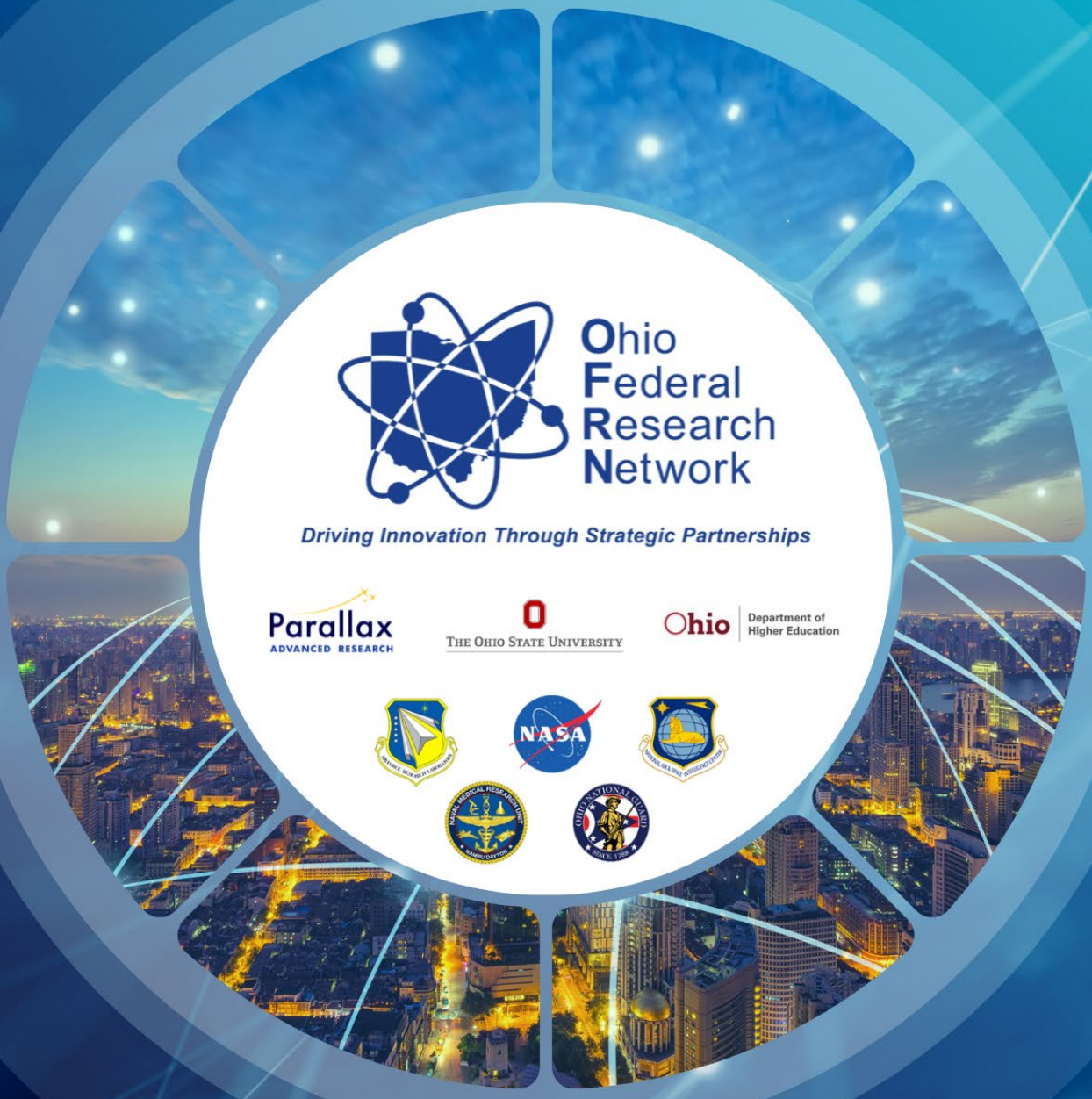
OHIO FEDERAL RESEARCH NETWORK

IMPACT REPORT **2025**



TO THE OHIO DEPARTMENT OF HIGHER EDUCATION

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Impact Summary

Managed by Parallax Advanced Research in collaboration with The Ohio State University and funded by the Ohio Department of Higher Education, the Ohio Federal Research Network stimulates Ohio's innovation economy by building vibrant, statewide university–industry research teams that meet the needs of Ohio's five federal partners—Air Force Research Laboratory (AFRL), National Air and Space Intelligence Center (NASIC), National Aeronautics and Space Administration – Glenn Research Center (NASA-GRC), Naval Medical Research Unit Dayton (NAMRU-D), and the Ohio National Guard (ONG).

OFRN's impact is well-documented and measurable. Since 2015, including Rounds 1-6, the program has transformed $62 million in State of Ohio investment into more than $405 million in follow-on funding, along with $41.3 million in cost-share, a seven to one return on investment. Additionally, the OFRN has incubated 16 commercial spinouts, administered 41 funded R&D projects, and resulted in 14 intellectual property outcomes (12 issued and 2 pending). The statewide network now includes 113 industry partners and 25 academic institutions, forming one of the strongest applied research ecosystems in the country. These achievements reflect OFRN's effectiveness in generating high-value technologies, strengthening federal partnerships, and increasing the share of research dollars flowing into Ohio.

History

Fueling Technology Development in Ohio for National Priorities

Establishment of the Ohio Federal Research Network (OFRN) was a key recommendation from the Ohio Federal Military Jobs Commission in 2015. The Ohio General Assembly, through the Ohio Department of Higher Education, funded OFRN to create a collaborative research hub designed to expand Ohio's cutting-edge research capability and create new economic opportunities for Ohio.

Figure 1: OFRN Goals

Figure 1 highlights the key goals of the OFRN, each of which integrates the broader objectives originally established by the Ohio Federal Military Jobs Commission. These goals include:

1. **Increase the amount of federal funding that flows to Ohio**
   This goal incorporates OFRN's mission to leverage state investment, capitalize on federal and university research assets, and prepare universities and companies to compete more effectively for federal opportunities. By building stronger proposal teams and aligning work with mission needs, OFRN increases Ohio's share of Department of Defense (DoD), NASA, and other federal R&D funding.
2. **Support federal missions and priority technologies**
   OFRN is designed to align Ohio research teams with the operational needs of federal partners, ensuring that state-funded projects directly support the missions of AFRL, NASIC, NASA GRC, NAMRU-D, and the Ohio National Guard. This also reflects OFRN's role in differentiating Ohio nationally as a state deeply committed to advancing defense and civil space missions.
3. **Increase collaboration among universities, industry, and federal labs**
   This goal incorporates OFRN's charge to integrate Ohio firms and industrial partners into R&D, strengthen cross-sector teaming, and ensure broad statewide participation. These collaborations build the sustainable networks needed for long-term competitiveness and encourage early technology transition pathways.

