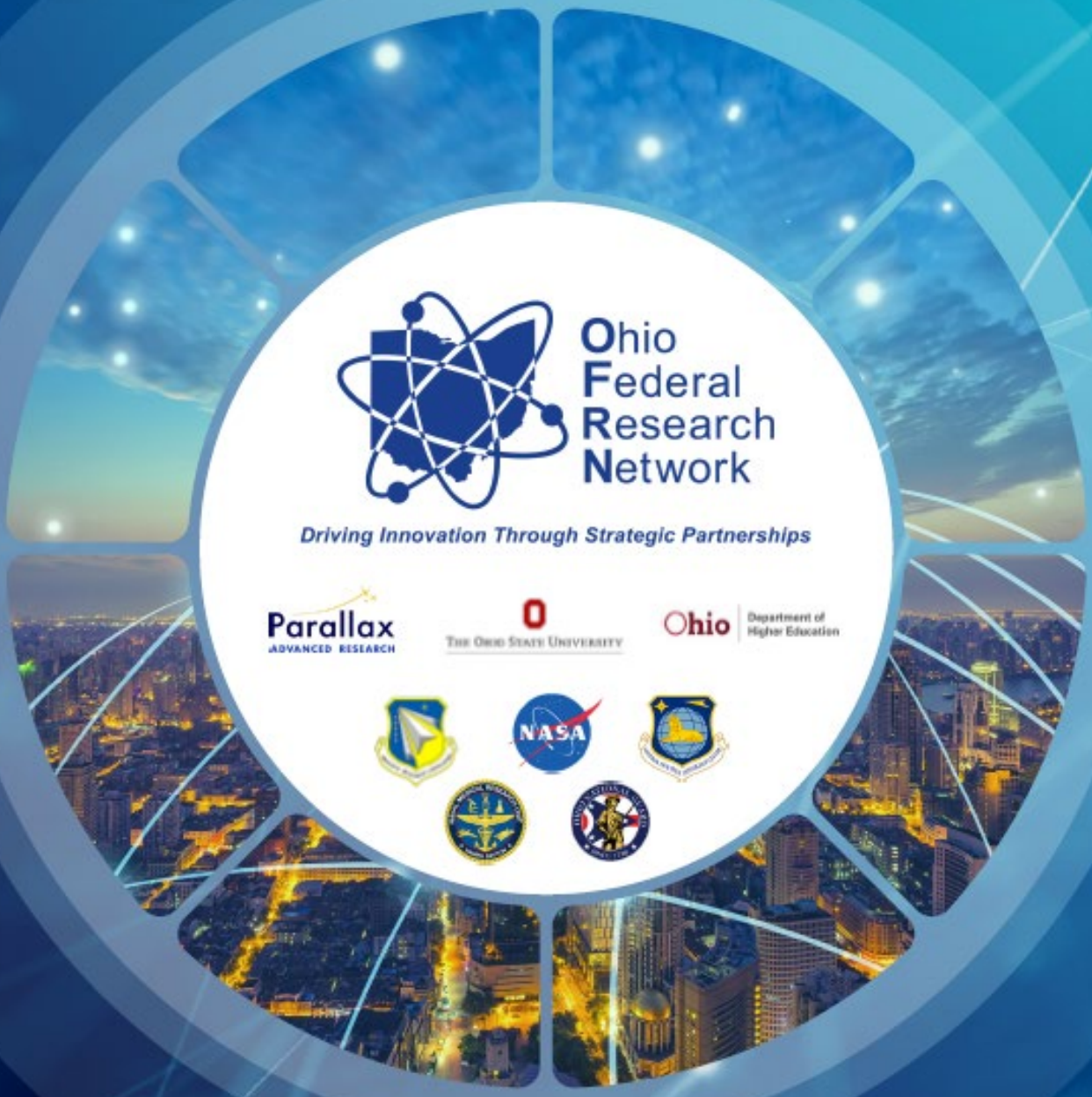
OHIO FEDERAL RESEARCH NETWORK

ANNUAL REPORT 2024



TO THE OHIO DEPARTMENT OF HIGHER EDUCATION

Executive Summary

In 2015, the Ohio Federal Military Jobs Commission (OFMJC) tasked Wright State University andThe Ohio State University to create a requirements-driven R&D initiative that would address the emerging mission requirements of Ohio's federal labs. The OFRN's mission is to stimulate Ohio'sinnovation economy, create leading edge technologies, and drive job-growth in Ohio by building vibrant, statewide university/industry research collaborations that meet the requirements of Ohio'sfederal installations. The OFRN has funded projects in research thrust areas for the federal laboratories and research centers located in Ohio. The OFRN has also engaged with the State ofOhio's Adjutant General (TAG) and the Ohio Department of Transportation (DOT) regarding their needs.

Round 1 and round 2 projects utilized university-led Centers of Excellence (COEs). The COEs included C2PNT (Communications, Cyber, Position, Navigation, and Timing), C4ISR (Command, Control, Communications, Computing, Intelligence, Surveillance, and Reconnaissance), Power andPropulsion, Energy Storage and Integration, Human, Performance and Health Sciences, and Materials and Manufacturing.

Round 3, 4, and 5 projects focused on the Sustaining Ohio's Aeronautical Readiness and Innovationin the Next Generation (SOARING) initiative with a mission to ***"Make Ohio the nexus for unmanned air systems (UASs), personal air vehicles (PAVs), and logistics delivery air vehicles (LDAVs) testing, integration, and manufacturing."*** All of which directly support Advanced Air Mobility (AAM) enabling technologies. The OFRN has enabled a jump start on positioning Ohio to be prepared for the changes underway with the USAF Agility Prime, NASA and FAA AAM program goals.

Round 6 is much more focused on the new, higher-level technologies that the State and our federal partners are currently embracing. Round 6 topics include technology in the areas of commercial space operations in Low Earth Orbit, Digital Engineering, Hypersonics, Human-Machine Teaming and Quantum Sensing.

Ohio's Federal Partners will be essential to the integration, funding, and commercialization of the types of technologies developed over the next 5-10 years. The OFRN will use the strategy and guidance developed by our Federal, State and Industry partners to make Ohio the technological andinnovation destination for the global marketplace.

A Student Experiential Engagement (SEE) requirement was added to Round 5, which required the teams to incorporate students into both the R&D development as well as the business aspects of the project. The SEE program included students who ranged from undergraduates to post-graduate researchers. In 2022/2023, 97 students participated in the seven projects funded in Round 5. Out of those students, 60 were undergraduates, 23 were in a master's program and 14 were working on their PhD. Nine universities and colleges had students that participated in the SEE program. One aspect of this requirement was to support the employment of students in Ohio industrypost-graduation, and to keep the top talent that our higher education system produces in Ohio. The OFRN program is proud to report that to date 6 of the students working in Round 5 were hired into full-time positions with the companies engaged in a project. This requirement has been continued into Round 6 and will be a permanent element of the OFRN in the future.

Fiscal Year 2024 Portfolio Results:

This year, OFRN had six (6) Round 6 projects; as well as four (4) Round 5 projects in the portfolio that were on-going throughout the state of Ohio. Of those ten (10) projects, the four Round 5 projects closed out this year. The OFRN portfolio accomplished the following during fiscal year 2024:

$15,019,894
Follow-on Funding

23
Jobs

$619,777
Cost Share

1
Spinouts

Project Closeouts

The OFRN portfolio had four projects from solicitation Round 5 that closed out (502, 528, 542,552). The results from those four projectsthus far:

$4,422,359
Follow-on Funding

17
Jobs

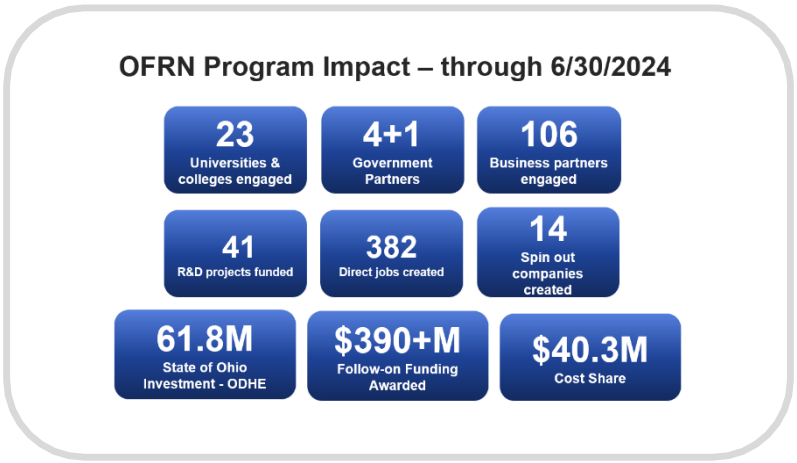
$2,325,693
Cost Share

Partnerships

The OFRN has enabled the Air Force Research Laboratory to leverage the outstanding skills and technologies that the Ohio S&T ecosystem provides through its small businesses and universities, to address mission challenges for our Air and Space forces. The expanded breadth and depth of the supply-chain and talent within Ohio will continue to maintain the OFRN as a key partner for AFRL into the future.

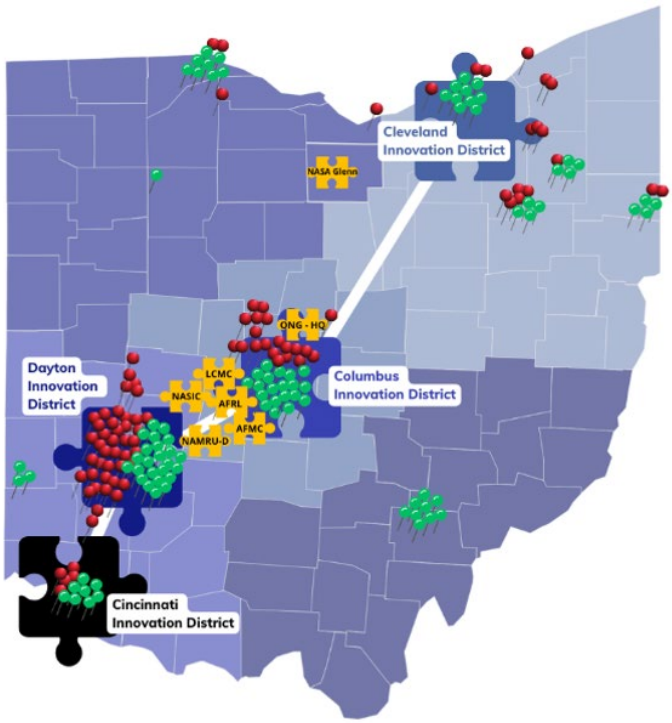
Brian McJilton, Director, Small Business Office, Air Force Research Laboratory

Overall Portfolio Results (Round 1-6)



OFRN Portfolio

In collaboration with our federal partners, The OFRN continues to focus on Applied Research in the state of Ohio. The following graphics illustrate the breadth of our impact around the state.



