JOINT INTERAGENCY FIELD EXPERIMENTATION 24-2

Event Dates: 5 – 9 February 2024

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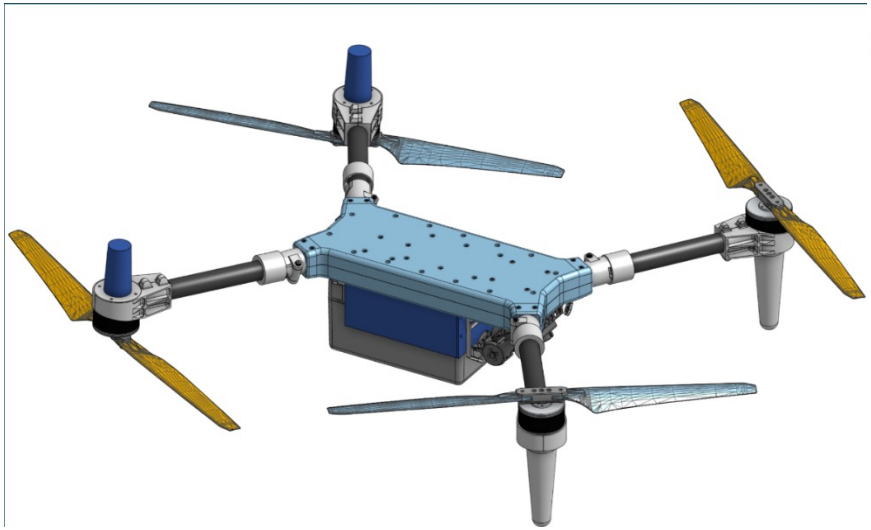
A-03: Mustang sUAS

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Zach Chase
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Federally (AFWERX)

PROPOSED EXPERIMENT OVERVIEW

We plan to do a number of tests on our UAS that are not allowed under FAA Part107 restrictions. This includes flying BVLOS, at altitudes above 400 AGL, and dropping non-explosive payloads.

SYSTEM DESCRIPTION

The Mustang sUAS is a GreenSight-developed 5kg quadcopter that is foldable and can accommodate payloads that are up to 2kg.

A-04: VESA

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Empirical Systems Aerospace, Inc.
Principal Investigator:	Braden Henderson
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

ESAero would like to demonstrate VESA's novel vertical takeoff, transition to 100+ mph flight, and vertical landing. This capability unique as the UAS is less than 7 lbs and has the capacity for a kinetic effect in the future. ESAero has not identified other UAS that have a VTOL capability and high-speed flight in VESA's form factor. VESA has the capability to survey and record data, but is not planned for this experiment.

SYSTEM DESCRIPTION

VESA is an sUAS designed for ground-to-ground strikes as well as countering other UAS. This system is a man portable UAS weighing under 7 lbs when equipped with a payload. VESA is a VTOL UAS starting in a rotor-copter position, then transitions to a fixed-wing position for full speed flight at 100+ mph. VESA also is equipped with an onboard vision system with processing for object detection and tracking to conduct autonomous missions.

A-05: GreenSight SA4 - Secure Advanced Aerial Atrittable Asset

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Mitch Jones
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Federally (DARPA)

PROPOSED EXPERIMENT OVERVIEW

GreenSight plans to test our new fixed wing UAS, ILED SA4. This is an electric long range UAV designed to operate autonomously in swarms at long range. In this experiment, we plan to obtain flight data on various modes of flight, including takeoff, climb, cruise, dash, and landing. During these flights we plan to obtain power and control logs to give us insight into the efficiency and stability of the aircraft in various conditions. JIFX presents a unique opportunity to test our aircraft at higher altitude and higher speed than what we are allowed to do under public airspace regulations. Flight data obtained during this experiment will be very valuable in understanding the limitations of the airframe.

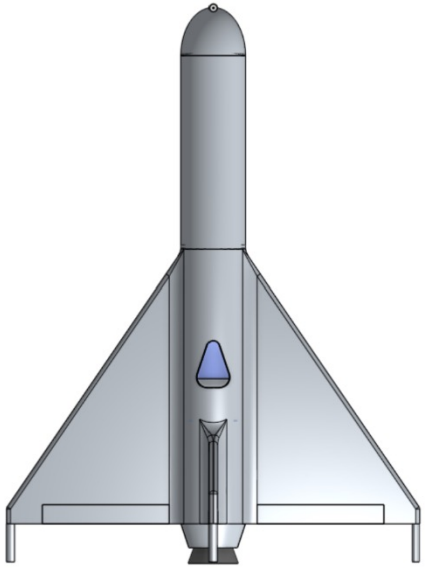
SYSTEM DESCRIPTION

ILED SA4 is a fixed wing, electric, autonomous UAS. It has a wingspan of approximately 2 meters and a flight weight of approximately 35 lbs. It is powered by a single electric motor located on the tail of the aircraft and has control surfaces on the wings and tail. The aircraft is designed to be pneumatically launched through its central tail boom. Command, control, and telemetry are done via a wireless link and the UAV is capable of autonomous flight using GPS and other sensors. The heart of the avionics is the GreenSight UltraBlue NDAA compliant flight control stack.