4. **Build long-term institutional and industry capability to compete and commercialize**

   This integrates developing lasting knowledge and capability across academia and industry, facilitating the transition of government-funded technologies to commercial markets, and creating the jobs, companies, and supply chains that will power Ohio's future economy.

Together, these goals ensure OFRN creates not only successful projects today but also the durable innovation capacity required for Ohio to lead in aerospace, defense, energy, and next-generation technologies.

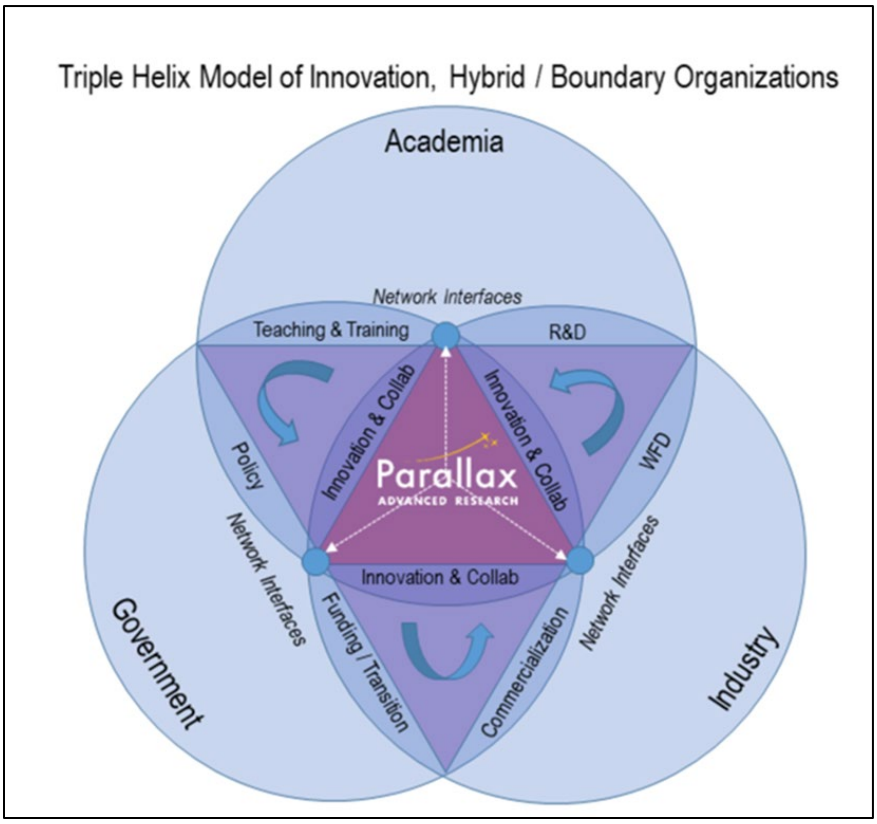


Figure 2: Triple Helix Model of Innovation

To achieve the mission, OFRN catalyzes federal, academic, and commercial collaborations to support the future growth of Ohio's workforce, with a focus on the priority research initiatives of Ohio-based federal and state partners (Figure 2). Since its inception, OFRN has been a forward-looking investment in Ohio's aerospace and defense future. Rather than responding solely to existing federal research needs, OFRN anticipates where the Department of War and NASA are heading and synergizes the research at Ohio's universities, industry partners, and research institutions to meet those emerging missions. This strategic posture positions Ohio early in areas now nationally recognized as critical: hypersonics, digital engineering, human performance, advanced materials, quantum technologies, autonomous systems, and low-Earth orbit commercialization.

OFRN's Influence on Emerging State and Federal Partnership Programs

OFRN has become a statewide model for innovation, collaboration and integration, demonstrating how coordinated investment, university–industry teaming, and alignment with federal missions can accelerate technology transition. Its integrated approach has directly shaped several major R&D and workforce development initiatives across Ohio.

OFRN's collaborative framework influenced the design of three major programs:

1. **Academic Partnership Engagement Experiment (APEX)**

   Built on OFRN's principles, APEX created a national network connecting universities and small businesses with the Air Force and Space Force. It adopted OFRN's model of coordinated academic engagement, federal alignment, and streamlined pathways into SBIR/STTR programs.

2. **Defense Innovation Unit OnRamp Hub: Ohio**

   The OnRamp Hub: Ohio program leveraged OFRN's approach to cross-sector teaming, rapid matchmaking, and transition support to build a statewide defense supplier pipeline. Lessons from OFRN's R&D proposals—particularly those focused on manufacturing innovation and supply-chain

readiness—helped shape the Hubs dual-use readiness, technical maturation, and defense-commercial transition model.

3. **National Advanced Air Mobility Center of Excellence (NAAMCE)**

   NAAMCE at Springfield–Beckley Airport grew from foundational OFRN investments in UAS, autonomy, digital engineering, and weather systems. OFRN-funded research, such as the eVTOL/UAS weather sensor network (Round 6), provided early technical infrastructure and credibility that helped secure federal, industry, and state support for Ohio's leadership in Advanced Air Mobility (AAM).

OFRN's success helped guide state and regional initiatives focused on expanding the research-to-commercialization pipeline, increasing SBIR/STTR competitiveness, supporting JobsOhio innovation districts, and growing high-skill workforce pathways through experiential R&D. These programs reflect OFRN's role not just as a funder, but as a statewide innovation strategy that continues to shape how Ohio builds and sustains federally aligned research capacity.

Together, APEX, OnRamp Hub: Ohio, and NAAMCE demonstrate how OFRN has become a blueprint for strategic R&D investment, technology and supply-chain transition, workforce development, and federal mission engagement.

Securing Ohio's Future in Defense, Aerospace, and Advanced Technology

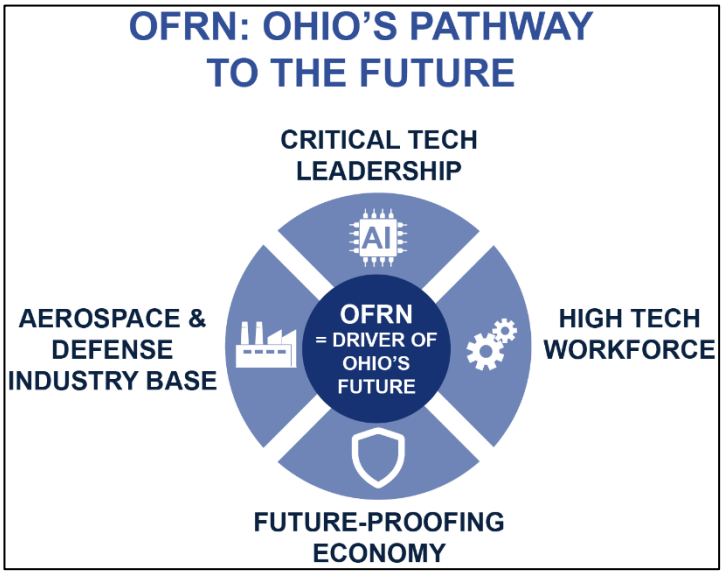


Figure 3: OFRN as an Engine Driving Ohio's Future in Defense, Aerospace, and Advanced Technology.