Government Partners

Glossary

- Air Force Material Command (AFMC)
- Air Force Research Laboratory (AFRL)
- Air Force Life Cycle Management Center (LCMC)
- NASA Glenn
- National Air and Space Intelligence Center NASIC)
- Naval Medical Research Unit-Dayton (NAMRU-D)
- Ohio National Guard (ONG)

Ohio Federal Research Network Industry Collaborations

- ABB
- Agile Ultrasonics LLC
- Akron Polymer Systems
- AlphaMicron, Inc.
- American Electric Power
- Amperand
- Arctos Technology Solutions
- Asymmetric Technologies LLC
- Autonodyne
- Battelle Memorial Institute
- BerrieHill
- Bertec Corporation
- Bosma Technology
- CAL Analytics
- CAR Technologies
- Caterpillar
- CFD Research
- Columbus Collaboratory
- Comsat Architects
- Converge Technologies
- CRG
- CSA America
- DataScience.com
- Demeter UAVs
- Design Knowledge
- Eccrine Systems
- Event38 Unmanned Systems
- Fenix Magnetics
- Flightprofiler, LLC
- Ford
- Future Motors
- Galois
- GE Additive
- GE Aviation
- GE EPISCenter
- GhostWave Inc.
- GIRD Systems Inc
- GoHypersonic
- Gooch & Housego Ohio
- Hana Microdisplay Systems
- Heureka Software
- Hewlett Packard
- Honeywell
- Hyphen Innovations
- IBM TJ Watson Research Ctr
- Illumination Works
- Infleqtion
- Innovative Scientific Solutions (ISSI)
- Ipsos
- Kairos Research LLC
- Kongsberg
- L3Harris
- Lexis Nexis
- Lockheed Martin
- Lockheed Martin Procerus
- Lucintech
- MacAir Aviation
- MacNauchtan Development
- MatchTx
- MaxPower
- Metro Health
- Nanoracks
- NEC Laboratories
- NONA Composites
- Norman Noble
- Nuance
- Orbita
- Orbital Research Inc.
- Orbital-ATK
- Organization
- PC Krause & Assoc.
- Perduco
- Persistent Surveillance Systems LLC
- PH Matter, LLC
- Powdermet
- Power Converters Future LLC
- Raytheon Technologies
- RegenFix
- RESILIENX, INC
- Riverside Research
- Rubix Technology
- Safran Power USA
- Simlat, Ltd
- Sivers
- SK Infrared, LLC
- SpineDynX
- StreamDSP
- Tenet3
- The Entrepreneurs' Center
- The Perduco Group
- TRUWEATHER SOLUTIONS, INC
- UES, Inc.
- Universal Technology Corp
- Unmanned Science
- Xerion Advanced Battery Corp.
- Youngstown Business Incubator

Ohio Federal Research Network University Collaborations

- Air Force Institute of Technology
- University of Akron
- Bowling Green State University
- Case Western Reserve University
- Kent State University
- Miami University
- Ohio University
- Otterbein University
- Sinclair Community College
- The Ohio State University
- University of Cincinnati
- University of Toledo
- University of Cincinnati
- University of Dayton
- University of Dayton Research Intitute
- University of Toledo
- Wright State University
- Youngstown State University

Innovation Districts | Central | Southwest | Northwest | Northeast | Southeast

FY24 Portfolio

Round 5 and Round 6

The OFRN Round 5 Areas of Interest

- *Unmanned Aerial Systems (UAS)*
- *Artificial Intelligence, Human Factors*
- *Data Analytics*
- *Space Commercialization*
- *Quantum Communications*
- *Advanced Power Systems*

The OFRN Round 6 Areas of Interest

- *Hypersonics*
- *Human Performance*
- *High Power Energy Conversion*
- *Digital Engineering Tools*
- *Commercial Space in Low Earth Orbit*
- *Quantum Sensing Technology*

Ohio Federal Research Network

Driving Innovation Through Strategic Partnerships

Ongoing or Completed Projects

CONTROL
R1 - Ohio State University: "Intelligent Control Architecture"
R2 - Ohio State University: "Effects of Motion Sickness on Military Health"
R2 - Wright State University: "Automated Test, Evaluation, Verification and Validation Tools"
R3 - Persistent Surveillance Systems: "Automated Cirrus SR22 for Surveillance or Personnel Transport"
R4 - Asymmetric Technologies: "IronClad Secure Flight Controller"

STRUCTURAL
R1 - University of Toledo: "Adaptive Bio-Inspired Aerospace Structures Actuated by Shape Memory Alloys"
R1 - University of Akron: "High Performance Plastic Substrates for Flexible Electronics"
R2 - University of Dayton Research Institute: "Cost Effective 3D Printed Complex Geometry Composites"
R2 - The Ohio State University: "Carbon Nanotube Electro-Thermal Ice Protection System for UAVs"
R6 - The Ohio State University: "Structural Materials Joining in Space"

PROPULSION
R1 - Case Western Reserve University: "High Temperature Magnetic Materials"
R1 - Ohio State University: "Hybrid Turbo-Electric Propulsion"
R2 - Ohio State University: "Advanced Turbine Cooling"
R3 - Ohio State University: "Brushless Doubly-fed Machine and Drive System for Aviation Application"

SENSORS & AWARENESS
R3 - GhostWave: "Optical-Radar Sensor Fusion for UAV Onboard Detect and Avoid"
R4 - Youngstown Business Incubator: "Geometrically Complex 3D Printed Sensors"
R5 - The Ohio State University: "Affordable LIDAR Technologies for Integration and Unmanned Deployment (ALTITUDE)"
R5 - Asymmetric Technologies: "Autonomous Capabilities for CASEVAC and Resupply in Urban Environments (ACCRUE)"
R6 - GhostWave: "Quantum Sensor System using Rydberg Atoms"

COMMUNICATION
R2 - Wright State University: "C2PNT Intelligent Channel Sensing"

POWER
R1 - Case Western Reserve University: "Multifunctional Structural Battery"
R1 - University of Akron: "High Density Li-ion Battery with Silicon Anodes"
R1 - University of Dayton Research Institute: "High-Energy Long-Life Li-S Battery"
R4 - Kent State University: "A Hybrid Fuel Cell – Battery/Capacitor Power Source for UASs"
R5 - Safran Power USA: "Advanced High Voltage DC Generator System for Aerospace with Rapid Dynamic Response"
R5 - Miami University: "High Reliability, Low EMI, Wide Bandgap Power Conversion for Air & Space Applications"
R6 - University of Akron: "High Bandwidth Light Weight Modular GaN Based Utility Interactive DC Generator"

AEROSPACE AWARENESS
R2 - Wright State University: "Human-Centered Big Data"
R3 - University of Cincinnati: "Regional Unmanned Traffic Management System (RUTMS)"
R4 - GhostWave: "Integrated Optical-Radar Sensor Fusion System for Air Space Awareness"
R5 - Flightprofiler: "Low Altitude Weather Network (LAWN)"

COMMAND & CONTROL
R1 - Wright State University: "Sliding-Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE)"
R2 - University of Cincinnati: "Advanced Cognitive and Physical Sweat Biosensing for Operators"
R4 - CAL Analytics: "Interoperability in the Modern UAS Traffic Management Architectures"
R4 - Riverside Research: "Computer-Human Interaction for Rapid Program Analysis through Cognitive Collaboration"
R6 - Kairos Research: "Ocular and Physio-Temporal Indicators of Cognitive State (OPTICS)"

PLANNING
R1 - Wright State University: "Regional Live-Virtual-Constructive Enterprise (RLVC)"

HYPERSONICS
R6 - CFD Research Corporation: "A Machine Learning Framework for Digital Engineering of Hypersonic Vehicles with Quantified Prediction Uncertainty (Hypersonic ML FW)"
R6 - ARCTOS Technology Solutions: "Gradient Alloy Processing in Laser Powder Bed Fusion for Hypersonic Applications"

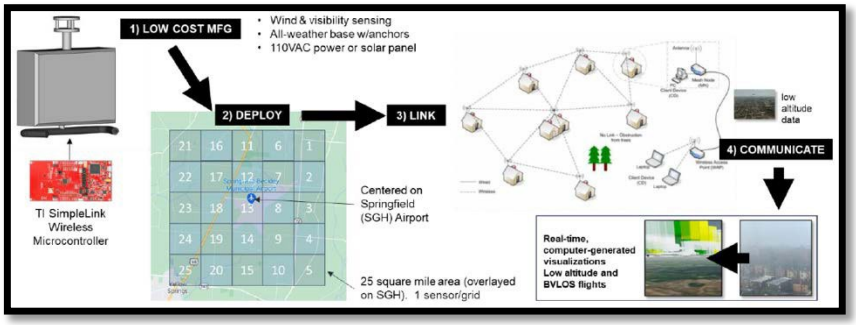
Funding Round Terms Key
R1 - The OFRN Centers of Excellence Round 1 projects
R2 - The OFRN Centers of Excellence Round 2 projects
R3 - The OFRN SOARING Initiative Round 3 projects
R4 - The OFRN SOARING Initiative Round 4 projects
R5 - The OFRN SOARING Initiative Round 5 projects
R6 - The OFRN Round 6 projects

Visit our website to learn about each initiative and project round: www.ohiofrn.org/ohio-federal-research-network-rd

Portfolio Overview

Low Altitude Weather Network (LAWN)	
OFRN Project Number: 502	**Status:** Final report and final demo to be completed
Project Start: 10/29/2021	**Projected Project End:** 12/31/2023
Current TRL: 4	**Total Jobs Created:** 8.83
Total Follow-on Funding: $182,000	**Total Cost Match:** $218,065
Lead: Flightprofiler (Cincinnati, OH)	**Federal Partner:** AFRL NASA Glenn, & NAMRU-D
Team: The Ohio State University, Ohio University	

Project Description: The project will produce, install and network twenty-five (25) weather sensors to deliver a fully operational, mid-sized, low-altitude weather service for VTOL/UAS operations at Springfield UAS Test Center, providing a steppingstone to federal contracts and DOT growth. The weather sensors are ground-based, weather sensor network to provide vertical takeoff and landing (VTOL) vehicles with the real-time, low-altitude, high-fidelity, visibility, wind,and icing data to operate in Ohio. This capability will provide low cost, low altitude aviation weather data not delivered by other sources and does not require additional aircraft hardware.



Results to Date: Over the past year, the Low Altitude Weather Network project has focused on the optimization of the camera firmware to meet the original project specifications. All hardware units have been assembled and test deployments have been completed at the Ohio University Airport (KUNI) and a temporary deployment at the Springfield-Beckley Regional Airport. During successful completion of our I-Corps program, it became apparent that there would be demand for a handheld version of the device using the same ML visibility estimation model, which was prototyped as tested. Similarly, a hardware-free version was developed as a mobile app which is currently in beta testing for approved users.

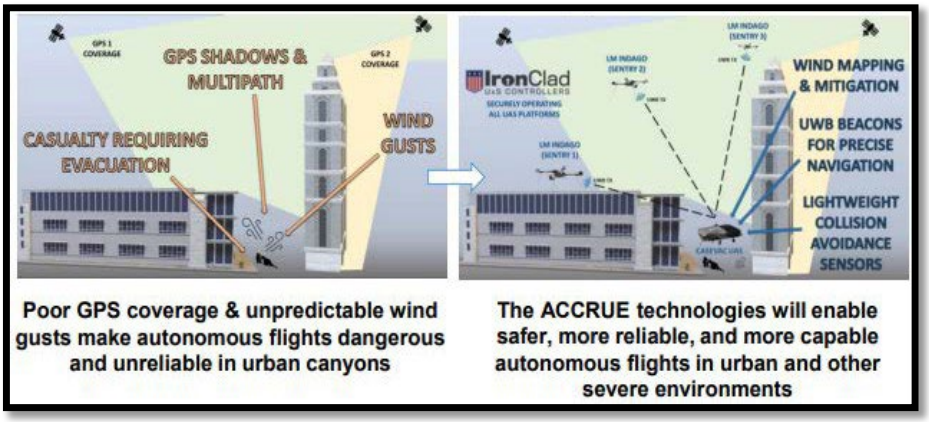
Connector

As an early career researcher, the Low Altitude Weather Network project, and the Ohio Federal Research Network, broadly, have been a great entry point into the Federal and state research ecosystem. The collaborative nature of the project, also helped me grow my network and form lasting relationships with other universities and industry.

