual RFI is created based on Stakeholders identified interest areas
- Experimenters submit Experiment Proposals
- Proposals are reviewed by NPS & Stakeholders
- Stakeholders vote on relevance of each proposal
- NPS invites and coordinates participation of accepted experimenters
- JIFX Event

Culture: Experiment Focus Areas

Unmanned Aerial System	Unmanned Systems Design, Deployment, Operation, Networking & Control	Countering Unmanned Systems	Communication and Networking	Cyber, Cyber Security, and Electronic Warfare
Intelligence, Surveillance and Reconnaissance	Situational Awareness	Defense Support to Civil Authorities	Health and Safety	Expeditionary Operations
	Infrastructure and Power	Mobility and Transportation	Precision strike, Non-Lethal Weapons, Information Operations	

Capabilities



Event Locations

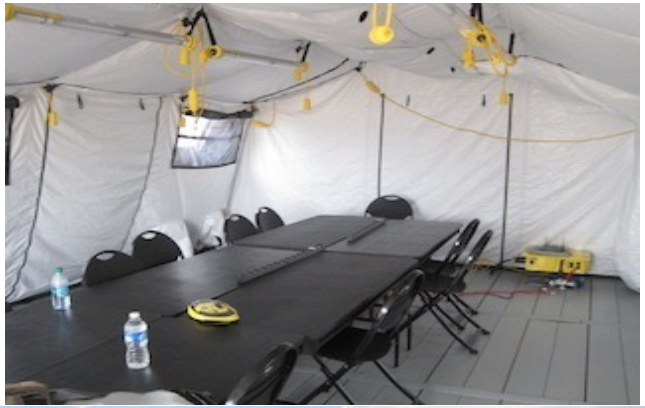
NPS Sea, Land, Air Military Research (SLAMR) Facility

NPS Field Laboratory at Camp Roberts Army National Guard Base (Primary)

Virtual Participation

Capabilities: Camp Roberts

- Controlled air & electromagnetic domains
  - Paved assault landing strip
  - Restricted Airspace to 15,000ft MSL
  - Restrictive Terrain
- Maneuver area – 30,000 acres
- Combined Arms Collective Training Facility
- Live-fire training facilities
- Networked "Technical Operations Center"



Capabilities: NPS

- Sea Land Air Military Research (SLAMR) Laboratory
  - Co-located with main campus
  - Repurposed Waste-Water Treatment plant
    - 3x In-ground Treatment Tanks
    - Hardscape and dunes
  - 5G Array
  - Network infrastructure provides real-time connectivity to JIFX at Camp Roberts & other locations
  - Future Subterranean & Air domain capabilities along with activities in bay

Community

- **Stakeholders**
  - US Combatant Commands (Primary)
  - All other DoD Organizations
  - Interagency (other federal organizations)
  - Allied Forces
  - State & Local Government Organizations
- **Innovators**
  - Commercial Industry
  - Military Commands
  - Federal Government Research Organizations
  - Academia
  - Non-Profit / Non-Governmental Organizations
  - NPS Faculty and Students
- **Evaluators**
  - Uniformed Military with varied technical backgrounds
  - NPS Faculty and Students
  - Red Team: Joint Vulnerability Assessment Branch (JVAB)

Supporting the NPS Mission

- The Naval Postgraduate School provides defense-focused graduate education, including classified studies and interdisciplinary research, to advance the operational effectiveness, technological leadership and warfighting advantage of the Naval service.

- JIFX supports the NPS mission by providing:
  - controlled sites to conduct interdisciplinary graduate education and research for students
  - applied research opportunities to evaluate the latest technologies and remain on the cutting edge of their disciplines
  - a platform for DoN, sister services, and DoD agencies to field test prototype platforms, payloads, and concepts of operations

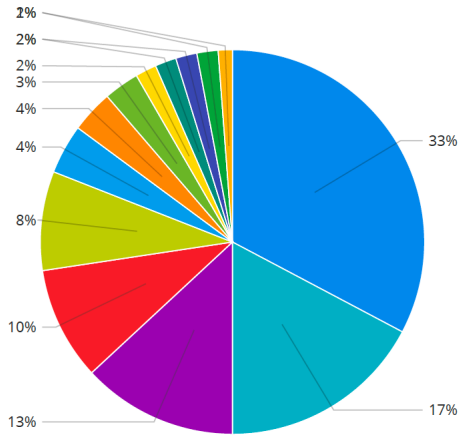
Doubling Return on Investment

USMC Students at JIFX 21-2 (1-5 MAR 2021)