A-06: GreenSight Samson - High-Speed Low-Cost Swarming Munitions

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

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

PROPOSED EXPERIMENT OVERVIEW

GreenSight plans to test our new fixed wing Loitering Munition, Samson. This is a rocket powered, vertical takeoff, high speed electric UAV designed to operate autonomously with high cruise and dash speeds. In this experiment, we plan to launch the vehicle from McMillan airfield, perform experimental flight maneuvers, loiter a target, and possibly attempt to strike a target. During these tests, we plan to obtain data on launch performance, formation accuracy, and strike maneuverability and accuracy. JIFX presents a unique opportunity to test our aircraft at higher altitude and higher speed than what we are allowed to do under public airspace regulations. Flight data obtained during this experiment will be very valuable in understanding the limitations of the airframe. There will be no live warheads tested during this JIFX event.

SYSTEM DESCRIPTION

Samson is a soldier-portable, fixed wing, electric, autonomous Loitering Munition, with a rocket booster for launch. It has a wingspan of approximately 4 ft and a flight weight of approximately 20 lbs. It is powered by a single electric ducted fan located in the fuselage of the aircraft and has control surfaces on the wings. The aircraft is designed to be rocket launched vertically. Command, control, and telemetry are done via a wireless link and the UAV is capable of autonomous flight using GPS and other sensors. The heart of the avionics is the GreenSight UltraBlue NDAA compliant flight control stack.

A-07: CASSEE: Compact Aerial Inspection System

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Andrew Delollis
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Federally (Navy)

PROPOSED EXPERIMENT OVERVIEW

CASSEE is a prototype Oblique Active-Tilting bicopter with the ability to quickly inspect dark, cramped, and dirty spaces within vessels while maintaining a long flight endurance. With this technology, GreenSight aims to build a tool for more rapid and efficient ship maintenance and construction, strengthening this critical capability of the American defense. As a prototype UAV, GreenSight looks to test its flight dynamics and capabilities at JIFX. This will consist of multiple human-piloted and autonomous maneuvers to collect sensor data such as endurance metrics (power draw, flight time under load, etc) and control system response (rate PID controller steady-state response, etc).

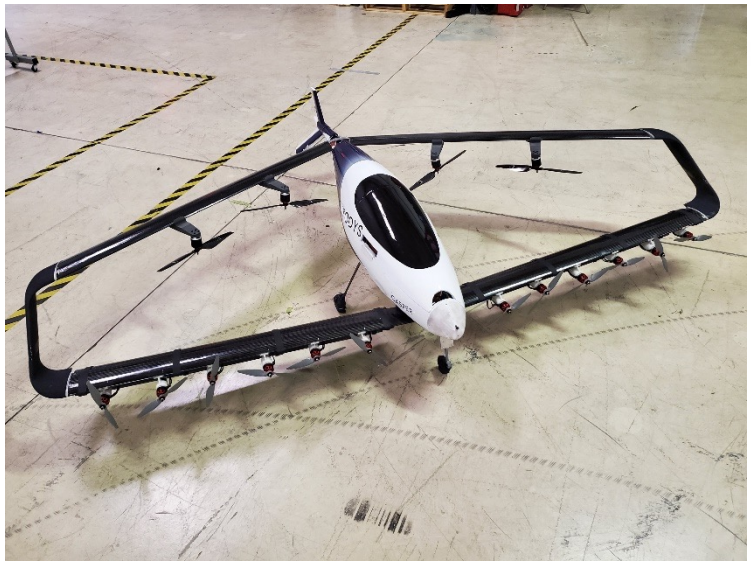
SYSTEM DESCRIPTION

CASSEE is an Oblique Active Tilting (OAT) bicopter. It differs from the conventional Forward-Aft Active Tilting (FAAT) bicopter by obliquely angling the axis of rotation of the rotor's pivoting mechanisms. This provides better pitching torque and allows CASSEE to have a higher center of mass than its FAAT counterpart. The higher center of mass means that CASSE is able to maintain a small cross-sectional area while maintaining the efficiency advantages that come from larger propellers. With a relatively small size and high endurance, CASSEE will be able to perform tough inspections for naval shipyards.

A-08: Test Flight of VTOL and Transition Demonstrators

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	Odys Aviation
Principal Investigator:	Axel Radermacher
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

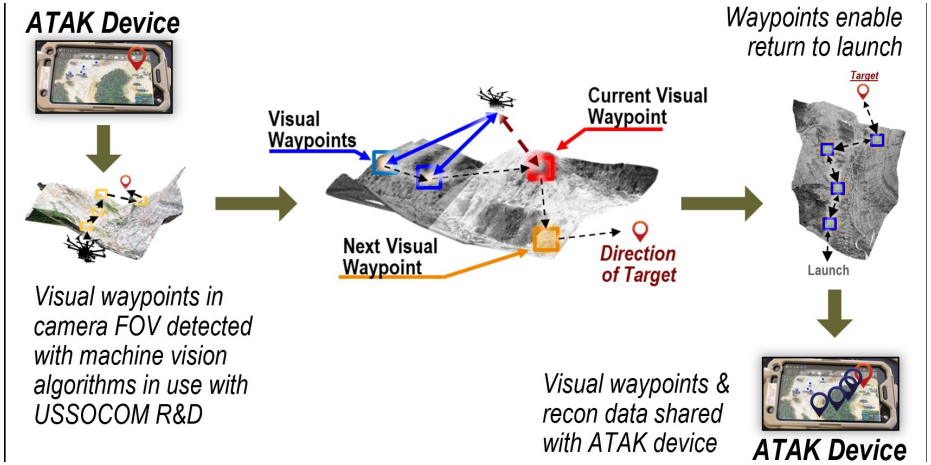
Odys will experiment with 2-3 prototypes called Caspar, Homer and Leona in order to gather more data concerning flight characteristics of the air frame. Caspar will be used to experiment with VTOL characteristics using the blown flap and box wing. Leona experiments will focus on flights in and around the airfield focused on forward flight, taking off and landings, Homer will focus on experiments with a full transition from VTOL to forward flight at subscale sizes.