Chad Mourning, Assistant Professor, Ohio University

Autonomous Capabilities for Casualty Evacuation and Resupply in Urban Environments (ACCRUE)	
OFRN Project Number: 528	**Status:** Completed
Project Start: 11/1/2021	**Project End:** 12/31/2023
Current TRL: 4	**Total Jobs Created:** 6
Total Follow-on Funding: $3,802,000	**Total Cost Match:** $1,097,702
Lead: Asymmetric Technologies (Dublin, OH)	**Federal Partner:** AFRL
Team: The Ohio State University, Ohio University	

Project Description: ACCRUE will enable future autonomous urban resupplyand Casualty Evacuation (CASEVAC) and Medical Evacuation (MEDEVAC) missions. It will do this by developing and building on several technologies to enable more capable, reliable, and safe autonomous flights in congested urban areas and other severe geographical environments, all hosted on Asymmetric's IronClad secure flight controller asthe central, secure hub hosting.



The U.S. government is specificallyinterested in this project because most current DoD-used autopilots are proprietary, outdated, and/or lack at least one (or several) criticalattributes of cybersecurity, open- source based flight control (FC) software, and/or deeply integrated edge computing. This same thing istrue for GPS-denied navigation tools and collision avoidance sensors, or sensors too large to allow additional payloads. Finally, no existing technologies map and mitigate wind gusts.

Results: While the full scope of the ACCRUE project was not realized, each team member met several milestones which, with further development, would prove to be a meaningful contribution for autonomous vehicles operating in urban or otherwise congested areas for military or commercial purposes. The most significant milestones met for each team are as follows: The Ohio State University successfully developed an experimental framework for assessing multirotor performance in the presence of sudden gust and wake encounters during forward flight. The method helped to identify a need for more research into the behavior of rotor thrust in the presence of sudden wind gust or wake. Ohio University successfully developed a working LiDAR + Camera positioning system for unmanned aircraft capable of position estimates comparable to GPS accuracy and update rate. Asymmetric Technologies successfully integrated a commercial Ultra-

Partnerships

This is where OFRN plays a crucial role. They are willing to support our ambitious ideas, offering funding and valuable networking opportunities to connect with the right partners. It has been highly effective for us, expanding our presence in the commercial marketplace that might have otherwise been challenging to access.

Rob Hettler, President, Asymmetric Technologies

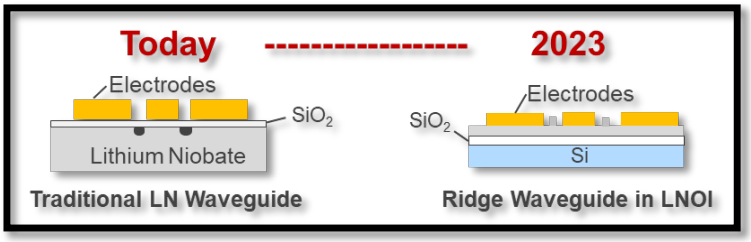
Wide Band ranging sensor with PX4 and Ironclad to enable a non-gps-based sensor positioning system for urban environments with accuracy comparable to GPS.

The impact on Ohio as result of this awarded project includes significant follow-on federal R&D contracting opportunities, specifically with several new IronClad opportunities utilizing algorithms and capabilities developing during this effort. Additionally, several engineering jobs in UAS and payload integration, advanced embedded electronics manufacturing and testing positions. For instance, this project supported five interns resulting in three full time hires at Asymmetric including Jeremy Browne and Joel Harrison from Ohio University, and Caleb Hawley from The Ohio State University.

The most important outcome of this project is the continued growth of commercialization opportunities for IronClad to both Government and commercial users. This includes several new federally funded efforts to use IronClad as a replacement for legacy UAS platforms, where the capabilities developed under this effort will be offered for specific mission sets. As evidence of this continued growth, Asymmetric was recently acquired by Chesapeake Technology International with IronClad being a key product that drove interest for the acquisition.

Asymmetric has ~$500k in IronClad product sales lined up for the next 6 months.

Thin-film Crystals for High-speed Optical Modulation	
OFRN Project Number: 542	**Status:** Completed
Project Start: 10/29/2021	**Project End:** 12/31/2023
Current TRL: 2	**Total Jobs Created:** 1
Total Follow-on Funding: $55,159	**Total Cost Match:** $323,585
Lead: The Ohio State University	**Federal Partner:** AFRL
Team: University of Dayton, and Gooch & Housego (G&H) Ohio	



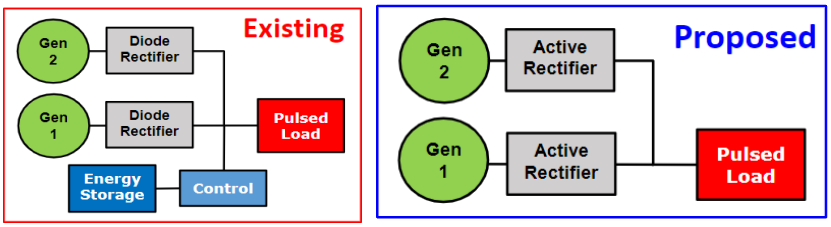
Project Description: In support of onshoringa capability from China to the US, the team isdeveloping thin-film lithium niobate (LN) on insulator (LNOI) technology for 100 GHz optical modulation to impact future telecom and DoD applications. A successful project outcome will be for G&H to become the U.S. supplier of LNOI wafers and a producer of commercial grade 100 GHz modulators. This upgrade to commercial modulation technology will impact the telecommunications infrastructure and be an enablerfor 5G/6G data capacity. This modulator will also serve the needs of our military. These outcomes translate to high-tech Ohio jobs as well as students educated in microwave photonics and optical materials.

Results: During this effort, the essential components of the optical modulator were created and characterized by the OSU team. Iterations of the LNOI material stack were created to establish processes for successful fabrication capability. Metallic RF electrodes were formed on the LNOI stack to energize the device. Optical waveguides were also formed on the LNOI stack. UD advanced techniques to couple light into the submicron-size optical waveguides by forming optical gratings using photolithography. UD also investigated and identified alternate electrooptic crystals for optical modulation.

This OFRN-funding facilitated valuable technical interactions between universities, industry, and the federal government to advance this important technology. The projects impact on

Ohio is establishing a leadership role in advancing thin film electrooptic crystal technology with research and development leading to future commercialization. Industry-partner G&H Ohio is an international supplier of LN wafers and is interested in commercializing LNOI. OSU is actively seeking follow-on funding to increase the technology readiness (TRL) of its LNOI fabrication processes to enable large-scale manufacturing capabilities. Additionally, the Department of Defense (DOD) is interested in LNOI and thin-film technology. OSU is looking to the DOD for funding to support development efforts. UD has received follow-on funding for their work developing optical gratings.

High Reliability, Low EMI, Wide Bandgap Power Conversion for Air & Space Applications	
OFRN Project Number: 552	**Status:** Completed
Project Start: 11/1/2021	**Project End:** 12/31/2023
Current TRL: 3	**Total Jobs Created:** 2
Total Follow-on Funding: $383,200	**Total Cost Match:** $686,341
Lead: Miami University	**Federal Partner:** AFRL
Team: The Ohio State University, GE Aviation Systems, PC Krause & Associates, Max Power Solutions, Power Converters Future	



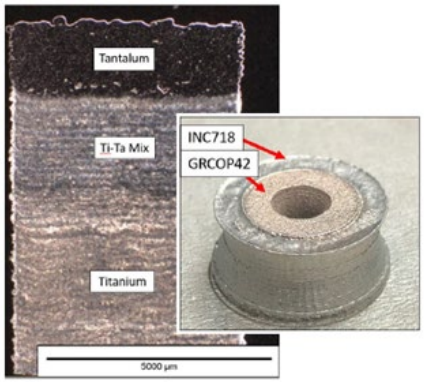
Project Description: This program continues the development of soft switching power conversion technology using wide band gap power semiconductors. Soft switching reduces component and system-level electromagnetic interference (EMI) issues regardless of the application. The soft switching control approach enables parallel operation of disparate power generation sources. It offers high reliability, rock-solid system stability when powering unruly loads including constant power and pulsed loads. This project will demonstratesoft switching in a 100-kW active rectifier powering a pulsed, constant power weapons-grade load.

Results: There are several economic outcomes from this project. We created a power conversion topology with applications in aviation and aerospace, data centers, and electric vehicles. The funding seeded two spinoff companies in Central Ohio: PCF and MP. It increased MU's ability to test power conversion equipment and enabled the research to continue after the grant, which will make us more competitive for future grants. It enables MU to offer a higher quality of education to its students. Also, an MU student received a Defense Associated Graduate Student Innovators (DAGSI) Fellowship to continue part of the work on this project. Furthermore, the United States Department of Commerce awarded MU $295k to develop a soft-switching-based converter for an off-grid solar-powered energy storage system. We are submitting a provisional patent based on this technology.

The team created and produced a 35-kW isolated dc-dc converter and tested the unit up to 19 kW. The team also evaluated SiC power modules, created a resonant gate drive for them, and produced customized, high-current magnetics. Because of the laboratory upgrades, we can validate the performance of the 35-kW isolated dc-dc converter without additional support. With the help of a Phase-I STTR grant, we can show the low-power operation of the three-phase system at low power.

Hypersonics: Gradient Alloy Processing in Laser Powder Bed Fusion for Hypersonic Applications	
OFRN Project Number: 625	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 5	**Total Jobs Created:** 0
Total Follow-on Funding: $1,000,000	**Total Cost Match:** $52,353.10
Lead: ARCTOS Technology Solutions	**Federal Partner:** NASA GRC
Team: Ohio University, University of Toledo, GoHypersonic Inc., Hyphen Innovations	

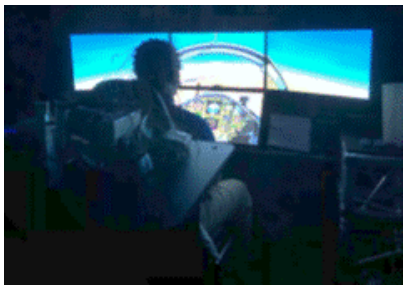
Project Description: This project will create gradient alloy parts with advanced laser powder bed fusion for hypersonic vehicles. The effort will develop and validate specific processes for multi-material deposition, focused on real-world applications. The focus and objective of the effort will be to build parts for hypersonic devices with a thin shielding layer of refractory metal. This project is designed to advance the state of the art in multi-material deposition for hypersonic applications and simultaneously drive expertise in multi-material solutions at Ohio universities.



Results to Date: The project's prototype design is 95% complete; drawings are 90% complete; RFQ is 20% complete; BOM orders are 2% complete. In two months, the laser powder bed fusion (LPBF) printers at Ohio University and the University of Toledo will have multi-material capabilities. The material analysis for WNiFe is looking strong and the final parameters are close to being discovered. The SEE is engaging students and teaching them about LPBF and Hypersonic applications.