- **Experiment:** : Tactical RF Signature Manipulation techniques to obfuscate a communications system's electromagnetic signature that challenges state-of-the-art direction-finding systems.
- **Highlight:** Unmanned platform enabled techniques and experiment parameters for evaluation at altitude - effectively ***enhancing power*** received at the sensor.
- **Interim Conclusion:** ***Techniques*** used against the DF system ***proved effective beyond anticipated estimates***.
- **Support:** Air Ops, Spectrum Mgr, and Joint Vulnerability Assessment Branch (JVAB) of US Army's Unique Mission Unit
- **Follow-on:** Evaluate techniques against the DF system at maximum theoretical estimates.
- ***Returning More Capable Leaders to the Force***: Thought Leaders and Subject Matter Experts who are Technologically literate and Competent moving from theory to application

2020–2022 Event Statistics

Experiments by RFI Areas of Interest



Unmanned Aerial Systems
Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Situational Awareness
Intelligence, Surveillance, and Reconnaissance (ISR)
Communication and Networking
Health and Safety
Cyber, Cyber Security, and Electronic Warfare
Infrastructure and Power
Mobility and Transportation
Expeditionary Operations
Defense Support to Civil Authorities (DSCA)
Countering Unmanned Systems
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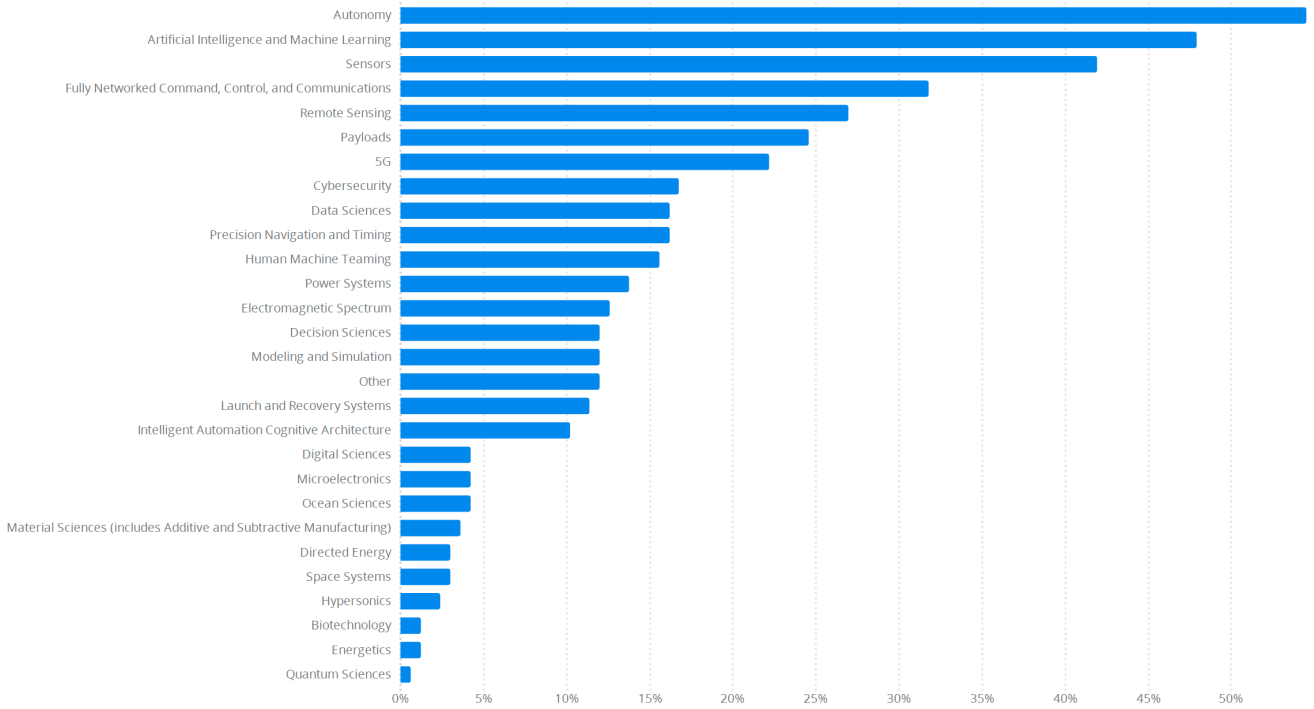
Technologies Related to DoD Modernization Priorities