SYSTEM DESCRIPTION

An electric VTOL aircraft with a box-wing architecture, utilizing deflected slipstream technology

A-09: GPS-Denied UAV Navigation

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	Rhoman Aerospace
Principal Investigator:	Thomas Youmans
Technology Readiness Level:	TRL 5: Component and/or breadboard validation in a relevant environment.
Research Area of Interest:	A) Unmanned Aerial Systems
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Fly UAV using GPS-Denied navigation system following prior data-collects at Camp Roberts. System level discussions and planning around multi-agent systems.

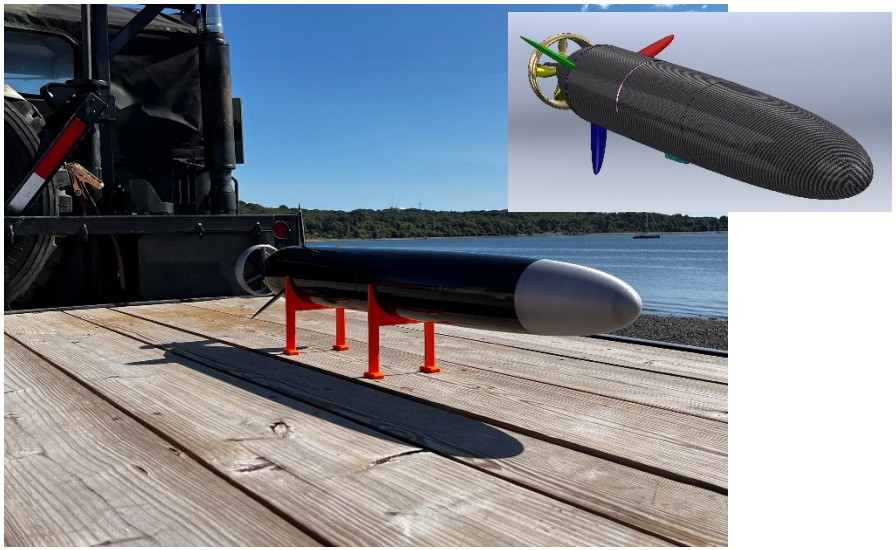
SYSTEM DESCRIPTION

Rhoman Aerospace develops vision-based UAV navigation systems that allow drones to perform their mission, stay on their flight route, and detect their target without GPS. The system tracks landmark-features during flight and does not use a pre-loaded terrain map.

B-02: S1 Attritable Modular Autonomous Underwater System

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	Vatn Systems, Inc.
Principal Investigator:	Daniel Hendrix
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

The proposed experiment will assess the ability of the S1 Autonomous Underwater System to hold position in moving water. The ability to remain in a fixed position is critical to mining, sensor and communications use cases. The experiment will consist of measuring the ability of the system to hold a position near a fixed mark (buoy) in real world conditions in a measured current. Test series one will measure the ability to hold position with GPS support at the surface. Test series two will test position hold performance without GPS at the surface. Test series three will test position hold performance at 2m subsurface (no GPS). The experiment will measure the proximity to the target over time to determine accuracy, precision, persistence and power consumption of the system. Data will be collected by aerial drone observation and onboard sensor and power data logging.

SYSTEM DESCRIPTION

The Vatn S1 Autonomous Underwater Effector is a modular, expendable, attritable and low-cost autonomous underwater system designed to provide flexible options for high volume underwater capabilities deployment. The system is designed to provide high speed, over the horizon (20nm) underwater infiltration of various payloads including sensors, kinetics and communications packages with swarming/schooling capability. Potential use cases include kinetic strikes, surveillance and reconnaissance, undersea geophysical and ocean conditions data collection, underwater sensor data harvesting and smart minefield emplacement in both ocean and riverine environments. The S1 was developed to give a range of operators, from industry users to military commanders, the ability to deploy high volume, low cost distributed capability to have a meaningful effect in the vast maritime space, reduce costs and risk, and overwhelm anti-access/area denial systems.

B-05: WeatherHive Swarming Meteorological Measurement System

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	GreenSight
Principal Investigator:	Eli Davis
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Federally (DIU/Air Force)

PROPOSED EXPERIMENT OVERVIEW

Our experiment involves the simultaneous operation of multiple sUAS. The expansive flight envelope at McMillan Airfield will allow us to test and find the limits of our system in terms of altitude and distance - we would like to test flying up to 10km out, and up to 5km AGL. We would also like to test some more complicated swarm missions. Part of the experiment will also be to collect atmospheric data as we fly and see if there are any issues. Lastly, we would like to invite others to operate the system (under our guidance) to find out how easy it is to use and operate.

SYSTEM DESCRIPTION

WeatherHive is a multirotor drone swarm solution for atmospheric sampling and wind measurement within a 10km radius, up to 5km AGL. 10 drones, each with a micro weather sensor, long range radio, and a large battery, are stored and transported inside of a container called the Hive. The Hive is a robotic system that can deploy the drones one by one and maintain long distance communication with all 10 drones simultaneously. The system is controlled wirelessly from a web browser interface.

B-06: Phalanx Shield Multi-Domain Sensor System

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Innovative Algorithm
Principal Investigator:	Jay Chesnut
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Experiment will further test aircraft speed, altitude, endurance, and communications characteristics of the sUAS under development as well as the performance of the UAS detection module as integrated into the overall Phalanx Shield system.