Human Performance: Ocular and Physio-Temporal Indicators for Cognitive State (OPTICS)	
OFRN Project Number: 624	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 5	**Total Jobs Created:** 2
Total Follow-on Funding: $1,276,397	**Total Cost Match:** $299,527
Lead: Kairos Research LLC	**Federal Partner:** AFRL, NAMRU-D
Team: Sinclair Community College, Wright State University, The Entrepreneurs' Center	

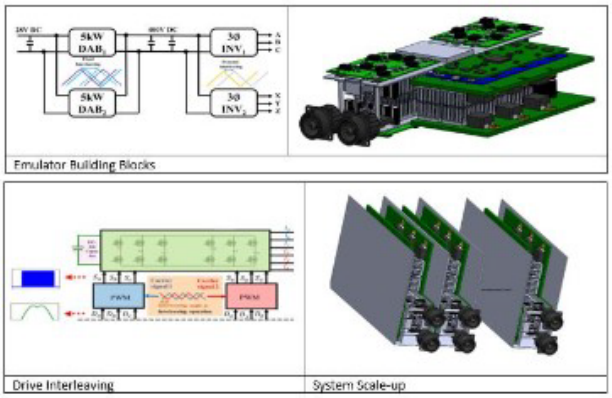
Project Description: This project seeks to: (1) develop and demonstrate *real-time algorithms* that analyze eye movements and other physiological indicators to identify and predict *cognitive states* related to impending loss of consciousness and/or incapacitation (such as fatigue, drowsiness, and loss of vigilance); (2) develop a *real-time dashboard visualization tool* that allows for monitoring of ocular/physiological data and associated cognitive states and that provides *alerts* when an operator has entered a sub-optimal cognitive state (e.g., fatigue state).



Results to Date: We continue to make progress in building and validating a reliable model for real-time estimation of cognitive states. Leveraging data from AFRL partners, we continue to

identify and model useful features and predictors of fatigue-induced performance decrements systematic relationships between physiological metrics and performance outcomes.

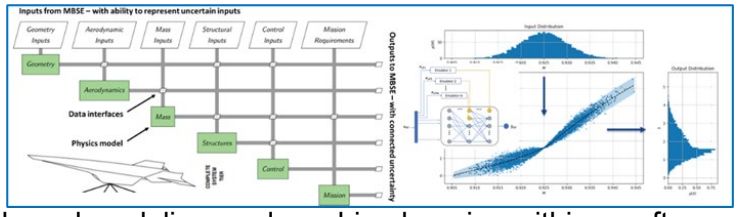
High Power Energy Conversion: High Bandwidth Light Weight Modular GaN Based Utility Interactive DC Emulator	
OFRN Project Number: 619	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 4	**Total Jobs Created:** 0
Total Follow-on Funding: $125,006	**Total Cost Match:** $15,471
Lead: University of Akron	**Federal Partner:** AFRL, NASA GRC
Team: Case Western Reserve University, PC Krause & Associates	



Project Description: This project proposes to develop a lightweight, compact, high-bandwidth DC emulator for Digital Engineering Systems. A Direct Current Emulator (DCE) that can operate as a programmable DC power supply (source) and a DC load (sink) is of particular interest to many electrical system Hardware-In-the-Loop (HIL) applications, such as avionics, automotive, and space power. To meet the requirements of a DCE for these HIL applications, we are proposing the development of a modular and scalable high bandwidth bidirectional DCE that uses a novel parallel interleaved GaN-based DC/DC Dual Active Bridge (DAB) converter topology as the basic building block of the DCE.

Results to Date: Modeling Simulation work proves the feasibility of the proposed system. The Hardware design is underway. Spinout organization Star Phase Technologies will be utilized to commercialize the modified emulator that will be produced through this project.

Digital Engineering Tools: A Machine Learning Framework for Digital Engineering of Hypersonic Vehicles with Quantified Prediction Uncertainty (Hypersonic ML FW)	
OFRN Project Number: 628	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 5	**Total Jobs Created:** 4
Total Follow-on Funding: $2,200,000	**Total Cost Match:** $14,262
Lead: CFD Research	**Federal Partner:** AFRL
Team: Air Force Institute of Technology (AFIT), Wright State University, Dr. Bill Oberkampf	



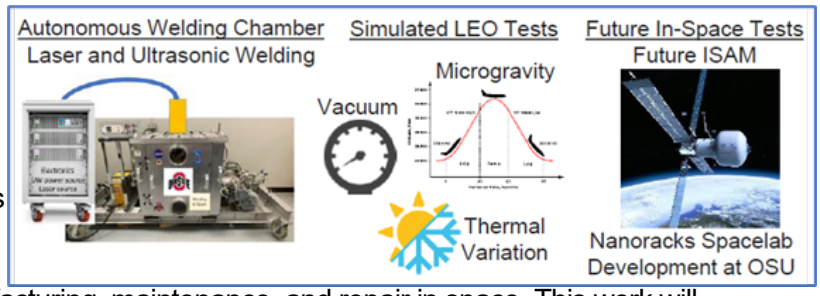
Project Description: This project will implement a machine learning framework for digital engineering of hypersonic vehicles with quantified prediction uncertainty. The framework will integrate model-based system engineering (MBSE) concepts; physics-based modeling; and machine learning within a software framework for advanced hypersonic vehicles. In combination, these capabilities will enable

digital representation of hypersonic systems with quantified uncertainty metrics that can be provided to decision makers.

Results to Date: The project is progressing: the initial model structure was drafted; aero and aerothermal data generation workflows were established; and E2NN model was built for aerodynamic data. The project has created a prototype for each of the following: ML Hypersonic Framework; Surrogate models for SRQs; and MBSE Integration Models.

The project has already provided considerable opportunities: Two outstanding new team members have joined CFD's Dayton office; New relationships with two Ohio-based Universities (WSU & AFIT); AFRL/RQ collaborators have been providing great feedback and are making us aware of specific challenges the final project can address; Existing collaborators within Navy SSP and AFRL/RW have expressed interest in the capability being developed; and the effort has allowed CFD to opportunistically pursue its digital engineering technology with the opportunity to be first to market with a tool of this kind.

Commercial Space in Low Earth Orbit: Structural Materials Joining in Space	
OFRN Project Number: 609	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 3	**Total Jobs Created:** 11
Total Follow-on Funding: $612,999	**Total Cost Match:** $9,257
Lead: The Ohio State University	**Federal Partner:** AFRL, NASA GRC
Team: University of Dayton, Central State University, Agile Ultrasonics LCC, Lincoln Electric, IPG Photonics, Nanoracks, EWI	



Project Description: The project focuses on the understanding and quantification of the challenges associated with materials joining in space conditions. This work includes developing and using an autonomous welding system that reproduces the vacuum, temperature, and gravity conditions encountered during manufacturing, maintenance, and repair in space. This work will advance the technology readiness level (TRL) of laser beam welding (LBW) of metals and ultrasonic welding (UW) of thermoplastics and advanced composites under space conditions from a TRL 3 to TRL 5. An autonomous welding system will be implemented using a vacuum chamber currently under development by a multidisciplinary undergraduate Capstone team at The Ohio State University (OSU), which is co-sponsored by NASA and OSU. This unique facility will consist of a vacuum chamber integrated with heating/cooling systems, motion devices, controls, and a sensor array, which will enable LBW and UW operations. This system is designed for materials joining under space conditions, including LEO, Moon, and Mars gravity (via parabolic flights), extreme temperatures, and vacuum. As data collection is a critical component of the proposed work, a sensor array is integrated with the chamber to maximize the data gathered during welding. This data will be used for future modeling efforts that will reduce experimental costs and accelerate and de-risk technology development.

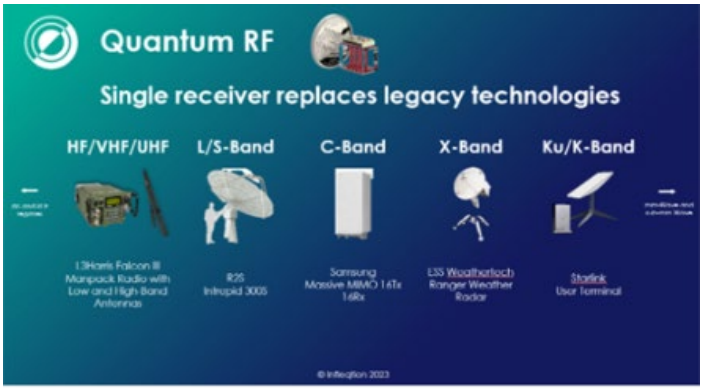
Results to Date:

- On track to have the automated welding chamber ready to fly an additional parabolic flight in August 2024.
- Hiring and training has been completed at all sites.
- Agile has product sales of $100,000.
- More SEE students are engaged than was originally planned.
- Follow-on funding has been awarded and in-kind support negotiated.

- Further funding is being targeted through a spinout that is being incorporated.
- In discussion with Voyager, Nanoracks, Starlab, and Zin to manufacture system for ISS experiments.
- Built a network of NASA and AFRL collaborators and continue to expand this network.
- Met new potential industrial partners on a monthly basis.
- Invited to speak at the Ohio Space Forum which generated connections.

Quantum Sensing Technology: Quantum Sensor System using Rydberg Atoms	
OFRN Project Number: 602	**Status:** On-going
Project Start: 10/29/2023	**Projected Project End:** 4/30/2025
Current TRL: 3-4	**Total Jobs Created:** 0
Total Follow-on Funding: $110,000	**Total Cost Match:** $43,415
Lead: GhostWave	**Federal Partner:** AFRL
Team: The Ohio State University, University of Dayton Research Institute, Converge Technologies, Infleqtion	

Project Description: The objective of this project is to demonstrate the potential enhancements of GhostWave sensors by leveraging Rydberg atoms, operating at a lower noise floor, and delivering higher fidelity with innovative quantum hardware and software. Team GhostWave will demonstrate a quantum sensing system, based on the integration of Rydberg atom quantum RF electric field sensors with telecommunications band wavelength converters and RF noise radar systems. The team will quantitatively characterize system levels of quantum advantage from the integration of state-of-the-art quantum technology with state-of-the-art-classical technology. The team anticipates that the improved sensitivity of the quantum sensor will reduce system noise, thereby providing system level enhancement in dynamic range and fidelity. Wavelength conversion to the telecommunications band provides stand-off distance capability. The results have the potential to significantly impact application spaces of interest to the DoD.



Results to Date: Rydberg RF sensing testbed fully constructed and operational. The project team completed their interface control study and started the Critical Design Review. The project has strong Federal collaborator involvement, and the team is coming together well with detailed discussions on a regular basis.

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Innovator

The Ohio Federal Research Network serves as an incubator for enabling technology concepts and encourages the formation of multi-disciplinary teams to solve military-aerospace challenge problems.

Charles Cerny, Ph.D., Principal Electronics Engineer, Air Force Research Laboratory

Portfolio Results

Portfolio Engagement
The OFRN continued a monthly cadence with the current portfolio. The OFRN Program Manager meets with each Program to learn about their progress, guide them on resource and opportunities to accelerate their progress towards the goal of commercialization. The Program Manager also visited with the leaders of the organizations for the on-going projects over this fiscal year to review the organization's capability and increase engagement.

Relationships
The OFRN continued a yearly cadence for the Portfolio to give exposure and share the teams' progress with our Federal Partners. This was accomplished through quarterly Executive Reviews with the Federal Partners and conducting deep dives twice a year that also included the Subject Matter Experts within the various federal agencies.

Increased SBIR/STTR Connectivity
In addition to the over $4.5M in SBIR/STTR awards for OFRN-funded teams, the OFRN team worked to connect non-selected teams to SBIR/STTR opportunities that aligned with their OFRN proposal. We supported this through presentations during our newly established quarterly OFRN Opportunity Days where we emphasized the number of SBIR/STTR opportunities across the U.S. government and provided a training session on SBIR/STTR. During this training we also highlighted the extensive SBIR/STTR training available on Parallax's free virtual training portal, if participants wanted further information. Finally, matchmaking services were provided between multiple universities and small businesses to develop teams to submit for SBIR/STTR opportunities throughout this reporting period.