Figure 3 illustrates how OFRN positions Ohio to lead in the next decade of aerospace, defense, and advanced technology innovation by serving as the engine driving the state's future growth. As federal mission needs accelerate in areas such as applied AI, biomanufacturing, contested logistics, quantum-enabled sensing, directed energy, and hypersonics, OFRN strengthens Ohio's national competitiveness by shaping emerging federal missions, ensuring Ohio institutions remain indispensable to DoD and NASA, and capturing a larger share of federal R&D investment.

At the same time, OFRN expands Ohio's aerospace and defense industry base by accelerating company formation, enabling technology transfer, attracting private-sector investment, and growing in-state supply chains that anchor high-paying jobs across all regions. Tangram Flex and Kairos Research are examples of two successful spinouts from OFRN projects. Tangram Flex has received over $143.1M in Federal contract awards and Kairos has received over $8.5M in contract awards – all in the state of Ohio. The program also builds and retains the high-tech workforce of the future through its Student Experiential Engagement (SEE) talent pipeline, creating pathways into federal labs and industry and deepening the talent pool necessary for Ohio's advanced manufacturing, aerospace, and defense sectors. In addition, OFRN helps accelerate Ohio's role in space, energy, and next-generation transportation by enabling leadership in commercial space manufacturing, LEO operations, high-power energy systems, hybrid-electric propulsion, and Advanced Air Mobility—leveraging NASA Glenn's world-class capabilities to expand state industry. Most importantly, OFRN future-proofs Ohio's innovation economy by integrating universities, industry, federal laboratories, and state economic priorities into a single, co-funded system capable of adapting to new national priorities and technological shifts. Together, these future-facing impacts illustrate how OFRN keeps Ohio ahead of the curve and positions the state as a national leader in defense innovation, high-tech economic growth, and next-generation workforce development.

Program Management & Process

OFRN Program Governance & Decision-Making Process

The Ohio Federal Research Network operates through a structured, multi-layered governance and decision-making model (Figure 4) that ensures state-funded research is mission-aligned, economically impactful, and focused on applied, transition-ready innovation. Unlike basic research programs, OFRN funds only applied research and development at TRL-3 and higher—equivalent to DoD S&T categories 6.2 (Applied Research) and 6.3 (Advanced Technology Development). This focus on transition-oriented R&D distinguishes OFRN from traditional academic research programs and ensures that every investment moves technologies closer to operational use, commercialization, or federal adoption.

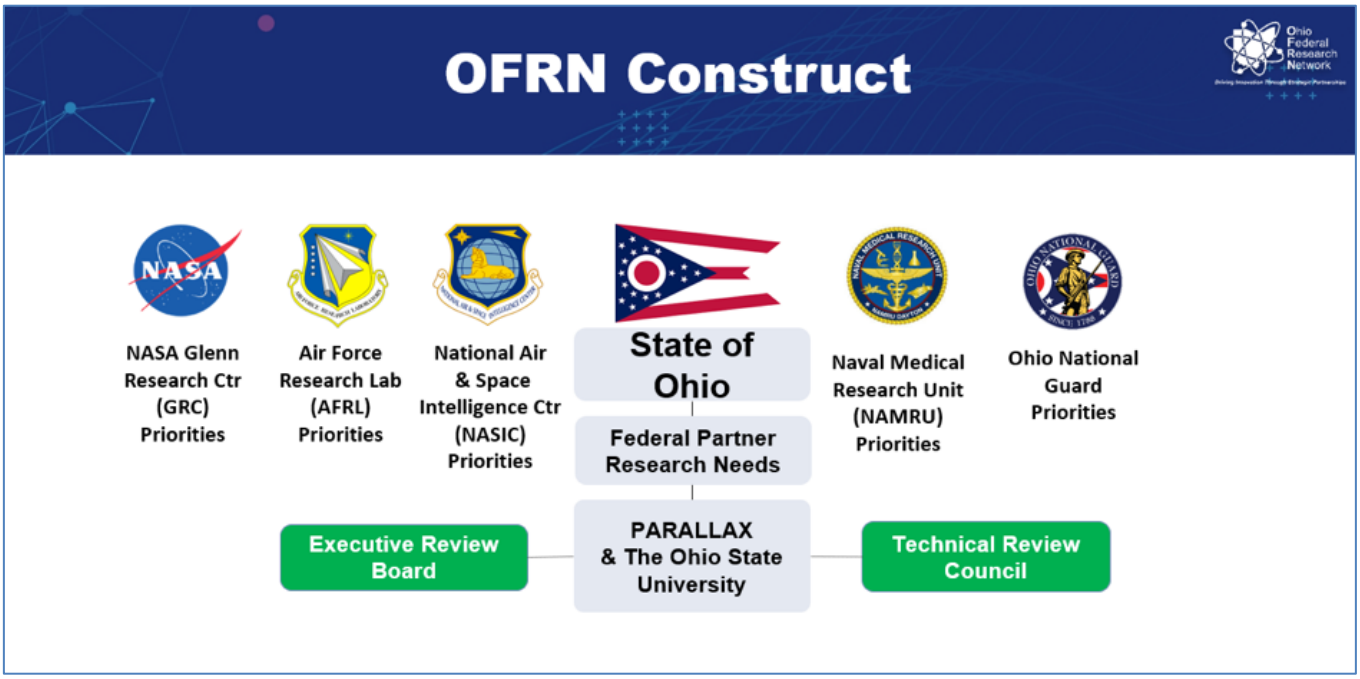


Figure 4: OFRN Network Construct

OFRN's process integrates continuous coordination among the Ohio Department of Higher Education (ODHE), Parallax Advanced Research, Ohio's federal mission partners, the Technical Review Council (TRC), and the Executive Review Board (ERB). Together, these entities guide a competitive and rigorous selection process designed to ensure that funded projects:

- Align with Ohio's state priorities and economic development goals
- Address mission needs and technology gaps identified by AFRL, NASIC, NASA GRC, NAMRU-D, and the Ohio National Guard
- Demonstrate strong technical merit, transition potential, and commercialization pathways
- Support university–industry teaming and statewide collaboration

This governance structure ensures that OFRN investments deliver near-term relevance and long-term impact, advancing DoD and NASA missions while strengthening Ohio's technology economy.

OFRN Stakeholder Network Construct

The OFRN program is managed by Parallax Advanced Research, operating as a subcontractor to The Ohio State University, and is guided by strategic oversight from the Executive Review Board (ERB) and technical evaluation by the Technical Review Council (TRC). Figure 3 illustrates how this organizational framework operates in practice—showing how state priorities, federal partner research needs, industry engagement, and academic capabilities converge to shape OFRN's funding decisions. The diagram depicts the coordinated relationship between the State of Ohio, OFRN's five federal mission partners (NASA GRC, AFRL, NASIC, NAMRU-D, and the Ohio National Guard), the ERB, the TRC, and the program management team. Collectively, this construct ensures that OFRN investments remain aligned to mission-critical challenges, grounded in applied research at TRL-3 and higher, and poised for maximum transition and economic impact.