SYSTEM DESCRIPTION

The Phalanx Shield sensor system with integrated small UAS and other detection equipment and software

B-09: A UxS That Collects Data Where No Other UxS Can

POSTPONED

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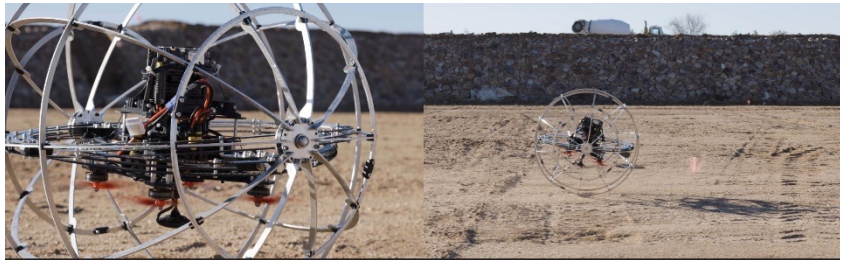


PROJECT INFORMATION

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

PROPOSED EXPERIMENT OVERVIEW

We propose two experiments:

1) Test our system's ability to operate and gather intel where no other UxS can. This requires real or simulated environments where neither a UAS nor UGS are able to navigate. For UAS, this includes indoors, in confined spaces, in collapsed buildings, underground, between dense flora, and in pipes and HVAC systems. For UGS, this includes extreme terrain (rocky, sloped, slippery), areas with obstacles (debris, ladders, ledges, water), and high-elevation areas.

2) Test our system's ability to save energy (thus extending operating time) when driving on the ground vs. when flying. A simple experiment includes operating the system until the battery runs out in a) driving mode, b) flying mode, and, optionally, c) loiter mode. Furtherance of this experiment can include testing the system in different environments with varying weather conditions, obstacles, and terrestrial surface characteristics.

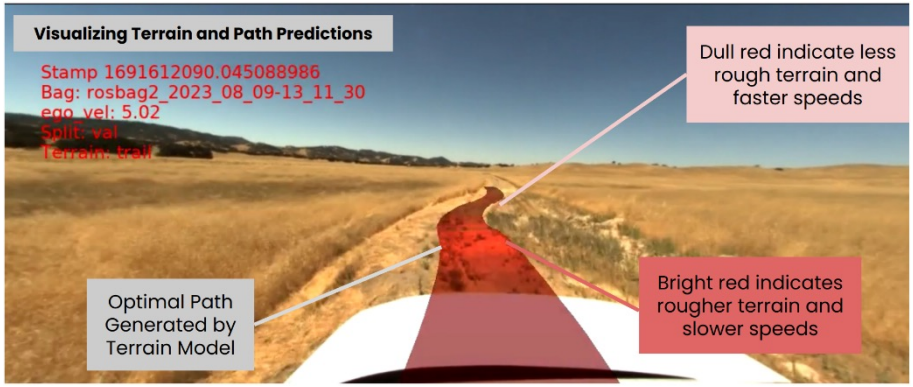
SYSTEM DESCRIPTION

Our UxS is a combination of UAS and UGS in one system. It can switch between driving on the ground and flying through the air to operate and collect intel where no other UxS can.

Our system consists of a quad-copter UAS mounted to two gyroscopic, rotating gimbal rings enclosed by a spherical exoskeleton. This enables the UAS to "roll" on the ground to save energy and operate 500-1000% longer than when flying. The added operating time increases payload capacity so it can carry a mix of swappable cameras and sensors. If the system approaches an obstacle that would prevent a UGS from continuing the mission, it can simply fly around it. The exoskeleton also enables the system to safely fly in confined spaces and complex environments without the fear of a mission-ending collision, and similar to a UAS it can fast travel and collect data at height.

B-12: Development & Assessment of Off-Road Autonomous-Driving Capabilities

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

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

PROPOSED EXPERIMENT OVERVIEW

Providing off-road driver-assist and autonomous driving can reduce risk to the warfighter and provide a force multiplier during deployment

Our first experiments will assess driver-assist technology for the warfighter:

- Evaluate terrain models trained on summer data during the winter to quantify model transferability
    - Dynamically update models with new field data as needed
- Assess first of their kind off-road navigation algorithms
    - Predict direction and speed guidance in new locations with limited knowledge of the domain
    - Provide “turn-by-turn” navigation for the battlefield

Our second experiments will pilot ground vehicle self-driving in off-road environments relevant for DOD missions:

- Using advanced terrain models we will test how well our system can predict optimal paths and speeds
    - A new path planning algorithm to follow trajectories off road will be deployed and critically evaluated

SYSTEM DESCRIPTION

- BlueSpace provides off-road autonomy solutions without traditional dependencies on AI, training data, and HD maps
- Our software leverages 4D sensors with our proprietary algorithms based on math and physics to deliver autonomy in any domain
- Industry-leading positioning accuracy (CTE<0.3%) using 4D Lidar/Inertial Odometry in any location on any terrain
- Motion-first perception provides detects and tracks objects with industry-leading motion estimation, no AI necessary
- Flexible off-road terrain understanding enables rapid learning for deployment in new areas
- Learn more at http://bit.ly/BlueSpaceDemos

B-13: Intelligent Humanoid Robot

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Aivot Robotics, Inc.
Principal Investigator:	Shashwat Srivastav
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

AIVOT's innovation lies in adapting a robotic system to any task without development effort or programming. The layperson operator can instruct the robot to perform the task using verbal instruction or visual demonstration. AIVOT will conduct the following experiment. 1. Ask the attendees to interact with the robot using natural interfaces and instruct it to perform a task. 2. Measure the percentage of the task the robot can perform satisfactorily. 3. Measure the number of iterations for the operator to provide improvement feedback before the robot performs satisfactorily. 4. Try the experiment with a few different types and complexities of the tasks.