1789 Participants

205 Experiments

46 Cyber Vulnerability Assessments

536 Sorties

FY2023 Events

Event	Dates	Focus Area	Location
JIFX 23-1	7 – 10 November 2022	Expeditionary Energy & Power Solutions	NPS Field Laboratory at Camp Roberts
JIFX 23-2	6 – 10 February 2023	Human Performance Monitoring & Situational Awareness	NPS Field Laboratory at Camp Roberts
JIFX 23-3	1 – 5 May 2023	Autonomous Logistics Enabled by AI/ML	NPS Field Laboratory at Camp Roberts
JIFX 23-4	7 – 11 August 2022	Autonomy & Human Machine Teaming	TBD

Success Stories: ScanEagle

2006: Flew first modified payload capable USN ScanEagle at JIFX event

2008: In conjunction with NSW, conducted first launch from Mark V Special Operations Craft

2009: ScanEagle flew from USS Brainbridge ISO operation to rescue crew of MV Maersk Alabama from Somali Pirates

2010: Tested rapid-deployment SIGINT payload (SIGEAGLE) prior to deployment to USMC in Afghanistan

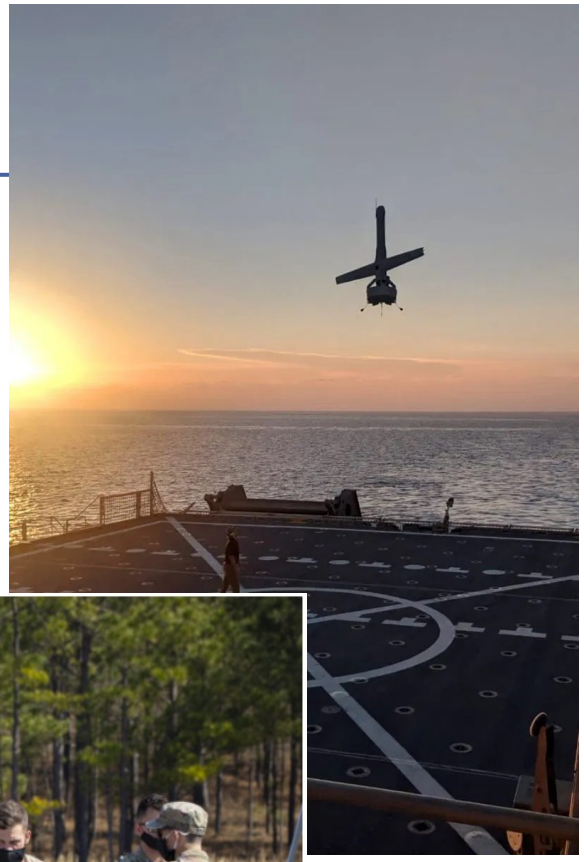
2013: Experimentation with autonomous copilot software

Success Stories: Chapparal

- Start-Up company regularly attended JIFX since 2018.
- Autonomous Cargo UAS, 150+ lbs payload, 300-mile delivery range.
- Partnerships with:
  - NPS
  - NASA
  - USAF Agility Prime
  - AYR Logistics global HA/DR operations