How OFRN Funding Decisions Are Made

OFRN follows a requirements-driven, multi-stage selection process that ensures funded research is applied research (TRL-3+), technically credible, mission-aligned, commercially relevant, and capable of generating follow-on investment. Federal partners (Figure 5)—including AFRL, NASIC, NASA Glenn Research Center, NAMRU-D, and the Ohio National Guard—play an active role throughout this process by shaping applied research priorities, developing and refining the Areas of Interest (AOIs) for each funding round, delivering subject-matter expertise, assessing technical alignment, advising on feasibility and transition pathways, and in many cases contributing directly to project execution. This iterative process allows federal subject-matter experts to work closely with OFRN leadership to communicate emerging mission needs, national security priorities, and technology gaps across every stage of the project lifecycle.

Figure 5: OFRN Federal Partners

Teams respond to AOIs through a two-stage competitive process: (1) proposals are screened for mission alignment and feasibility; and then (2) full proposal submission is evaluated on technical merit, economic value, workforce impact, commercialization potential, and relevance to federal research needs.

Subject-matter experts from Ohio's federal research laboratories review all proposals to verify alignment with the AOI sub-topic requirements. The Technical Review Council (TRC)—composed of senior federal researchers, industry experts, academic leaders, and state technical advisors—serves as the primary evaluation body for full proposals. The TRC conducts a rigorous, criteria-based review modeled after Small Business Administration evaluation standards, assessing each submission for technical merit, feasibility, team capability, mission alignment, commercialization potential, and overall project readiness (including TRL-3+ maturity). After independent scoring and ranking, the TRC provides formal recommendations to the Executive Review Board (ERB).

The ERB serves as the final decision authority for project selection and funding. Comprised of senior leaders representing Ohio's federal research installations, state agencies, industry, and universities, the

ERB ensures that OFRN investments align with state priorities, support federal mission needs, strengthen Ohio's industrial base, and deliver meaningful economic and workforce outcomes. The ERB reviews the TRC's ranked recommendations and selects a balanced portfolio of projects with strong technical merit, transition potential, and direct relevance to Ohio's aerospace and defense ecosystem.

Figure 6 provides a visualization of the decision authorities involved in the TRC evaluation and the ERB selection. The OFRN decision-making process ensures that state-funded research is aligned with federal priorities, rigorously evaluated by technical experts, and approved by a cross-sector Executive Review Board.

OFRN 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. Steven Ringel
Bowling Green State University	Dr. Rodney Rogers
Miami University	Dr. Gregory Crawford
Cleveland State	Dr. Laura Bloomberg
Kent State University	Dr. Todd Diacon
Youngstown State University	Bill Johnson
Industry, Enable Injections	Mike Hooven
Ohio Department of Transportation	Rich Fox
Ohio Department of Development	Scott Ryan
Independent	Dr. Dave Williams
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 Matthew Woodruff

Technical Review Council	Designee
University of Cincinnati	Scott Petersen
Kent State University	Dr. Christina Bloebaum
University of Toledo	Dr. Arun Nadarajah
Youngstown State University	Dr. Sev Van slambrouck
Case Western Reserve University	Dr. Chris Zorman
Bowling Green State University	Dr. Joseph Furgal
Bowling Green State University	Dr. Imran Tusar
Bowling Green State University	Dr. Mohammed Abouheaf
Industry, NCDMM	Dr. Edward Herderick
Business, PQR Energy	Jim Wheeler
Business, Ohio Innovation Fund	Faith Voinovich
The Ohio Academy of Science	Michael Woytek
Industry, DriveOhio	Santos Ramos
Business, Factor 7 Medical	Kim Frazier
Industry, OneDefense	Chris Eusebi
AFRL	Brian McJilton
NASA GRC	Maxwell Briggs & Eric Clark
NASIC	Steven Zech
NAMRU-D	Dr. Richard Arnold
Ohio National Guard	Maj Don Braskett

Figure 6: Overview of the OFRN Funding Review Process from Federal Requirements to TRC Evaluation and ERB Final Selection

Figure 7 illustrates this multi-stage governance model, from federal requirements development to TRC evaluation and final ERB selection. This process entails:

1. **Technical Review Council (TRC) Evaluation**

   The TRC, comprised of representatives from Ohio-based federal laboratories industry experts, academic researchers, and state technical advisors, conducts the first major gate review. The TRC:

   - Reviews and scores all proposals
   - Ranks submissions against published criteria
   - Assesses alignment with government AOIs & sub-topics
   - Recommends the most meritorious and mission-aligned projects to the ERB

2. **Executive Review Board (ERB) Decision Authority**

   The ERB, comprised of leaders from Ohio's federal partner installations, State government (ODoD, ODoT), industry, universities, and is the final decision-making body for OFRN funding. The ERB:

   - Provides strategic oversight of OFRN
   - Evaluates TRC recommendations
   - Approves, rejects, or modifies the recommended project portfolio
   - Ensures alignment with our federal partners

Figure 7: OFRN Program Governance & Decision Making Process

3. **Program Management & Oversight**

   Once projects are funded, Parallax Advanced Research manages day-to-day execution, including:

   - Contracting & procurement
   - Monthly project reviews with the Parallax team
   - Quarterly project reviews with the Federal partners and semi-annual reviews with the federal subject matter experts
   - Deliverables management
   - Financial compliance
   - Commercialization and workforce development support

Why This Governance Model Works

The process—rooted in state priorities, federal needs, and rigorous technical review—ensures that:

- State funding drives high-impact applied research
- Ohio institutions are better positioned to win federal awards
- Projects have clear commercialization pathways
- Teams include both universities and industry
- Workforce development is integrated from the start
- Funded technologies are more likely to transition into DoD, NASA, or commercial adoption

This structure is the reason OFRN has become one of Ohio's most effective and mission-aligned research and innovation engines.

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

Figure 8: OFRN Leadership Team

Figure 8 highlights the OFRN leadership team, which consists of: Dennis Andersh, CEO and President of Parallax Advanced Research, and Mark Bartman, Maj Gen (Ret.), USAF, who are the program executives. Key to their success is Parallax Advanced Research support staff including John Owen as the Program Manager, and Becky Mescher as the Program Coordinator.

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.

Program Results Overview

Relationships with Ohio's federal installations are a core strength of the program. Regular briefings, collaboration workshops, and technical reviews deepened engagement with AFRL, NASIC, NASA Glenn, NAMRU-Dayton, and the Ohio National Guard. These interactions helped shape OFRN solicitations, guided project selection, and ensured that state-funded applied research aligned with the long-term needs of federal sponsors. This alignment continues to be a major differentiator for Ohio—one that expands research opportunities, strengthens mission-critical programs, and supports federal workforce development pipelines.