Increased BAA Awareness Connectivity, Teaming and Proposal Support
The OFRN provided training on Broad Area Announcements (BAAs) during our quarterly OFRN Opportunity Days to increase awareness and understanding of the BAA opportunities available across the U.S. government. A specific outcome we were looking to achieve was to build a team under the "OFRN" banner and submit a proposal where OFRN would be the Prime contractor facilitating expeditious proposal submission in support of our network partners.

Opportunity Days
To accomplish our goals to increase SBIR/STTR Connectivity and BAA Awareness Connectivity, the OFRN conducted four Opportunity Days, which are quarterly events that further connect and enlarge our network of government, academic, and industry partners, based on posted opportunities and customer discussions. These events featured Federal Partner Thought Leader presentations, networking, program status updates from OFRN leadership, and Q&A sessions.

During this fiscal year, OFRN's virtual Opportunity Days had over 262 attendees from industry, government, and academia. Thought leaders from AFRL, Ohio Aerospace Institute, NAMRU-D, Parallax Advanced Research, NASA GRC, and the Cleveland Clinic presented on topics such as Digital Engineering, Human-Machine Teaming, Commercial Space in Low Earth Orbit, and Quantum.

Expanding New Horizons with NASA Glenn Research Center and OFRN
To accomplish our goal to increase Connectivity, on December 5, 2023, key stakeholders in aerospace and defense joined to expand collaborative research and innovation between NASA GRC and OFRN. The aim of the event was to broaden and deepen mutual awareness and collaboration opportunities between NASA GRC and the Industrial and Academic communities in Ohio as enabled by the OFRN program.

The event took place at the Ohio Aerospace Institute (OAI), next door to the NASA GRC facilities. The event included an OFRN overview presentation by Mark Bartman, Maj Gen (Ret.), USAF, VP for Advanced Development, Parallax Advanced Research; followed by NASA Glenn Research and Technology Overview by Deputy Director of Research and Division Chiefs, including Ajay Misra (Overview of NASA Glenn R&D efforts), Dawn Emerson (Communications and Intelligent Systems), Tim Ruffner (Power Systems), Joyce Dever (Materials and Structures), and Dr. George Schmidt (Propulsion Overview). The overviews were then followed by OFRN Rounds 4, 5, and 6 project presentations with Q&A. In the afternoon, participants were shuttled to the NASA GRC facilities where they toured the Advanced Communications Facility, Zero-Gravity Facility, among others.

Outreach – Event Participation
2024 Ohio Space Forum (April 29-30, 2024) is an event that brings together federal, military, industry, and academic leaders in the dynamic fields of space research, operations, intelligence, exploration and defense to address Ohio's space history, and how the state continues to lead. Ohio's Excellence in Space Research Panel – a session that highlighted the various research areas from Ohio's Research Universities and how they are contributing to commercial, civil and defense of space. The panel highlighted OFRN and the Ohio Space Grant Consortium. Maj Gen (Ret) Mark Bartman moderated the panel consisting of OFRN universities: Dr. Kelly Cohen, Professor, Brian H. Rowe Endowed Chair, Aerospace Engineering, University of Cincinnati; Dr. Boyd Panton, The Lincoln Electric Endowed Professor, Assistant Professor, Welding Engineering, The Ohio State University; Dr. Chris Zorman, F. Alex Nason Professor I, Dept. of Electrical, Computer, and Systems Engineering, Associate Dean, Research, Case Western Reserve University; Dr. Brian Davis, Associate Dean, Washkewics College of Engineering, Cleveland State University; and Dr. Marla Perez-Davis, Director, Kent State University Center for Advanced Air Mobility.

The Association for Uncrewed Vehicle Systems International (AUVSI) Xponential 2024 (April 22-25, 2024) is a yearly gathering of global leaders and end users in the uncrewed systems and robotics industry. Founded on the belief that cross-pollination drives innovation, it features opportunities to connect and problem-solve with experts across markets and domains. OFRN was represented at this event in the Ohio delegation led by JobsOhio and the Dayton Development Coalition.

In addition to formal panels and exhibits, OFRN was also represented by Maj Gen (Ret) Mark Bartman throughout the fiscal year at the following events:

- Life Cycle Industry Days (LCID/WDI) (July 29-31, 2023)
- NDIA Emerging Technologies for Defense Conference & Exhibition (August 28-30, 2023)
- Air & Space Forces Assoc. 2023 Air, Space & Cyber Conference (AFA) (September 11-13, 2023)
- 2023 National Advanced Air Mobility Industry Forum (September 18-19, 2023)
- Ohio Defense & Aerospace Forum 2023 (October 30 – 31, 2023)
- Hilliard Manufacturing Showcase (November 16, 2023)
- 2023 CyberOhio Summit (December 6, 2023)
- OhioX State of Tech (February 7, 2024)
- Ohio Air Mobility Symposium (March 4-5, 2024)
- 2024 AUSA Global Force Symposium and Exposition (March 26-28, 2024)
- OhioX's Tech @ Night (April 3, 2024)
- DLA Supply Chain Alliance Conference & Exhibition (April 23-24, 2024)
- 2024 Ohio Space Forum (April 29-30, 2024)
- Hypersonics Innovation Conference (May 7-9, 2024)
- 2024 Ohio CEO Summit | Supply Chain: The DNA of Resilient Networks (May 14, 2024)
- OhioX Tech Summit (May 16, 2024)
- Ohio Innovation Summit (June 18, 2024)
- DDC CORONA Community Reception (June 24, 2024)

Workforce Development

The Student Experiential Engagement Experience (SEE) was first introduced with the Round 5 projects and was continued in the Round 6 projects. This workforce development tool required the teams to incorporate students into both the R&D development as well as the business aspects of the project. The Student Experiential Engagement (SEE) program included STEM students ranged from undergraduate to post- graduate researchers. Students gained hands on experience during their internships. Some examples of hands-on experience include: GhostWave's project 602 Master of Engineering student Andrew Rockovic is supporting FPGA programming and development for the waveform generator, and BS Engineering intern Aaron Zheng is updating the website and creating fresh white papers and marketing materials. The Ohio State University's project 609 undergraduate research assistants, capstone students, and graduate students focused on upgrading a chamber for parabolic flights and began laser welding parameter development for flights to take place later in the Summer.

One aspect of the SEE program was to support the employment of students in Ohio industry post-graduation, and to keep the top talent that our higher education system produces in Ohio. Examples of this are:

- Asymmetric project 528: This project supported five interns resulting in three full time hires at Asymmetric including Jeremy Browne (Mechanical Engineering) and Joel Harrison (Computer Science/Software Engineering) from Ohio University, and Caleb Hawley (Mechanical Engineering) from The Ohio State University.

- Flightprofiler project 502: One student hired on as full-time employee.

Improved Processes

Through state-wide engagement with our stakeholders, we identified a need for multiple improved processes and have continued to identify and make improvements. There was a need for increased transparency and engagement. We continued with the quarterly OFRN Opportunity Days,in part, to provide consistent public-facing engagement. In fiscal year 2024, we added the Expanding Horizons event which is an in-person event. This was an opportunity to celebrate OFRN project achievements. The event was for government, academia, and industry to network and engage with OFRN project teams while listening to presentations by government, academia and industry involved with OFRN.

Fire Award

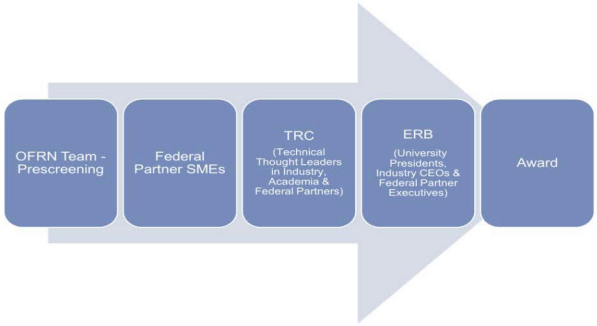
On August 6, 2023, the Dayton Business Journal Inno Team announced that the Ohio Federal Research Network is a Fire Award Honoree in the category of Defense Technology. Joining OFRN as honorees in the category are GoHypersonic Inc. and Spintech Holdings. In the category of Technology, OFRN emerged as the Blazer Winner, setting the stage ablaze with its exceptional achievements.

The Fire Awards recognize the remarkable contributions of local startups, manufacturers, nonprofits, and technology companies that are igniting the region's innovation economy. Honorees are nominated by peers and selected by the Dayton Inno editorial team. 15 honorees across four categories were acknowledged for their exceptional contributions to the local innovation landscape.

Round 6 Solicitation - FY24 Timeline

The OFRN Round 6 Solicitation was released on March 1, 2023. The solicitation process concluded in FY24.

- August 21, 2023: The Executive Review Board (ERB) approved the Technical Review Council (TRC) recommendation to award funding to six projects. This accomplished the goal to fund one project for each AOI.
- August 22, 2023: Round 6 Awards announced and project contracting began.
- September 2023: OFRN conducted debriefs with the 25 non-awarded projects
- October 26, 2023: The six awarded projects started upon completion of contracts.



Reviewer (ERB & TRC) Composition

Executive Review Board	Designee
Chair, Industry, Carmen Partners	Dr. Mike Triplett
Case Western Reserve University	Dr. Michael Oakes
The Ohio State University	Dr. Peter Mohler
Bowling Green State University	Dr. Rodney Rogers
Miami University	Dr. Gregory Crawford
Cleveland State	Dr. Laura Bloomberg
Industry, Enable Injections	Mike Hooven
Ohio Department of Transportation	Rich Fox
Ohio Department of Development	Scott Ryan
Independent	Dr. Dave Williams
OhioX	Chris Berry
Non-Voting Members	
AFRL	Dr. Tim Bunning
NASA-GRC	Dr. Jimmy Kenyon
NASIC	Steven Zech
NAMRU-D	Dr. Richard Arnold
Ohio National Guard	Brig Gen Maynus

Technical Review Council	Designee
Chair, Industry, Hripko Consulting	Mike Hripko
Case Western Reserve University	Dr. Chris Zorman
University of Cincinnati	Scott Petersen
Kent State University	Dr. Christina Bloebaum
University of Toledo	Dr. Patty Relue
University of Dayton VPR	Dr. John Leland
Cleveland State University	Dr. Forrest Faison III
Ohio University	Dr. Dennis Irwin
AFRL	Brian McJilton
NASA GRC	Dr. Kurt Sacksteder
NASIC	Steven Zech
NAMRU-D	Dr. Richard Arnold
Ohio National Guard	Maj Don Braskett
Industry, DriveOhio	Rich Granger
Industry, Cornerstone Research	Doug Ebersole
Business, PQR Energy	Jim Wheeler
The Ohio Academy of Science	Michael Woytek

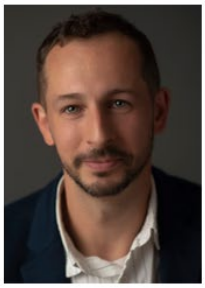
Areas Of Interest	Topics
Hypersonics	- Additive manufacturing of structures with gradient thermal properties - High temperature joining techniques with ”warm” or “cold” adjacent structures
Human Performance	- Physiological and environment monitoring for ocular health and human performance - XR telemedicine / patient care in austere/isolated environments
High Power Energy	- Affordable DC emulation and digital engineering - B-Ga203 substrate development - High voltage to low voltage DC energy conversion
Digital Engineering Tools	- Techniques to convert between model fidelity levers or utilization of multifunctioning models - Methods (low cost) model validation and assessment of digital maturity models
Commercial Space Research - LEO	- Materials joining automation in LEO - In-orbit biomanufacturing and repurposing of space-based materials
Quantum Technologies	- Quantum sensing: e.g., magnetic, electric field and photonics - Integration of at least two sensors

Ohio Stakeholders

Federal Partners

The OFRN partners are critical to the success of this program. They provide valuable insight and guidance to the program as well as helping to drive engagement from Subject Matter Experts within their organization.