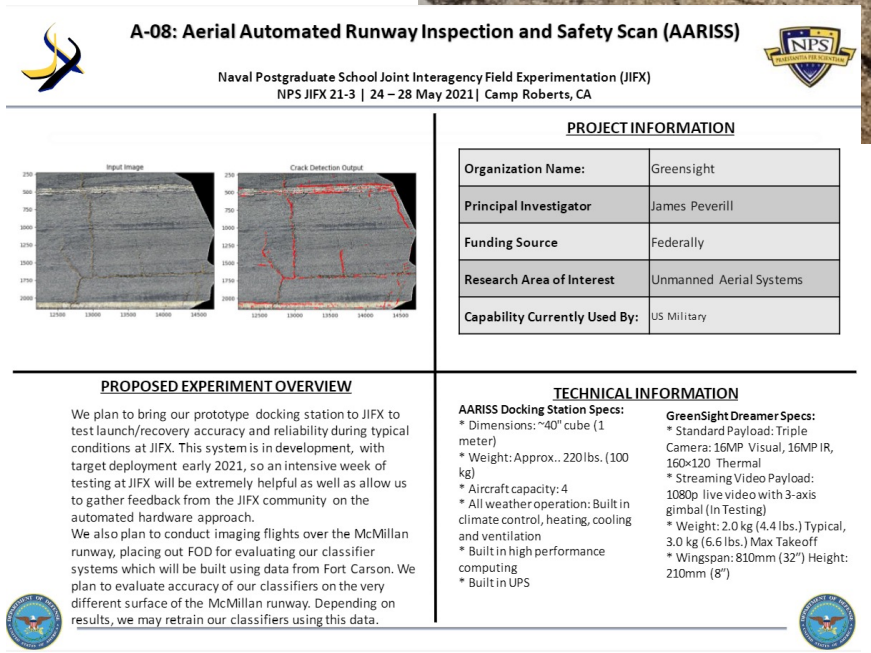
Success Stories: V-BAT

- Martin UAV proved and refined V-Bat beginning in 2019
- Marine Warfighting Laboratory's Organic Reconnaissance, Surveillance, and Target Acquisition Office developed TTPs for Maritime UAV operations
- Deployed and provided direct support to operations in Fall 2020 as part of the USMC's 31st MEU.
- Under contract for evaluation by Canadian Forces.



Accelerating Development: AARISS

- Greensight, Inc. took stakeholder feedback at JIFX 20-2 led to develop the Aerial Automated Runway Inspection and Safety Scan (AARISS) system.
- AARISS deployed to Fort Carson Army Airfield for 2020-2021.
- Awarded a 2-year contract from DARPA's Strategic Technology Office to develop the technology under the "Distributed, Secure, and Trusted Processing for Heterogeneous Swarms of Autonomous Vehicles."



A-08: Aerial Automated Runway Inspection and Safety Scan (AARISS)

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-3 | 24 – 28 May 2021| Camp Roberts, CA

Input Image

Crack Detection Output

PROJECT INFORMATION

Organization Name:	Greensight
Principal Investigator	James Peverill
Funding Source	Federally
Research Area of Interest	Unmanned Aerial Systems
Capability Currently Used By:	US Military

PROPOSED EXPERIMENT OVERVIEW

We plan to bring our prototype docking station to JIFX to test launch/recovery accuracy and reliability during typical conditions at JIFX. This system is in development, with target deployment early 2021, so an intensive week of testing at JIFX will be extremely helpful as well as allow us to gather feedback from the JIFX community on the automated hardware approach.
We also plan to conduct imaging flights over the McMillan runway, placing out FOD for evaluating our classifier systems which will be built using data from Fort Carson. We plan to evaluate accuracy of our classifiers on the very different surface of the McMillan runway. Depending on results, we may retrain our classifiers using this data.

TECHNICAL INFORMATION

AARISS Docking Station Specs:
* Dimensions: ~40" cube (1 meter)
* Weight: Approx.. 220 lbs. (100 kg)
* Aircraft capacity: 4
* All weather operation: Built in climate control, heating, cooling and ventilation
* Built in high performance computing
* Built in UPS

GreenSight Dreamer Specs:
* Standard Payload: Triple Camera: 16MP Visual, 16MP IR, 160×120 Thermal
* Streaming Video Payload: 1080p live video with 3-axis gimbal (In Testing)
* Weight: 2.0 kg (4.4 lbs.) Typical, 3.0 kg (6.6 lbs.) Max Takeoff
* Wingspan: 810mm (32") Height: 210mm (8")

Early Engagement: Edgebox

- At 21-2, TMG Core introduced 2-phase liquid cooled high-performance computing platform delivering capabilities of large-scale data center or data center PODs.
- 21-3 demonstrated mobile form factor of system proving potential applications for national strategic resiliency.
- 22-1 Distributed experiment from Thunderstorm Contested Logistics Tech Demo.
- 22-2 Reconfigured for maritime and aviation platforms.
- Under evaluation by IQT; research partnership with NPS.

21-2

21-3

22-1

Value to Force

- Safe, secure, legal, & collaborative venue for non-traditional technology innovators to meet with DoD
- Responsive to stakeholders: 45-90 days from nomination to field observation
- Cost Effective – free to attend
- Fertile ground for harvesting technology and concept of employment directly to force

How You Can Participate

- Join our Stakeholder roster
- Attend an Event
  https://www.nps.edu/web/fx/home
- Propose or Nominate an Experiment
  https://nps.edu/web/fx/experiment-proposal
- Sponsor an Experiment Challenge
- Visit "How to Participate" page:
  https://www.nps.edu/web/fx/participate

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