OFRN also advanced statewide workforce development through the Student Experiential Engagement (SEE) program, which integrated interns and graduate researchers into real-world R&D teams. Participants gained hands-on experience supporting project testing, modeling, simulation, fabrication, and data analysis. The Student Experiential Engagement (SEE) program continues to cultivate the next generation of Ohio's defense and aerospace workforce while increasing the technical capacity of OFRN-funded projects. By integrating 171 students across 15 Ohio colleges and universities into real-world R&D teams, the Student Experiential Engagement (SEE) program strengthens the state's future talent pipeline and increases the technical capacity of companies and research organizations participating in OFRN projects. These students contribute directly to project execution—supporting testing, modeling, simulation, data analysis, and fabrication—which reduces project cost, accelerates development timelines, and expands the overall economic value of state-funded research investments.

In addition, the Student Experiential Engagement (SEE) program amplifies the return on investment of OFRN's statewide engagement efforts. Throughout the year, OFRN expanded participation through Opportunity Days, executive reviews with federal partners, and outreach events that connected student-supported research teams to federal opportunities such as SBIR/STTR. This integration positions

students for high-tech career pathways in Ohio's defense and aerospace sectors and helps retain talent within the state, strengthening Ohio's long-term workforce competitiveness.

This network has produced a level of economic and technological return unmatched by any other state-led R&D program in Ohio. Figure 9 shows the impact of the OFRN program from inception through funding Round 6. From an initial $62 million in state investment, OFRN teams have generated more than $405 million in follow-on funding, attracted $41.3 million in industry and academic cost-share, and delivered 41 mission-aligned research projects that advance capabilities in hypersonics, space systems, quantum, digital engineering, human performance, advanced materials, and autonomous systems.

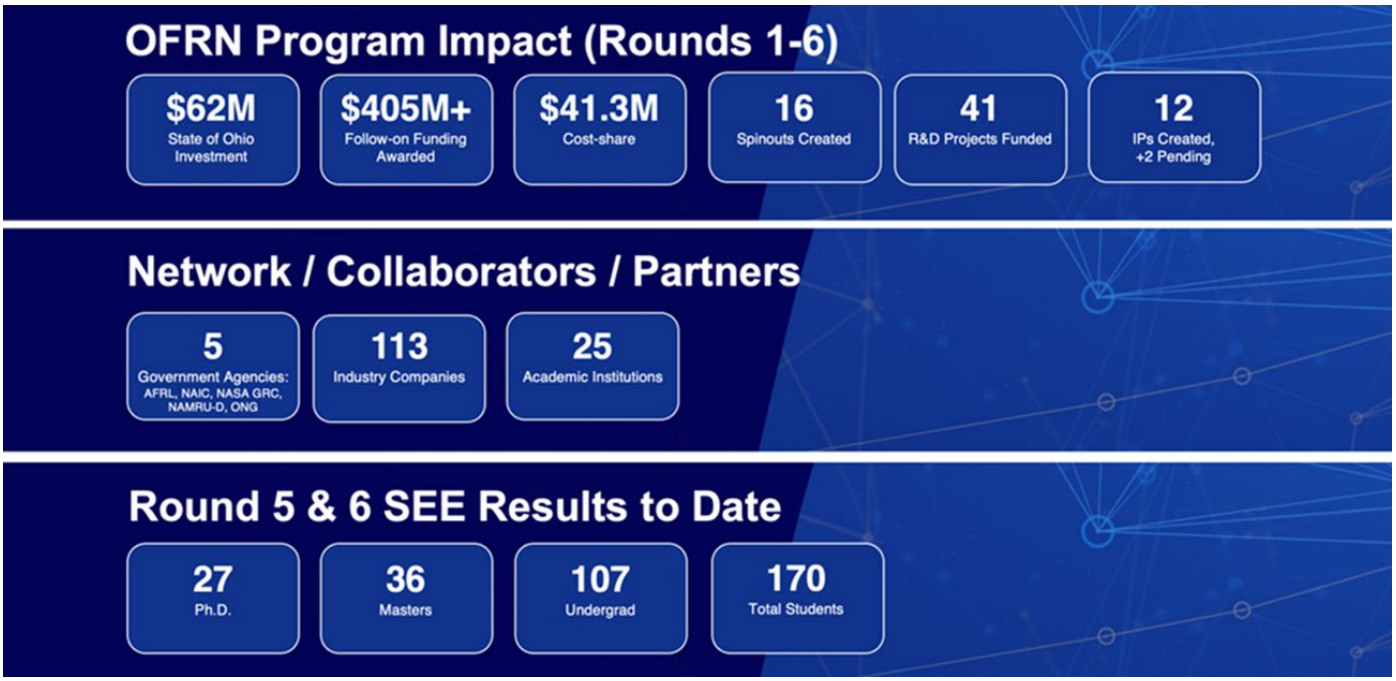


Figure 9: OFRN Program Impact (Rounds 1-6)

The impact also extends well beyond research outputs. OFRN has enabled the creation of 16 new Ohio-based spinoff companies, strengthened supply chains, and supported 391 high-skilled jobs tied directly to defense, aerospace, and advanced technology sectors. These companies and jobs aren't clustered in a single city—they're distributed across Ohio's JobsOhio regions, ensuring that innovation-driven economic growth reaches communities statewide.

As Ohio continues to expand its role as a national leader in aerospace, defense, and advanced manufacturing, OFRN represents a proven vehicle for strategic state investment. The program strengthens Ohio's position in emerging federal mission areas, drives research commercialization, supports job creation, and enhances the long-term competitiveness of Ohio's innovation economy. OFRN remains a critical asset for ensuring that Ohio not only keeps pace with national priorities—but leads them.

Statewide Reach & Impact

In collaboration with our federal partners, the OFRN continues to focus on applied research inthe state of Ohio. Figure 10 illustrates the breadth of our impact around the state.