Brian McJilton
U.S. Air Force Research Labs



Maxwell Briggs
NASA Glenn Research Center

Steven Zech
U.S. Air Force

Dr. Richard Arnold
Navy Medical Research Unit – Dayton (NAMRU-D)

Major General John C. Harris, Jr.
Ohio National Guard

Executive Review Board / Technical Review Council

To ensure we have unbiased perspective and focus, the OFRN created an Executive Review Board (ERB), and a Technical Review Council (TRC) that are administered by Parallax Advanced Research and The Ohio State University and funded by the Ohio Department of Higher Education (ODHE). The ERB and TRC provide strategic and technical guidance and oversight of the OFRN. OFRN also has contracts with several consultants to assist with commercialization, proposal navigation, and workforce development. The members of the commercialization team evolve based on project and stakeholder needs.

Executive Review Board (ERB)

The ERB oversees the development, funding, and performance of the OFRN. The ERB provides ongoing oversight of OFRN to support the research priorities of the federal installations and build Ohio's capabilities in applied research, workforce development, and technology commercialization. The ERB reviews concur with or reject the recommendations of the TRC as to which projects will be funded under the OFRN. To ensure the continued alignment of the OFRN within the original Ohio Federal Military Jobs Commission (OFMJC) goals and initiatives, the former OFMJC chair has a seat on the ERB. Additionally, OFRN leadership leverages the ERB for strategic guidance on new initiatives and activities.

Technical Review Council (TRC)

The TRC oversees the portfolio of technologies that are used and developed by OFRN-funded projects. The TRC reviews all white papers and proposals, ranks them according to key criteria (established in requests for proposals), and then submits funding recommendations to the ERB.

OFRN Leadership Team

Dennis Andersh
Program Executive
OFRN

Mark Bartman, Maj Gen (Ret)
Program Executive
OFRN

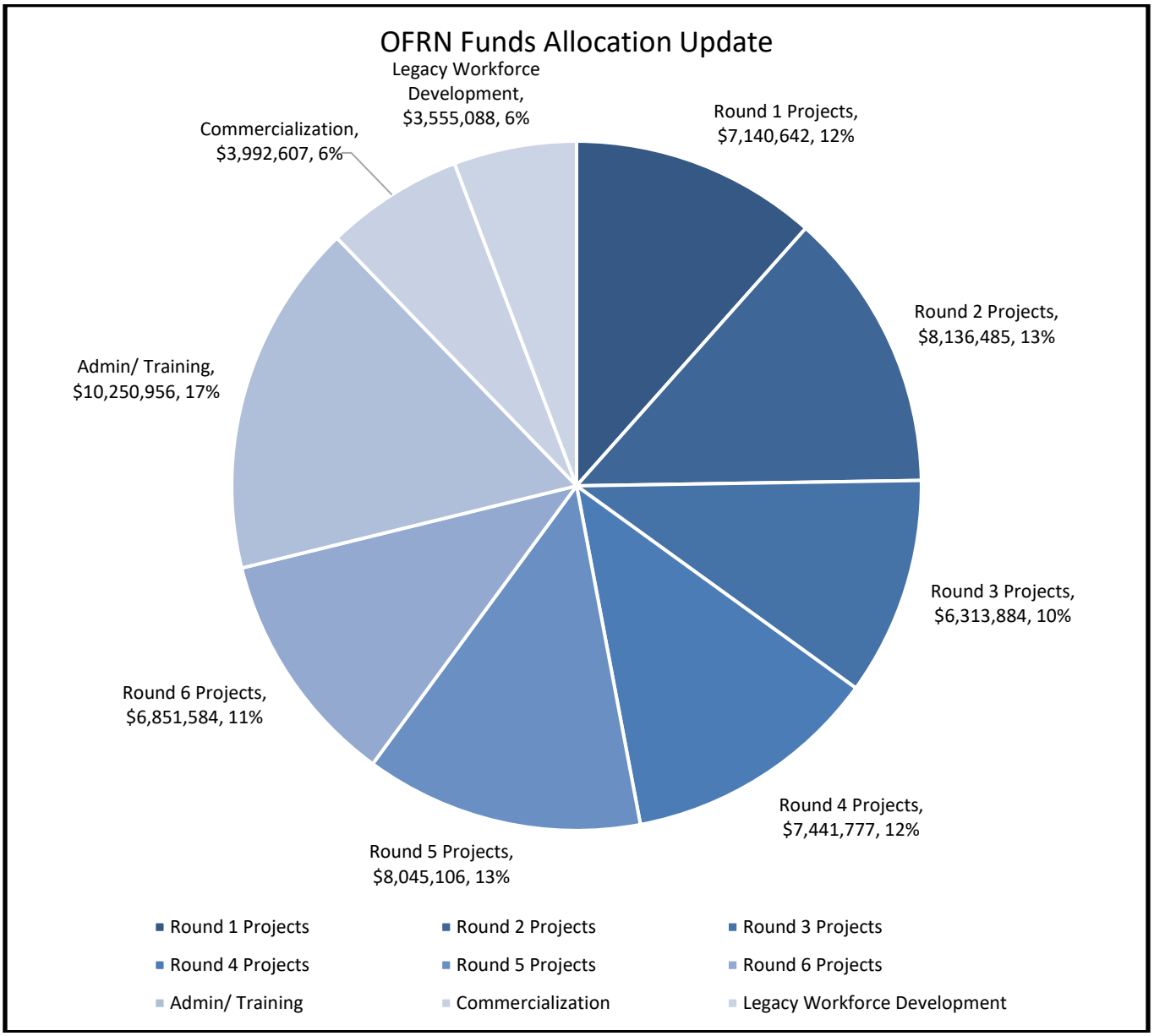
John Owen
Program Manager
OFRN

Becky Mescher
Program Coordinator
OFRN

Dennis Andersh and Mark Bartman, Maj Gen (Ret.) are the OFRN program executives. Key to their success is Parallax Advanced Research, The Ohio State University support staff, as well as the support and engagement of critical state offices, including ODHE, the Ohio Department of Development (ODOD), the Ohio Department of Transportation (ODOT), and JobsOhio. John Owen is the Program Manager of OFRN. Becky Mescher is the Program Coordinator of OFRN.

These leaders regularly provide OFRN briefings to key partners, state officials, and other interested groups across the state of Ohio. This open and transparent briefing process is part of their commitment to build a partnership coalition that allows Ohio's research and industry talent to be exemplified, with the goal of boosting the State of Ohio's overall economic impact to bring more federal research dollars to the state.

Finances



Total state operation funding for the OFRN programs for defense, aerospace, workforce development, and federal defense emerging mission is $61.8 million for FY16 through FY24.

ODHE-WSARC (OFRN) MOU Section 369.455 of Amended House Bill 64 of the 131st General Assembly, Defense/Aerospace Workforce Development Initiative

Budget Categories	Budget	Costs through Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
PRESIDES COE - Case Western Reserve	$1,633,806	$1,633,806	$0	$0	$1,633,806	$1,633,806									$1,633,806	-$1,633,806	$0
OCPP COE - The Ohio State University	$3,745,145	$3,745,145	$0	$0	$3,745,145	$2,005,537	$1,739,609								$3,745,145	-$3,745,145	$0
M&M COE - University of Dayton	$3,024,438	$3,024,438	$0	$0	$3,024,438	$2,007,377	$1,017,061								$3,024,438	-$3,024,438	$0
HPHS COE - Wright State University	$1,493,922	$1,493,922	$0	$0	$1,493,922	$1,493,922									$1,493,922	-$1,493,922	$0
C4ISR COE - Wright State University	$1,200,000	$1,200,000	$0	$0	$1,200,000		$1,200,000								$1,200,000	-$1,200,000	$0
C2PNT COE - Ohio University	$20,118	$20,118	$0	$0	$20,118		$20,118								$20,118	-$20,118	$0
C&WD Team - Cleveland State University	$1,108,000	$1,108,000	$0	$0	$1,108,000								$1,108,000		$1,108,000	-$1,108,000	$0
C&WD Team - Lorain County Community College	$974,884	$974,884	$0	$0	$974,884								$974,884		$974,884	-$974,884	$0
OFRN Legacy Workforce Development Programs	$3,555,088	$3,555,088	$0	$0	$3,555,088									$3,555,088	$3,555,088	-$3,555,088	$0
OFRN Administration	$3,244,599	$3,244,599	$0	$0	$3,244,599							$2,757,517	$487,082		$3,244,599	-$3,244,599	$0
Subtotal	**$20,000,000**	**$20,000,000**	**$0**	**$0**	**$20,000,000**	**$7,140,642**	**$3,976,787**	**$0**	**$0**	**$0**	**$0**	**$2,757,517**	**$2,569,966**	**$3,555,088**	**$20,000,000**	**-$20,000,000**	**$0**

ODHE-OSU (OFRN) MOU Section 369.473 of Amended House Bill 64 of the 131st General Assembly, Emerging Missions and Job Growth Opportunities

Budget Categories	Budget	Costs through Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
C2PNT COE - Ohio University	$2,087,478	$2,087,478	$0	$0	$2,087,478		$2,087,478								$2,087,478	-$2,087,478	$0
HPHS COE - Wright State University	$2,072,220	$2,072,220	$0	$0	$2,072,220		$2,072,220								$2,072,220	-$2,072,220	$0
OFRN CONSULTANTS	$223,337	$223,337	$0	$0	$223,337							$43,019	$180,317		$223,337	-$223,337	$0
OFRN ADMIN G&A	$40,255	$40,255	$0	$0	$40,255							$40,255			$40,255	-$40,255	$0
OSU PROJECTS & ADMIN	$576,710	$576,710	$0	$0	$576,710							$576,710			$576,710	-$576,710	$0
Subtotal	**$5,000,000**	**$5,000,000**	**$0**	**$0**	**$5,000,000**	**$0**	**$4,159,698**	**$0**	**$0**	**$0**	**$0**	**$659,984**	**$180,317**	**$0**	**$5,000,000**	**-$5,000,000**	**$0**

ODHE-OSU (OFRN) MOU Section 381.440 of Amended Substitute House Bill 49 of the 132nd General Assembly, Emerging Missions and Job Growth Opportunities

Budget Categories	Budget	Costs through Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
PERSISTENT SURVEILLLANCE SYSTEMS (PROJECT 315)	$1,998,349	$1,998,349	$0	$0	$1,998,349			$1,998,349							$1,998,349	-$1,998,349	$0
GHOST WAVE (PROJECT 309)	$1,344,597	$1,344,597	$0	$0	$1,344,597			$1,344,597							$1,344,597	-$1,344,597	$0
UNIVERSITY OF CINCINNATI (PROJECT 314)	$968,938	$968,938	$0	$0	$968,938			$968,938							$968,938	-$968,938	$0
OFRN CONSULTANTS	$213,986	$213,986	$0	$0	$213,986							$57,595	$156,391		$213,986	-$213,986	$0
WSARC UNALLOCATED	$22,494	$13,058	$9,065	$371	$22,123							$9,074	$13,049		$22,123	-$22,123	$0
THE OHIO STATE UNIVERSITY PROJECTS (303) & ADM	$2,180,596	$2,180,596	$0	$0	$2,180,596			$2,002,000				$178,596			$2,180,596	-$2,180,596	$0
FLIGHTPROFILER (PROJECT 502)	$29,731	$0	$29,731	$0	$29,731					$29,731					$29,731	-$29,731	$0
ASYMMETRIC (PROJECT 528)	$113,006	$0	$113,006	$0	$113,006					$113,006					$113,006	-$113,006	$0
MIAMI UNIVERSITY (PROJECT 552)	$19,667	$0	$19,667	$0	$19,667					$19,667					$19,667	-$19,667	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$8,636	$0	$8,636	$0	$8,636					$8,636					$8,636	-$8,636	$0
TOTAL	**$6,900,000**	**$6,719,524**	**$180,105**	**$371**	**$6,899,629**	**$0**	**$0**	**$6,313,884**	**$0**	**$171,040**	**$0**	**$245,265**	**$169,440**	**$0**	**$6,899,629**	**-$6,899,629**	**$0**