SYSTEM DESCRIPTION

AIVOT builds fast-learning humanoid robots to perform various complex tasks in dynamic environments using the latest AI advancements. The robots can navigate autonomously with their mobile bases and perform dexterous tasks using their two arms based on visual perception of environments. The intelligent agents learn new skills by understanding spoken instructions and observing human demos. They follow operators' verbal commands and improve with experience. The software stack can be deployed on third-party hardware and unmanned systems. AIVOT's technology can be used for surveillance & reconnaissance, neutralizing explosive threats, repair & construction, contested logistics, terrain shaping, warfighting swarms, chemical & biological testing, and mundane support tasks in defense scenarios. AIVOT is deployed at a commercial customer site for beverage bottle production, and the company is working on pilot projects with select mid-sized manufacturers.

D-02: Variable Text Encryption Using Physical Tokens

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Expanse Laboratories Incorporated
Principal Investigator:	Ben DiDonato
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	D) Communication and Networking
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Because our technology is strictly for encryption, we have significant flexibility in how the experiment is performed. Our current plan is to distribute our system to 2-4 USMC units and allow them to use it as they conduct operationally representative activities. The purpose of this is to give the Marines the flexibility to experiment and see how our technology performs in as wide a variety of circumstances as possible. Performance data will be collected by survey at the conclusion of the experiment.

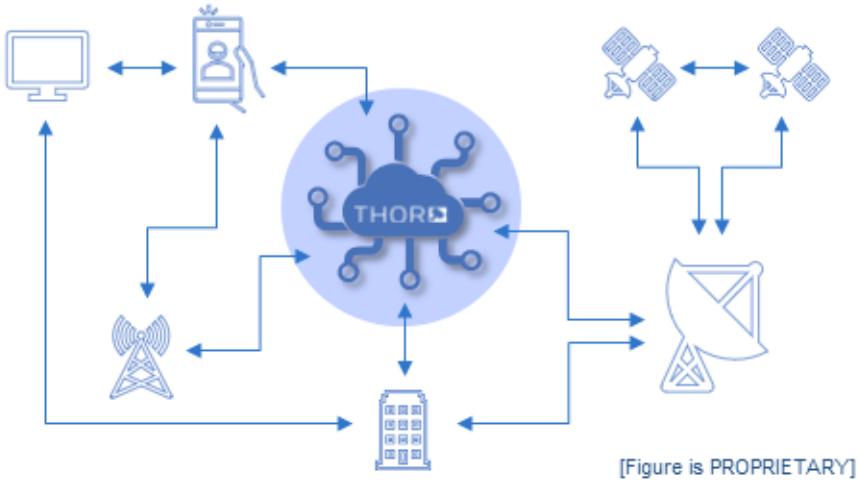
To avoid interfacing civilian hardware with potentially sensitive systems, we only plan to transmit text messages during this exercise. However, we are also open to integrating into another team's experiment since we could provide secure communications for any data in a collaborative experiment.

SYSTEM DESCRIPTION

As illustrated in the video below, our technology uses measurements of steel tokens to create a hybrid physical-digital encryption system. Tokens are a small steel bar with a series of notches cut into the side, allowing measurements to be taken between any combination of notches. This allows users to vary the digital encryption key from message to message by measuring different combinations of notches. Tokens are produced in sets with one of these tokens provided to each party needing to communicate securely, and may be discarded or destroyed as needed. It is also possible to use anything manufactured with reasonable precision as a token if needed, and multiple measurements can be added together to increase the number of possible variations. Our current communications implementation uses civilian hardware (computers or smartphones), but this technology could be easily integrated into DoD systems.
https://www.youtube.com/watch?v=LY9JwdBuGMU

E-01: THOR

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



[Figure is PROPRIETARY]

PROJECT INFORMATION

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

PROPOSED EXPERIMENT OVERVIEW

Aronetics technology, Thor, prevents data and identity abuses in a tamper-proof manner. The experimentation would include 24-1 contacts to bring data assurance to and from UAVs and the internal communications onboard as well as using 24-1 experiment contacts to bring unique communication projects to Aronetics' technology.

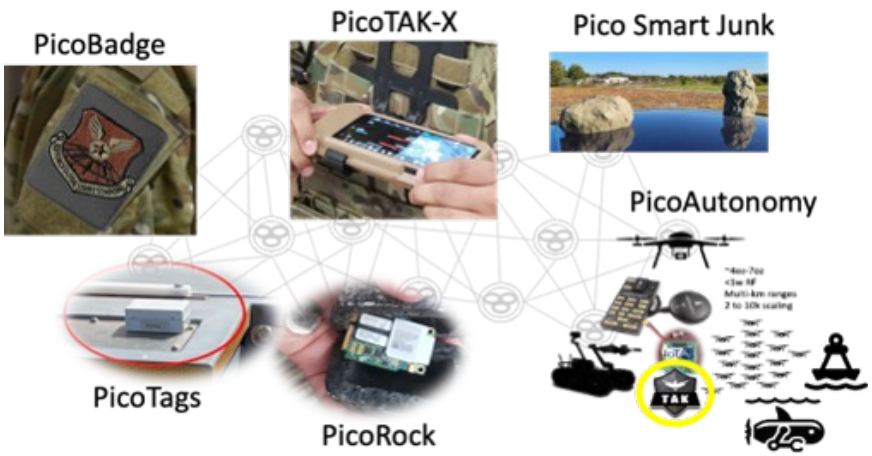
SYSTEM DESCRIPTION

At the core, Aronetics' technology provides implicit trust and operation for the data and identity utilizing the compute machine

Thor is a modular solution built using C and C++ and TCP/IP to communicate across the architecture in a meta-network analysis.