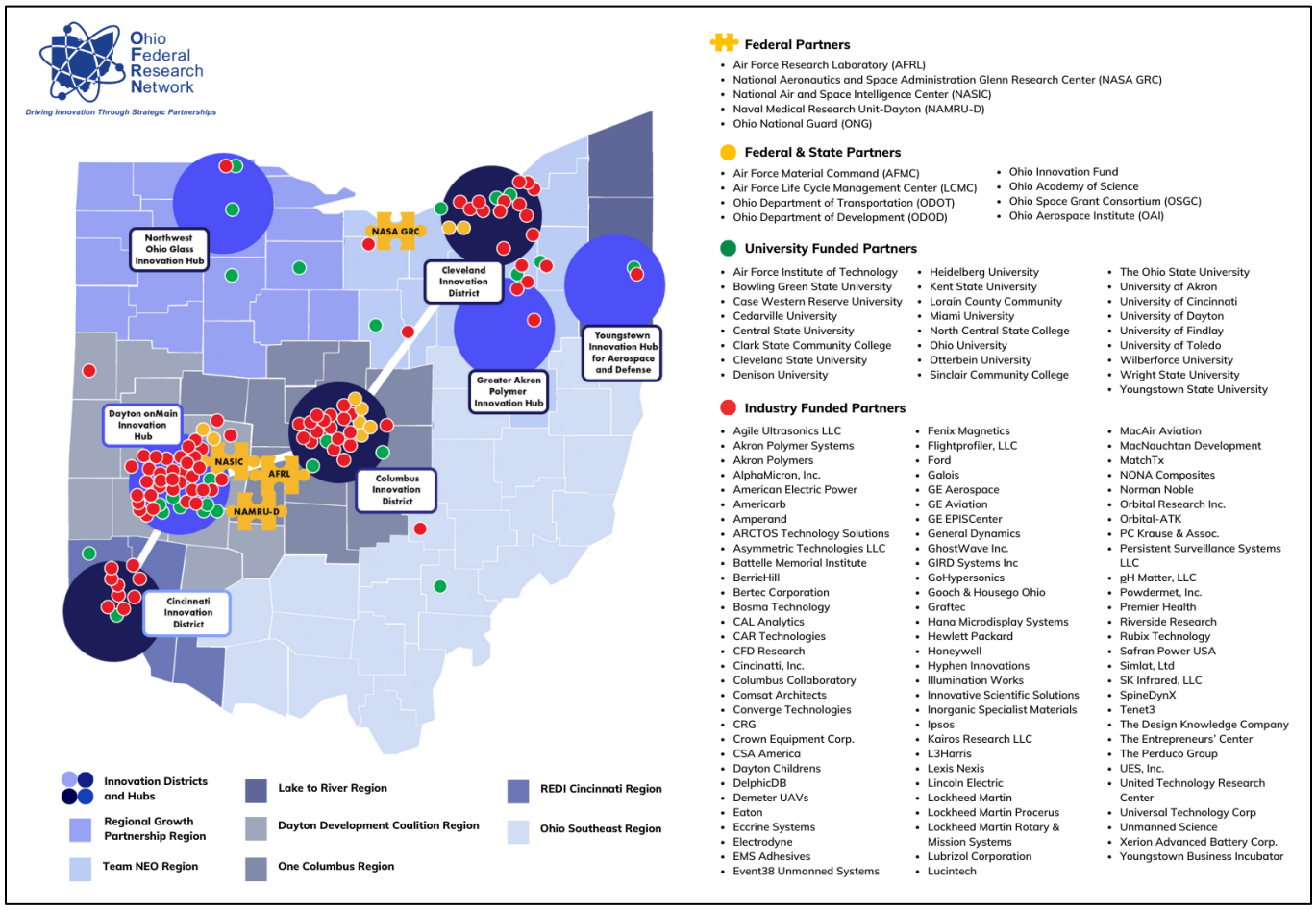


Figure 10: Ohio Innovation Map

OFRN is uniquely structured to reach every major region of Ohio, connecting federal installations, universities, and industry partners into one cohesive innovation ecosystem. The distribution of red, yellow, and green markers shows how OFRN-funded projects, collaborators, and partnerships extend far beyond any single city—touching rural, suburban, and urban communities across all of Ohio's major economic and geographic corridors. The map also highlights OFRN's unique ability to connect Ohio's five major federal partners—AFRL, NASIC, NASA-GRC, NAMRU-D, and the Ohio National Guard—with 25 universities and more than 100 industry partners statewide. These linkages enable knowledge flow, technology transition, and cross-sector collaboration that no other program in Ohio currently provides at this scale. Because OFRN projects are intentionally distributed across multiple regions, the economic and workforce benefits of the program reach every part of the state—not just federal base communities.

Moreover, OFRN's footprint aligns directly with the JobsOhio Innovation Districts in Cincinnati, Columbus, Cleveland, Dayton, Akron, and Youngstown. This alignment ensures that state-funded research investment reinforces existing regional strengths while also expanding high-tech opportunities into emerging and underserved areas. By anchoring projects in and around these districts, OFRN supports the commercialization pipelines, workforce development initiatives, and federal mission priorities that JobsOhio and the state rely on to grow competitive sectors like aerospace, advanced manufacturing, energy, biomedical innovation, and intelligence systems.

Why This Matters for Ohio

Without the OFRN, Ohio would not have the same visibility, access, or competitiveness in securing federal research funding or defense innovation opportunities. With OFRN, Ohio has a proven, scalable, and nationally recognized model for building future technologies, catalyzing company formation, and positioning the state as an indispensable partner to the Department of Defense and NASA.

OFRN is not just supporting Ohio's goals—it is outperforming expectations, driving measurable return on investment, and ensuring that Ohio continues to lead in the nation's most strategically important technology domains. Continued support for the program is essential to maintain this momentum and to position Ohio for the next generation of federal missions and economic opportunities.

Funded Research Project Rounds

The infographic in Figure 11 provides a comprehensive view of the research projects funded through the Ohio Federal Research Network and illustrates how each effort aligns to specific application domains across aerospace, defense, and advanced technology missions. The distribution of projects across categories—ranging from control systems and structural materials to propulsion, sensing, communications, power, autonomy, planning, and hypersonics—demonstrates the breadth of Ohio's technical capabilities and the strategic depth of OFRN's investment portfolio.

The visualization highlights that OFRN projects are not isolated research efforts; they form a coordinated, mission-focused pipeline that supports the needs of Ohio's federal partners, including AFRL, NASIC, NASA Glenn, NAMRU-D, and the Ohio National Guard. By funding projects across multiple interconnected disciplines, OFRN strengthens the entire innovation ecosystem: advancing foundational science, accelerating technology transition, enabling commercialization opportunities, and preparing Ohio's workforce for emerging national priorities.

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"
R7 - Ohio State University: "Photonic Interfaces for Atom-based Quantum Processors"
R7 - Laser Fusion Solutions: "Joining of ODS Additive Materials"

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"
R7 - Ohio State University: "Gas-insulated Cable with Integrated Partial Discharge Detection for Aerospace Systems"

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)"
R7 - Ohio State University: "Space GUIDE: Spaceborne Gain-enabled Ultra-sensitive Infrared Detector with Event-based sensing"

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)"
R7 - Mined XAI: "Resilient Explainable AI for Casualty Triage with Logistics Awareness Using Deep Topological Modeling (REACT-X)"
R7 - Kairos Research: "Validated Indicators for Selective Trust in Autonomy (VISTA)"

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"
R7 - AsterTech: "Hypersonic Engineered Reusable Ceramic Ultra-Lightweight Enduring System (HERCULES)"

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
R7 - The OFRN Round 7 projects

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

Figure 11: OFRN Projects (Rounds 1-7)

Rounds 1–5 (FY16–23): Establishing the Foundation of Ohio's Defense & Aerospace Innovation Network

The first five rounds of the Ohio Federal Research Network laid the essential foundation for one of Ohio's most effective and mission-aligned research and innovation engines. Across these rounds, OFRN strengthened statewide research capacity, expanded university–industry partnerships, and established enduring collaborations with Ohio's federal laboratories—including AFRL, NASA Glenn, NASIC, NAMRU-D, and the Ohio National Guard.