ODHE-OSU (OFRN) MOU Section 381.440 of Amended Substitute House Bill 166 of 133rd General Assembly

Budget Categories	Budget	Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
ASYMMETRIC TECHNOLOGIES (PROJECT 422)	$1,429,017	$1,429,017	$0	$0	$1,429,017				$1,429,017						$1,429,017	-$1,429,017	$0
CAL ANALYTICS (PROJECT 424)	$1,399,882	$1,399,882	$0	$0	$1,399,882				$1,399,882						$1,399,882	-$1,399,882	$0
GHOST WAVE (PROJECT 417)	$1,262,622	$1,262,622	$0	$0	$1,262,622				$1,262,622						$1,262,622	-$1,262,622	$0
KENT STATE UNIVERSITY (PROJECT 428)	$1,200,661	$1,200,661	$0	$0	$1,200,661				$1,200,661						$1,200,661	-$1,200,661	$0
RIVERSIDE RESEARCH (PROJECT 405)	$1,176,717	$1,176,717	$0	$0	$1,176,717				$1,176,717						$1,176,717	-$1,176,717	$0
YOUNGSTOWN BUSINESS INCUBATOR (PROJECT 421)	$972,877	$972,877	$0	$0	$972,877				$972,877						$972,877	-$972,877	$0
OFRN ADMINISTRATION	$2,136,723	$2,127,988	$8,382	$353	$2,136,370							$1,172,409	$964,315		$2,136,723	-$2,136,370	$353
Subtotal	**$9,578,500**	**$9,569,765**	**$8,382**	**$353**	**$9,578,147**	**$0**	**$0**	**$0**	**$7,441,777**	**$0**	**$0**	**$1,172,409**	**$964,315**	**$0**	**$9,578,500**	**-$9,578,147**	**$353**

ODHE-OSU (OFRN) MOU Section 381.373, Ohio H.B. 110 of 134th General Assembly

Budget Categories	Budget	Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
FLIGHTPROFILER (PROJECT 502)	$787,612	$787,612	$0	$0	$787,612					$787,612					$787,612	-$787,612	$0
THE OHIO STATE UNIVERSITY (PROJECT 507)	$1,739,488	$1,455,543	$283,945	$0	$1,739,488					$1,739,488					$1,739,488	-$1,739,488	$0
ASYMMETRIC TECHNOLOGIES (PROJECT 528)	$1,233,998	$1,233,998	$0	$0	$1,233,998					$1,233,998					$1,233,998	-$1,233,998	$0
ALPHAMICRON (PROJECT 529)	$849,999	$807,495	$42,505	$0	$849,999					$849,999					$849,999	-$849,999	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$951,943	$669,455	$282,487	$0	$951,943					$951,943					$951,943	-$951,943	$0
SAFRAN (PROJECT 550)	$1,256,590	$1,256,590	$0	$0	$1,256,590					$1,256,590					$1,256,590	-$1,256,590	$0
MIAMI UNIVERSITY (PROJECT 552)	$368,625	$368,625	$0	$0	$368,625					$368,625					$368,625	-$368,625	$0
OFRN ADMINISTRATION	$2,711,745	$3,053,241	-$391,437	$49,941	$2,661,804							$2,625,695	$86,050		$2,711,745	-$2,661,804	$49,941
Subtotal	**$9,900,000**	**$9,632,559**	**$217,500**	**$49,941**	**$9,850,059**	**$0**	**$0**	**$0**	**$0**	**$7,188,254**	**$0**	**$2,625,695**	**$86,050**	**$0**	**$9,900,000**	**-$9,850,059**	**$49,941**

ODHE-OSU (OFRN) MOU Section 381.520, Ohio H.B. 33 of 135th General Assembly

Budget Categories	Budget	Last Period	This Period	Balance	Total Expenses	Round 1 Projects	Round 2 Projects	Round 3 Projects	Round 4 Projects	Round 5 Projects	Round 6 Projects	Admin/ Training	Commercialization	Legacy Workforce Development	Total Budget	Total Expensed	Balance
GHOSTWAVE (PROJECT 602)	$1,005,120	$0	$321,957	$683,163	$321,957						$1,005,120				$1,005,120	-$321,957	$683,163
THE OHIO STATE UNIVERSITY (PROJECT 609)	$1,193,345	$0	$115,534	$1,077,811	$115,534						$1,193,345				$1,193,345	-$115,534	$1,077,811
UNIVERSITY OF AKRON (PROJECT 619)	$1,128,607	$0	$14,668	$1,113,939	$14,668						$1,128,607				$1,128,607	-$14,668	$1,113,939
KAIROS (PROJECT 624)	$1,160,000	$0	$327,857	$832,143	$327,857						$1,160,000				$1,160,000	-$327,857	$832,143
ARCTOS (PROJECT 625)	$1,164,566	$0	$312,608	$851,958	$312,608						$1,164,566				$1,164,566	-$312,608	$851,958
CFD (PROJECT 628)	$1,199,945	$0	$198,192	$1,001,754	$198,192						$1,199,945				$1,199,945	-$198,192	$1,001,754
FLIGHTPROFILER (PROJECT 502)	$71,969	$0	$71,969	$0	$71,969					$71,969					$71,969	-$71,969	$0
ASYMMETRIC (PROJECT 528)	$106,850	$0	$106,850	$0	$106,850					$106,850					$106,850	-$106,850	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$14,641	$0	$14,641	$0	$14,641					$14,641					$14,641	-$14,641	$0
SAFRAN (PROJECT 550)	$190,920	$0	$190,920	$0	$190,920					$190,920					$190,920	-$190,920	$0
MIAMI UNIVERSITY (PROJECT 552)	$301,432	$0	$301,432	$0	$301,432					$301,432					$301,432	-$301,432	$0
OFRN ADMINISTRATION	$2,812,605	$0	$1,299,289	$1,513,315	$1,299,289							$2,790,086	$22,519		$2,812,605	-$1,299,289	$1,513,316
Subtotal	**$10,350,000**	**$0**	**$3,275,916**	**$7,074,084**	**$3,275,916**	**$0**	**$0**	**$0**	**$0**	**$685,811**	**$6,851,584**	**$2,790,086**	**$22,519**	**$0**	**$10,350,000**	**-$3,275,916**	**$7,074,084**

Grand Total	**$61,728,500**	**$50,921,848**	**$3,681,903**	**$7,124,749**	**$54,603,751**	**$7,140,642**	**$8,136,485**	**$6,313,884**	**$7,441,777**	**$8,045,106**	**$6,851,584**	**$10,250,956**	**$3,992,607**	**$3,555,088**	**$61,728,129**	**-$54,603,751**	**$7,124,379**

Note: OFRN Round 6 administration time and effort during FY23 charged to Round 5 - $271,629.63

Note: OFRN Round 5 project underspends have been applied to OFRN admin expenses

Note: OFRN Round 5 no cost extensions given to 4 projects for a total spend of $330k for work performed July 1, 2023, through December 31, 2023 (FY24)

Appendix - Partners

Government

1. Air Force Research Laboratory
2. NASA Glenn
3. National Air and Space Intelligence Center
4. Naval Medical Research Unit-Dayton
5. Ohio Department of Transportation
6. Ohio National Guard

Academic

1. Air Force Institute of Technology
2. Bowling Green State University
3. Case Western Reserve University
4. Central State University
5. Clark State Community College
6. Cleveland State University
7. Heidelberg University
8. Kent State University
9. Lorain County Community College
10. Miami University
11. North Central State College
12. Ohio University
13. Otterbein University
14. Sinclair Community College
15. The Ohio State University
16. The University of Akron
17. The University of Cincinnati
18. The University of Dayton
19. The University of Findlay
20. The University of Toledo
21. Wilberforce University
22. Wright State University
23. Youngstown State University

Industry

1. AAB
2. Advanced TeleSensors
3. AEP
4. Agile Ultrasonics LLC
5. Akron Polymer Systems
6. Akron Polymers
7. AlphaMicron
8. Americarb
9. Amperand
10. ARCTOS Technology Solutions
11. Asymmetric Technologies
12. Autonodyne/Avidyne
13. Battelle Memorial Institute
14. Berriehill Corp
15. Bertec Corporation
16. Bosma Technology
17. Broadline Capital
18. CAL Analytics
19. CAR Technologies
20. Caterpillar
21. CFD Research
22. Cincinnati Inc.
23. Columbus Collaboratory
24. Comsat Architects
25. Converge Technologies
26. CRG
27. Crown Equipment
28. CSA America
29. DataScience.com
30. Dayton Childrens
31. DelphicDB
32. Demeter UAVs
33. DesignKnowledge
34. Eaton
35. Electrodyne
36. EMS Adhesives
37. The Entrepreneur's Center
38. Event 38 Unmanned Systems
39. Fenix Magnetics
40. Flightprofiler
41. Ford
42. Galois
43. GE Aerospace
44. GE Aviation
45. GE EPIS Center
46. General Dynamics
47. GhostWave Inc.
48. GIRD Systems Inc.
49. GoHypersonic
50. Gooch & Housego Ohio
51. GrafTech
52. Hana Microdisplay Systems
53. Hewlett Packard
54. Honeywell
55. Hyphen Innovations
56. Illumination Works
57. Infleqtion
58. Innovative Scientific Solutions, Inc.
59. Inorganic Specialist Materials
60. Ipsos
61. IS4S
62. Kairos Research LLC
63. KeyW Corp
64. Kongsberg Geospatial
65. Lexis Nexis
66. L3Harris Space & Sensors
67. Lincoln Electric
68. Lockheed Martin
69. Lockheed Martin Procerus
70. Lockheed Martin Rotary and Mission Systems
71. Lubrizol
72. Lucintech
73. MacAir Aviation
74. MacNauchtan Development
75. MatchTx
76. Meggitt
77. Nanoracks
78. NONA Composites
79. Norman Noble
80. Nuance
81. Orbital Research
82. Orbital-ATK
83. Parker Hannifin
84. PC Krause & Associates
85. Perduco
86. Persistent Surveillance Systems
87. ph Matter
88. Powdermet
89. Power Converters Future
90. Premier Health
91. Resilient and Secure UAS Flight Control
92. ResilienX
93. Riverside Research
94. Rubix
95. SAFRAN
96. Simlat, Ltd
97. SK Infrared LLC
98. SpineDynX
99. Tenet3
100. TruWeatherSolutions
101. UES
102. United Technology Corporation from Dayton
103. Unmanned Science, Inc (USI)
104. UTRC
105. Xerion
106. Youngstown BusinessIncubator (YBI)

Appendix – Program Expenditures & Costs

Funds Expended Report – As of 30 June 2024

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOU's
OFRN FUNDS EXPENDED REPORT