E-02: C5ISR Technologies for the Tactical Edge

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	IoT/AI
Principal Investigator:	Kevin Montgomery
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	E) Cyber, Cyber Security, and Electronic Warfare
Funding	Federally (SOCOM, Army, Navy, UASF)

PROPOSED EXPERIMENT OVERVIEW

This experiment seeks to deploy and evaluate next-generation C5ISR technologies relevant to tactical applications for contested environments in representative environments (field, urban, building, subterranean). These technologies include LPI/LPD communications for sensors and personnel, EW detection and disruption, non-GPS PNT, and other technologies. Our communications devices utilize a novel LPI/LPD radio technology with TS-level encryption/authentication, along with a highly scalable (1000s of nodes+), self-configuring/healing distributed wireless mesh network algorithm which uses AI/ML techniques to optimize aggregate performance of the network based on traffic, load, RF environment, and other parameters. The goal is to evaluate several applications of these technologies in real-world conditions for tactical applications to further develop and refine these technologies and transition these technologies to usage by military and other communities.

SYSTEM DESCRIPTION

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

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

F-01: Target Detection using Neuromorphic Vision

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

Neuromorphic Camera detects a drone flying around

PROJECT INFORMATION

Organization Name:	Grayscale AI Inc
Principal Investigator:	Dragos Stanciu
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

We intend to use a neuromorphic camera aka event-based camera for the purposes of target detection. We'd like to see how a number of detection algorithms perform in various conditions.

We want to explore two environments, depending on availability:
- aerial - detection of fast-moving objects in the air
- underwater - detection of moving objects in underwater environments

Changing conditions include:
- sunny/cloudy environments
- detection of objects with the camera "blinded" by the sun
- underwater - clear/murky water

Data collection will be done with a neuromorphic camera. We will tune parameter settings to ensure good data capture.
We will provide two lenses (narrow/wide field of view).

SYSTEM DESCRIPTION

We will collect data using an event-based vision sensors also known as neuromorphic sensors. These sensors alleviate limitations of conventional cameras such as information redundancy, power consumption and motion blur. The pixels of these cameras only trigger events when lighting changes have been detected. This results in sparse output at microsecond resolution, reduced power consumption and no motion blur when tracking high-speed objects.

F-02: Multi-Domain Expeditionary Artificial Intelligence and Behavior Analysis at-the-edge for Tactical Surveillance Application

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

MT-5-R Autonomous Surveillance System

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)
Funding	Federally (DoD)

PROPOSED EXPERIMENT OVERVIEW

Gantz-Mountain will continue experiments with SENSING TECHNOLOGIES using expeditionary Artificial Intelligence and Behavior Analysis at the edge for tactical surveillance applications. Specifically, this will include integration of software upgrades to improve robustness along with exploring logistical applications for the technology. Additionally, the MT-5-R will pass near real-time alerts and imagery of threat behaviors across Mission Command systems (TAK, COPERS, etc.).

Capability Experimentation goals:

- Techniques to increase robustness of AI-driven Behavior Analysis at the tactical-edge
- Explore Autonomy and Human Machine Teaming applications for expeditionary AI and behavior analysis with pre-collected UAS data
- Slew-to-Cue of Long-Range Intelligence Sensor Node (LRISN) from trigger
- Experiment with additional AI feature classifiers

SYSTEM DESCRIPTION

MT-5-R: The world's toughest Warriors and First Responders deserve custom built expeditionary smart surveillance technology with Artificial Intelligence and Behavior Analysis at-the-edge to guarantee success. Gantz-Mountain Intelligence Automation Systems Inc. has pioneered revolutionary turn-key smart-edge surveillance and intelligence automation systems to answer this call.

F-03: Versatile Offsite Reconnaissance Terrain Explorer (VORTEX)

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Skyline Software Systems, Inc.
Principal Investigator:	Blair Jenkins
Technology Readiness Level:	TRL 7: System prototype demonstration in an operational environment.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

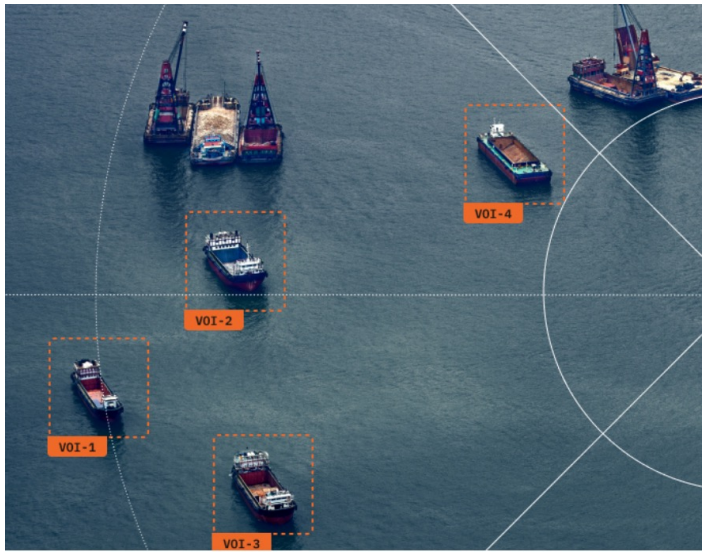
Skyline will be experimenting with the VORTEX system that is designed to produce accurate high quality 2D and 3D Geospatial models in a completely disconnected environment. We will be testing the system's ability to do this accurately under a specific time period for different types of terrain, structures and mission sets. At its core the VORTEX is designed to be a ruggedized GIS/GEOINT workstation that is capable of generation accurate intelligence in near real time in austere environments.