Rounds 1–4 focused on building the fundamental capabilities Ohio needed to become a national leader in defense and aerospace innovation. These rounds advanced core technologies in autonomy, sensing, advanced materials, propulsion, digital engineering, and human performance while developing the partnership structures that enabled sustained coordination between universities, industry, and federal mission partners.

Round 5 built directly on this foundation, expanding Ohio's applied research capabilities into next-generation areas such as UAS systems, microelectronics, and advanced power systems. These investments provided the technical and workforce base that would support more advanced, mission-critical disciplines in later rounds—including , artificial intelligence, human factors, data analytics, space commercialization, quantum communications, , and advanced power systems.

Round 1: Centers of Excellence (FY16-17)

Round 1 initiated OFRN's core mission: to build multi-institution teams capable of conducting high-impact research aligned with federal priorities. The round focused on establishing Centers of Excellence in areas where Ohio already held competitive advantages:

- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)
- Advanced materials and manufacturing
- Advanced Communications Positioning, Navigation, and Timing (PNT) and Sophisticated Software (SW)
- Energy Storage / Integration
- Human performance and health sciences
- Power and Propulsion

These initial centers forged long-term collaborations between Ohio universities, federal labs, and industry partners. They also validated the OFRN model: aligning state investment with federal technology needs to accelerate innovation and commercialization.

Strategic purpose: Build Ohio's baseline R&D capacity in aerospace, propulsion, sensing, and human-centered technologies to support AFRL, NASA Glenn, and state economic priorities.

Round 2: Centers of Excellence Expansion (FY17-18)

Round 2 expanded the Center of Excellence model to deepen Ohio's strengths in mission-critical domains. Projects in this round advanced:

- Health and Human Performance
- Big Data
- Next-generation materials for aerospace structures
- Advanced propulsion and power systems
- UAS autonomy, data analytics, and flight-safety technologies
- Advanced Communications

Round 2 also broadened industry engagement and introduced more direct ties to technology transition

pathways within AFRL and NASA.

Strategic purpose: Extend Ohio's technical leadership in aerospace and materials science while building scalable university–industry teams aligned to federal research priorities.

Round 3: Sustaining Ohio's Aeronautical Readiness and Innovation in the Next Generation (SOARING) Initiative (FY18-19)

Round 3 marked a shift toward mission need–driven solicitations, focused specifically on accelerating technology transition. The Sustaining Ohio's Aeronautical Readiness and Innovation in the Next Generation (SOARING) initiative supported more applied projects that bridged early R&D with prototype development and validation. This round focused on expanding Ohio's leadership in federal and industry aerospace research, development and sustainment for unmanned air systems (UASs), personal air vehicles (PAVs), and logistics delivery air vehicles (LDVs). The focus areas included:

- Plug-and-Play Payloads
- Universal Translator and Monitoring
- Field Swappable Aircraft Variants
- Automated Data-Feed Analytics
- Human Operational Effectiveness Policy
- Onboard Energy
- Cryogenic Engines, Superconducting Magnetic Energy Storage (SMES), and Induction Motor
- Onboard Protocols for Non-Traditional Systems
- Computational Efficiencies and Onboard Heat Management
- Human Interpretation and Traffic Management in a Flexible Airspace
- Automation, Qualification, and Subcomponent Packaging
- Virtual Accelerator from Distributed Prototyping to Scaled Production of Flight-Worthy Parts
- Integrated Communications and Sensors
- Detect and Avoid
- Security Assurance, Encryption, and Testing
- Alternative Airfield Technologies

This round emphasized direct collaboration with federal subject-matter experts and increased opportunities for commercialization and follow-on federal funding.

Strategic purpose: Move OFRN-supported technologies closer to transition and strengthen Ohio's competitiveness in securing SBIR/STTR and federal acquisition opportunities.

Round 4: Sustaining Ohio's Aeronautical Readiness and Innovation in the Next Generation (SOARING) Initiative Expansion (FY20–21)

Round 4 expanded the Sustaining Ohio's Aeronautical Readiness and Innovation in the Next Generation (SOARING) initiative model with more targeted investment in technologies prioritized by AFRL, NASA Glenn, and NASIC. These projects advanced:

- Onboard energy
- Integrated communications and sensors
- Detect and avoidance of threats and perimeter monitoring
- Field swappable aircraft variants
- Automated Data-Feed Analytics
- Onboard protocols for non-traditional systems
- Computational Efficiencies and Onboard Heat Management
- Human Interpretation and Traffic Management in a Flexible Airspace

This round also strengthened Ohio's innovation districts and increased engagement with small and mid-sized Ohio companies while advancing critical workforce and internship components.

Strategic purpose: Deepen Ohio's capabilities in emerging aerospace sectors— addressing technical and FAA certification challenges facing the Federal and State research entities and the Ohio aerospace industry. —while expanding industry participation and preparing for commercialization and production opportunities.

Round 5 (FY22–23)

Round 5 marked a pivotal stage in the evolution of the OFRN program. Over Fiscal Years 2023–2024, the OFRN portfolio advanced research in mission-critical domains aligned with the needs of Ohio's federal installations and high-growth technology sectors statewide. Rounds 5 and 6 established strong foundations in disciplines that continue to shape Ohio's competitiveness in defense, aerospace, and advanced manufacturing.

Round 5 focus areas directly supported the missions of the Air Force Research Laboratory (AFRL), National Air and Space Intelligence Center (NASIC), NASA Glenn Research Center, Naval Medical Research Unit–Dayton (NAMRU-D), and the Ohio National Guard. Round 5 Areas of Interest included:

- Vertical Take-Off & Landing (VTOL)
- Situational Awareness and Proliferated Surveillance Systems
- Patient care in austere and contested environments
- Personal Exposure Devices
- Acceleration Effects
- Improving Human-Machine Teaming Performance Using Brain-Machine Interface (BMI) Technologies
- Large Data Set Triage
- Journal Article Warning and Correlation
- Applications of commercial satellites to humanitarian, disaster, and defense topics
- Quantum Communications
- Advanced Power Systems Applicable to Aviation Propulsion, Micro-Grids, and Lunar Surface Operations

Strategic purpose: Strengthen Ohio's statewide research base by advancing foundational technologies essential to next-generation aerospace and defense capabilities. By targeting foundational technologies and enabling multidisciplinary collaboration, Round 5 strengthened Ohio's long-term ability to develop, transition, and commercialize innovations essential to national security and economic growth.