Please Type all Information

Subaward No.: 60064366/Sec.381.440, Ohio H.B. 49 of 132nd G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Centers of Excellence
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Costs Through Last Report	(C) Costs Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Expenditures B+C
PERSISTENT SURVEILLLANCE SYSTEMS (PROJECT 315)	$1,998,349	$1,998,349	$0	$0	$1,998,349
GHOST WAVE (PROJECT 309)	$1,344,597	$1,344,597	$0	$0	$1,344,597
UNIVERSITY OF CINCINNATI (PROJECT 314)	$968,938	$968,938	$0	$0	$968,938
OFRN CONSULTANTS	$213,986	$213,986	$0	$0	$213,986
WSARC UNALLOCATED	$22,494	$13,058	$9,065	$371	$22,123
THE OHIO STATE UNIVERSITY PROJECTS (303) & ADMIN	$2,180,596	$2,180,596	$0	$0	$2,180,596
FLIGHTPROFILER (PROJECT 502)	$29,731	$0	$29,731	$0	$29,731
ASYMMETRIC (PROJECT 528)	$113,006	$0	$113,006	$0	$113,006
MIAMI UNIVERSITY (PROJECT 552)	$19,667	$0	$19,667	$0	$19,667
THE OHIO STATE UNIVERSITY (PROJECT 542)	$8,636	$0	$8,636	$0	$8,636
TOTAL	$6,900,000	$6,719,524	$180,105	$371	$6,899,629

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU. Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: OFRN Round 5 project NCE expenses charged to Round 3 to spend down unspent Round 3 project funding $171K
:

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOU's
OFRN FUNDS EXPENDED REPORT

Please Type all Information

Subaward No.: 60073805/Sec.381.440, Ohio H.B. 166 of 133rd G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Centers of Excellence
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Costs Through Last Report	(C) Costs Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Expenditures B+C
ASYMMETRIC TECHNOLOGIES (PROJECT 422)	$1,429,017	$1,429,017	$0	$0	$1,429,017
CAL ANALYTICS (PROJECT 424)	$1,399,882	$1,399,882	$0	$0	$1,399,882
GHOST WAVE (PROJECT 417)	$1,262,622	$1,262,622	$0	$0	$1,262,622
KENT STATE UNIVERSITY (PROJECT 428)	$1,200,661	$1,200,661	$0	$0	$1,200,661
RIVERSIDE RESEARCH (PROJECT 405)	$1,176,717	$1,176,717	$0	$0	$1,176,717
YOUNGSTOWN BUSINESS INCUBATOR (PROJECT 421)	$972,877	$972,877	$0	$0	$972,877
OFRN ADMINISTRATION	$2,136,723	$2,127,988	$8,382	$353	$2,136,370
TOTAL	$9,578,500	$9,569,765	$8,382	$353	$9,578,147

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOU's
OFRN FUNDS EXPENDED REPORT

Please Type all Information

Subaward No.: GR125178/Sec.381.373, Ohio H.B. 110 of 134th G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Centers of Excellence
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Costs Through Last Report	(C) Costs Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Expenditures B+C
FLIGHTPROFILER (PROJECT 502)	$787,612	$787,612	$0	$0	$787,612
THE OHIO STATE UNIVERSITY (PROJECT 507)	$1,739,488	$1,455,543	$283,945	$0	$1,739,488
ASYMMETRIC TECHNOLOGIES (PROJECT 528)	$1,233,998	$1,233,998	$0	$0	$1,233,998
ALPHAMICRON (PROJECT 529)	$849,999	$807,495	$42,505	$0	$849,999
THE OHIO STATE UNIVERSITY (PROJECT 542)	$951,943	$669,455	$282,487	$0	$951,943
SAFRAN (PROJECT 550)	$1,256,590	$1,256,590	$0	$0	$1,256,590
MIAMI UNIVERSITY (PROJECT 552)	$368,625	$368,625	$0	$0	$368,625
OFRN ADMINISTRATION	$2,711,745	$3,053,241	-$391,437	$49,941	$2,661,804
TOTAL	$9,900,000	$9,632,559	$217,500	$49,941	$9,850,059

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: OFRN Round 6 administration time and effort during FY23 charged to Round 5 and moved to Round 6 - $432,714.80
Note: OFRN Round 5 project underspends have been applied to OFRN admin expenses
Note: OFRN Round 5 no cost extensions given to 4 projects for a total spend of $214K for work performed July 1, 2023, through December 31, 2023 (FY24).
Note: OFRN Round 5 project NCE expenses charged to Round 3 to spend down unspent Round 3 project funding $171K
Note: OFRN Round 5 project expenses charged to Round 6 - $685,811 (FY24).

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOU's
OFRN FUNDS EXPENDED REPORT

Please Type all Information

Subaward No.: GR133672 / Sec.381.520, Ohio H.B. 33 of 135th G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Centers of Excellence
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Costs Through Last Report	(C) Costs Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Expenditures B+C
GHOSTWAVE (PROJECT 602)	$1,005,120	$0	$321,957	$683,163	$321,957
THE OHIO STATE UNIVERSITY (PROJECT 609)	$1,193,345	$0	$115,534	$1,077,811	$115,534
UNIVERSITY OF AKRON (PROJECT 619)	$1,128,607	$0	$14,668	$1,113,939	$14,668
KAIROS (PROJECT 624)	$1,160,000	$0	$327,857	$832,143	$327,857
ARCTOS (PROJECT 625)	$1,164,566	$0	$312,608	$851,958	$312,608
CFD (PROJECT 628)	$1,199,945	$0	$198,192	$1,001,754	$198,192
FLIGHTPROFILER (PROJECT 502)	$71,969	$0	$71,969	$0	$71,969
ASYMMETRIC (PROJECT 528)	$106,850	$0	$106,850	$0	$106,850
THE OHIO STATE UNIVERSITY (PROJECT 542)	$14,641	$0	$14,641	$0	$14,641
SAFRAN (PROJECT 550)	$190,920	$0	$190,920	$0	$190,920
MIAMI UNIVERSITY (PROJECT 552)	$301,432	$0	$301,432	$0	$301,432
OFRN ADMINISTRATION	$2,812,605	$0	$1,299,289	$1,513,315	$1,299,289
TOTAL	$10,350,000	$0	$3,275,916	$7,074,084	$3,275,916

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU. Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: OFRN Round 6 administration time and effort during FY23 charged to Round 5 and moved to Round 6 - $432,714.80
Note: OFRN Round 5 project expenses charged to Round 6 - $685,811 (FY24).

Cost Share Contribution Report – As of 30 June 2024

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOUs
OFRN COST SHARE CONTRIBUTION REPORT

Please Type all Information

Subaward No.: 60064366/Sec.381.440, Ohio H.B. 49 of 132nd G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Cost Share Contribution
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Cost Share Through Last Report	(C) Cost Share Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Cost Share B+C
PERSISTENT SURVVEILLLANCE SYSTEMS (PROJECT 315)	$5,482,826	$10,719,279	$0	-$5,236,453	$10,719,279
GHOST WAVE (PROJECT 309)	$1,247,722	$1,277,856	$0	-$30,134	$1,277,856
UNIVERSITY OF CINCINNATI (PROJECT 314)	$1,009,024	$1,062,407	$0	-$53,383	$1,062,407
THE OHIO STATE UNIVERSITY (PROJECT 303)	$2,230,000	$1,483,000	$0	$747,000	$1,483,000
TOTAL	$9,969,572	$14,542,542	$0	-$4,572,971	$14,542,542

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: A negative number in column D represents cost share provided in excess of budget.

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOUs
OFRN COST SHARE CONTRIBUTION REPORT

Please Type all Information

Subaward No.: 60073805/Sec.381.440, Ohio H.B. 166 of 136th G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Cost Share Contribution
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Cost Share Through Last Report	(C) Cost Share Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Cost Share B+C
ASYMMETRIC TECHNOLOGIES (PROJECT 422)	$1,352,278	$1,727,916	$0	-$375,638	$1,727,916
CAL ANALYTICS (PROJECT 424)	$1,177,798	$1,314,983	$0	-$137,185	$1,314,983
GHOST WAVE (PROJECT 417)	$1,396,614	$145,828	$0	$1,250,787	$145,828
KENT STATE UNIVERSITY (PROJECT 428)	$1,011,776	$1,030,674	$0	-$18,898	$1,030,674
RIVERSIDE RESEARCH (PROJECT 405)	$748,260	$1,174,017	$0	-$425,757	$1,174,017
YOUNGSTOWN BUSINESS INCUBATOR (PROJECT 421)	$434,229	$413,532	$0	$20,697	$413,532
TOTAL	$6,120,955	$5,806,950	$0	$314,005	$5,806,950

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: A negative number in column D represents cost share provided in excess of budget.

12

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOUs
OFRN COST SHARE CONTRIBUTION REPORT

Please Type all Information

Subaward No.: GR125178/Sec.381.373, Ohio H.B. 110 of 134th G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Cost Share Contribution
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Cost Share Through Last Report	(C) Cost Share Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Cost Share B+C
FLIGHTPROFILER (PROJECT 502)	$219,294	$206,145	$11,920	$1,229	$218,065
THE OHIO STATE UNIVERSITY (PROJECT 507)	$417,292	$471,448	$0	-$54,156	$471,448
ASYMMETRIC TECHNOLOGIES (PROJECT 528)	$1,083,526	$1,067,828	$29,874	-$14,176	$1,097,702
ALPHAMICRON (PROJECT 529)	$349,688	$350,000	$0	-$313	$350,000
THE OHIO STATE UNIVERSITY (PROJECT 542)	$287,559	$209,892	$113,692	-$36,026	$323,585
SAFRAN (PROJECT 550)	$1,010,331	$940,492	$0	$69,839	$940,492
MIAMI UNIVERSITY (PROJECT 552)	$821,376	$686,341	$0	$135,035	$686,341
TOTAL	$4,189,065	$3,932,147	$155,487	$101,431	$4,087,634

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Note: A negative number in column D represents cost share provided in excess of budget.

OHIO DEPARTMENT OF HIGHER EDUCATION
WORKFORCE DEVELOPMENT AND EMERGING MISSIONS MOUs
OFRN COST SHARE CONTRIBUTION REPORT

Please Type all Information

Subaward No.: GR133672 / Sec.381.520, Ohio H.B. 33 of 135th G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Cost Share Contribution
Reporting Period:	July 1, 2023 - June 30, 2024

Budget Categories (Subawards)	(A) Budgeted Amount	(B) Total Cost Share Through Last Report	(C) Cost Share Incurred This Period Only	(D) Balance A-(B+C)=D	Cumulative Cost Share B+C
GHOSTWAVE (PROJECT 602)	$367,635	$0	$85,134	$282,501	$85,134
THE OHIO STATE UNIVERSITY (PROJECT 609)	$181,951	$0	$9,257	$172,693	$9,257
UNIVERSITY OF AKRON (PROJECT 619)	$346,059	$0	$15,471	$330,588	$15,471
KAIROS (PROJECT 624)	$810,000	$0	$299,528	$510,472	$299,528
ARCTOS (PROJECT 625)	$108,031	$0	$52,353	$55,678	$52,353
CFD (PROJECT 628)	$76,704	$0	$2,547	$74,157	$2,547
TOTAL	$1,890,379	$0	$464,290	$1,426,090	$464,290

CERTIFICATION: I hereby certify that the above amounts are true and accurate to the best of my knowledge; that all costs incurred are solely for the purpose set forth in ODHE MOU.
Appropriate documentation, including, but not lmited to, receipts or other evidence of payment, is on file and available as provided for in the Award Agreement.

Authorized Signature: _____ Date: 12/10/2024

Typed Name: Dennis Andersh

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Project Administrator: _____ Date: _____