SYSTEM DESCRIPTION

The VORTEX is a man portable workstation built around a series of commercial off the shelf (COTS) microcomputers working in tandem with Skylines proprietary software suite.

F-04: The Frontline Perception System

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	TurbineOne, Inc.
Principal Investigator:	Ed Padinske
Technology Readiness Level:	TRL 9: Actual system proven through successful mission operations.
Research Area of Interest:	F) Intelligence, Surveillance, and Reconnaissance (ISR)
Funding	Internally (IRAD) and Federally

PROPOSED EXPERIMENT OVERVIEW

We will examine edge-deployed ML with the Frontline Perception System (FPS) enabling operators to easily build, tune, and deploy ML in comms-contested environments which will reduce operator workload significantly. These sensor feeds will include a ground camera feed, a drone video feed (pre-recorded), and an EO/IR camera sensor that will be used to detect and track multiple objects. The FPS will aggregate the disparate sensor feeds and enable users to build, tune, and deploy any ML model (ie. car detection) to any sensor and receive customizable alerts on a laptop. This experiment will demonstrate how ML can eliminate the need for manual monitoring of sensor feeds, and instead users can just take a look at relevant alerts when the system detects something. TurbineOne will measure the reduction in manual watching time for analysts compared to automatic, tunable alerting from the FPS - we expect a 90% reduction.

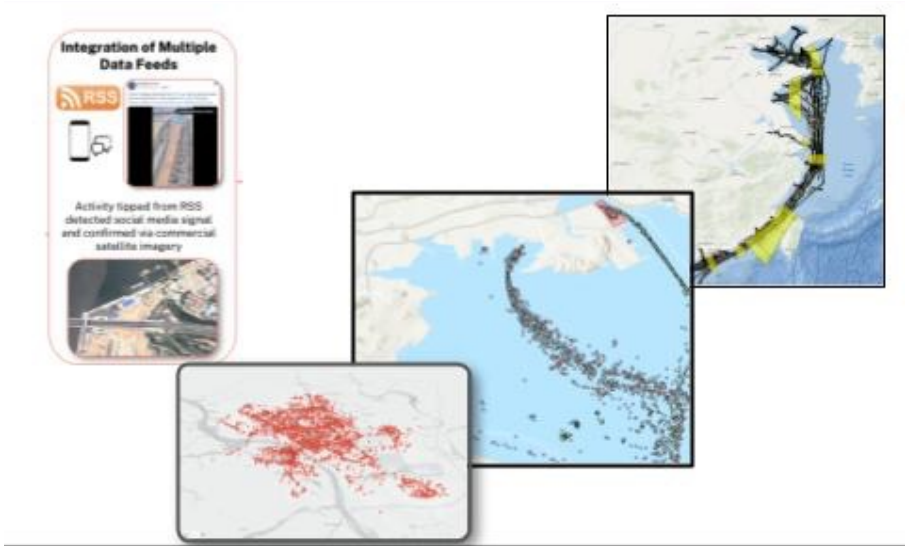
SYSTEM DESCRIPTION

The first of its kind, the Frontline Perception System (FPS) is an AI/ML software platform that monitors all sensors and cues decision-makers based on ML detections, even in a comms-contested environment. The FPS identifies, classifies, and labels threats, and subsequently alerts users in real-time with the right information at the right time to obtain decision advantage and reduce cognitive overload. Additionally, the FPS's MOSA architecture enables integration of any sensor feed and any ML algorithm, avoiding vendor lock. FPS is the only product that enables Warfighters to build, fix and deploy new, responsible AI/ML capabilities entirely within comms-contested environments and without having to code. With a few swipes and button selections, an operator is easily able to train a specific ML model to identify relevant threats in near-real time without a cloud connection. An operator with no technical training or experience can easily train and fine-tune ML algorithms with FPS.

G-01: VideoAI & Automated Imagery Collection

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	Premise Data
Principal Investigator:	John Wishart
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	G) Situational Awareness
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

Most analysts face enormous pressures, with an overwhelming amount of information flooding their screens and impatient decision makers demanding insights immediately. In a contested logistics environment, Premise will improve visibility and enhance organizational decision making with risk informed data driven assessments. During the 4 day experiment, Premise contributors will collect approximately 750 video submissions from three INDOPACOM countries. Contributors will assess foreign malign influence and security conditions. Additionally through discovery and validation, we will catalog, and deliver foreign influence detection, situational awareness, and change detection. Premise will fuse AIS, RSS social media signaling, overhead imagery using change detection algorithms, and Premise contributor photos and sentiment surveys via mobile application assessing foreign malign influence and indications and warnings.

SYSTEM DESCRIPTION

Premise turns millions of Premise contributors into a network of responsive, thinking sensors. Premise tasks a global network of contributors through a smartphone app. Contributors provide direct observations (high-resolution, geo-tagged smartphone photos), sentiment, and point-of-interest (POI) mapping in response to opportunities on the Premise app, fulfilling information requirements for Premise's customers. Premise subsequently leverages AI/ML modules and computer vision capability, to QC the data and convert contributor submissions into usable information. Our proprietary technology enables you to uncover in-depth insights and sentiments from millions of global Contributors on any topic or interest. Internet and smartphone users are moving away from traditional typing and instead gravitating toward voice messages and visuals for communication. This shift offers opportunities for better accessibility and innovative user interfaces, prompting tech companies to adjust their platforms to suit these new habits and create added value for end-users.

G-03: Holographic Situational Awareness

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2

PROJECT INFORMATION

Organization Name:	Avalon Holographics
Principal Investigator:	Wally Haas
Technology Readiness Level:	TRL 6: System/subsystem model or prototype demonstration in a relevant environment
Research Area of Interest:	G) Situational Awareness
Funding	Mix of Internal & Federal (Canadian)

PROPOSED EXPERIMENT OVERVIEW

We will provide a short overview of our technology, then demonstrate a series of holographic battlespace visualization content on both our 1st-gen and 2nd-gen prototypes. We will collect qualitative feedback from user experts on their impressions and evaluation of the benefits of the technology, and comments on their perceived cognitive and comfort impacts of using the display for 3D visualization, as compared to the 2D displays we will also show the content on. We will also ask for their opinions on how the technology compares to VR and AR solutions (we will not have these available for direct comparison). Primary areas for qualitative feedback include: - Cognitive effort - Viewer comfort, avoidance of typical 3D side-effects - Ease of use – Ease of communication with colleagues

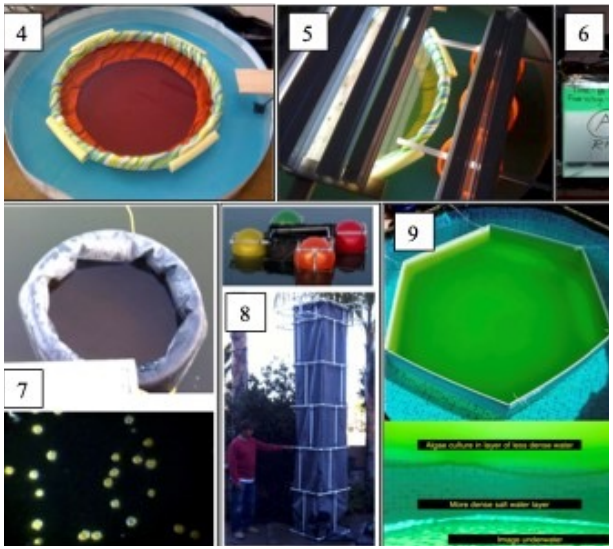
SYSTEM DESCRIPTION

Avalon Holographics makes professional holographic displays and systems that revolutionize the way people produce, view and understand visual content. By replicating the experience of looking at real objects, Avalon's holographic displays produce realistic, comfortable, and headgear-free immersive experiences that facilitate collaboration while reducing cognitive load. In defense applications, these displays are anticipated to significantly improve Situational Awareness and OODA loop performance for command staff and teams while evaluating a Common Operating Picture. A system consists of a tabletop or desktop display driven by a graphics computer, which would be fed by existing battle management software. The current experimental setup leverages a holographic viewer application that can take inputs from applications such as SIMDIS and other simulation software that utilize similar datasets and formats (such as DIS/HLA).

I-01: Demonstration of Rho Pond: Scalable, Controlled Habitat for Aquaculture, and Nutrient Remediation

POSTPONED

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX) 24-2



PROJECT INFORMATION

Organization Name:	Algae Research and Supply, Inc.
Principal Investigator:	Matthew Huber
Technology Readiness Level:	TRL 6: System//subsystem model or prototype demonstration in a relevant environment.
Research Area of Interest:	I) Health and Safety
Funding	Internally

PROPOSED EXPERIMENT OVERVIEW

For this event we propose to create algae blooms using our Rho (density) Pond System. The controlled algae bloom should treat and discharge water with lower nutrient concentrations and higher pH, while increasing oxygen content in the marine environment. The microalgae biomass presents a potentially profitable commodity for fuels, foods, cosmetics, carbon capture, and fertilizers (Mathimani et al, 2019). This proposal offers a novel approach by creating an artificial marine surface layer of water where controlled microalgae can thrive. The Rho Pond System is a controlled ecosystem for aquaculture that can be used to address environmental issues such as eutrophication, ocean acidification, and low oxygen zones. It could also be used as a method for growing edible micro and macroalgae in a marine environment. This scalable system creates an artificial, low-density, surface water layer over denser seawater (replicating a natural algae bloom). This artificial surface layer can then be used as a platform for aquaculture, as water of different densities do not readily mix.

SYSTEM DESCRIPTION

The Rho Pond (density is represented by the symbol rho “r”) operates on principles of fluid dynamics and density stratification. It contains a layer of less dense water, freshwater, which is maintained above a denser saline water body—seawater. The difference in densities, with freshwater 1001 g/L and seawater 1025 g/L due to its salt content, creates a stable stratification. The Rho Pond maintains this stratification by confining the freshwater within a containment boom, which acts as a physical barrier to the horizontal spread of water, creating a controlled environment. Nearly every natural algae bloom is born because of a similar less dense surface layer. Within our Rho Pond upper layer, microalgae can thrive, utilizing the available nutrients trapped in the layer. The containment boom / turbidity curtain we use to create the Rho Ponds is a commodity product with American manufactures with a Technology Readiness Level (TRL of 10).