Specifically, Round 5 expanded Ohio's network of university–industry–federal partnerships. Projects brought together researchers from multiple Ohio universities with industry partners and federal lab subject-matter experts, creating applied R&D teams capable of moving technologies from concept to early prototype. These collaborations reinforced federal confidence in Ohio's R&D ecosystem and increased industry participation in defense-aligned innovation.

Moreover, Round 5 laid the groundwork for the more advanced work undertaken in Round 6, establishing the technical baselines, partner relationships, and statewide capacity required to accelerate progress in hypersonics, digital engineering, quantum sensing, and high-power energy systems.

Round 6 (FY24-25)

Fiscal Year 2024 underscored OFRN's value as a high-return, innovation-driven investment for the State of Ohio. Round 6 expanded the program into some of the most advanced, federally prioritized technology domains—hypersonics, human performance, high-power energy conversion, digital engineering tools, commercial space in low Earth orbit, and quantum sensing. These disciplines are essential to next-generation aircraft and spacecraft, space systems, advanced materials, modeling environments, and mission readiness capabilities needed by DoD and NASA today.

Across the year, six Round 6 projects operated statewide, each aligned to the critical technology priorities

of Ohio's federal partners. All six concluded their period of performance on June 30, 2025, delivering mission-relevant advancements in hypersonic materials processing, high-power energy systems, digital twin modeling frameworks, biotechnology and human performance tools, LEO in-space manufacturing, and quantum-enabled sensing technologies. This round further strengthened applied research ties with AFRL's 711 HPW and RX Directorates, NASIC, NASA Glenn's propulsion and space systems divisions, and Ohio National Guard autonomy and resilience initiatives.

These projects did far more than meet research milestones—they generated measurable economic and technological returns for the state. OFRN Round 6 projects collectively produced:

- $15,777,397 in follow-on funding
- $1,541,914 in industry and academic cost share
- 9 new jobs created in Ohio
- 2 new Ohio-based spinoff companies launched this year alone

This year's spinoffs—Fuse-X (The Ohio State University, Project 609) and the reactivated Star Phase Technologies (University of Akron, Project 619)—add to the total number of OFRN-enabled companies; today's total is 16. Each represents new jobs, new technologies, and new revenue streams anchored within the state's innovation economy.

The impact extends well beyond funding and commercialization. OFRN is also building the talent pipeline that Ohio's defense and aerospace sectors urgently need. Through the Student Experiential Engagement (SEE) program, 171 Ohio students—including 27 PhDs, 36 master's students, and 107 undergraduates from 15 colleges and universities—were embedded in Round 5 and Round 6 project teams. Students gained hands-on experience in prototyping, modeling, simulation, testing, and advanced R&D while working directly with Ohio companies and federal mission partners. Importantly, the SEE program has opened pathways for students to remain in Ohio, enabling them to transition into full-time roles at Ohio companies, federal laboratories, and university research centers.

This workforce development impact ensures that state investments produce long-term economic benefit and that Ohio remains competitive in critical technology fields such as hypersonics, advanced materials, AI/ML, biotechnology, and energy systems.

> *"Each of our students has moved on to further their career trajectories post-project. Ritter went on to employment at WBAFB; Piyush and Lovelass are pursuing their bachelor's degrees in computer science (at Wright State University and Ohio State University respectively); Sanuk not only continues completing his computer science degree at Miami University but was hired by Kairos for a part-time position following his OPTICS work." -- Kairos round 6 project*

Together, these outcomes demonstrate that OFRN continues to multiply the impact of every state dollar invested—attracting federal resources, catalyzing commercialization, strengthening Ohio's high-tech workforce, and advancing the mission needs of Ohio's federal installations.

Round 7 (FY26-27)

Round 7 represents a strategic evolution of the OFRN program. In FY26, OFRN awarded $10.198 million to seven collaborative research projects, expanding the portfolio into new technological areas driven by urgent state and federal needs. Round 7 deliberately extends OFRN's reach into disciplines that directly support Air Force Science & Technology Strategy, NASA Glenn mission requirements, National Defense Industrial Strategy (NDIS), JobsOhio's innovation sectors, and statewide economic development goals in aerospace, materials, energy, and digital systems.

Round 7 projects strengthen Ohio's competitiveness by focusing on interdisciplinary R&D that advances capabilities in:

1. **Advanced Materials & Manufacturing for Defense and Space**
   Projects expand on critical materials supply for aerospace, composite systems, additive manufacturing, and high-temperature materials. These technologies directly support AFRL's structural materials portfolio, NASA Glenn propulsion research, and Ohio's advanced manufacturing clusters.
2. **Digital Engineering, Autonomy, and Model-Based Systems Development**
   Building on Round 6's digital engineering gains, Round 7 accelerates AI-powered modeling, simulation, and digital twin technologies that reduce design cycles for next-generation aerospace systems. This aligns with federal modernization initiatives to digitize the entire acquisition lifecycle.
3. **Energy Systems & Electrification Technologies**
   Round 7 includes work on high-efficiency power systems, advanced energy conversion, and grid-relevant technologies, supporting both DoD energy resilience priorities and NASA electrified propulsion efforts.
4. **Biomedical & Human-Centered Technologies**
   Several Round 7 efforts address the intersection of aerospace demands and human performance—supporting NAMRU-D's medical research mission and the Air Force's need for improved physiological monitoring and performance optimization tools.
5. **Autonomous and AI-Enabled Systems**
   Round 7 further strengthens Ohio's research base in autonomy, leveraging statewide industry–academic teams to build systems that support Ohio National Guard, AFRL autonomy programs, and future Intelligent Air Mobility initiatives.
6. **Space and LEO Mission Support Technologies**
   Projects support NASA Glenn's spaceflight systems, materials for in-space manufacturing, and commercial space partnerships—helping Ohio companies transition into the rapidly growing LEO economy.
7. **Quantum Technologies**
   Round 7 advances Ohio's leadership in quantum science by supporting the development of quantum communication, computation, and sensing technologies critical to future defense and space missions. These projects focus on enabling higher-fidelity quantum systems, improving robustness in operational environments, and strengthening Ohio's role in national quantum technology initiatives led by AFRL, NASA, and the broader DoD enterprise.

Additionally, Round 7 continues the SEE program, which provides STEM students across the state and particularly from collaborator universities the opportunity to work on the Round 7 state-funded R&D projects. This unique opportunity enables students to gain practical experience, advance their portfolios and curriculum vitae, as well as work directly for Ohio small businesses. The goal of the SEE program is to enable student retention in the Ohio workforce following completion of their studies.

> *"The targeted outcome is to turn the students into highly employable engineers and scientists who can plug directly into the industrial work force or at AFRL/NASA GRC, i.e.... because our staff includes former academics, we are also uniquely suited to help student interns navigate the gap between academic and industry research cultures" -- Kairos Round 7 Project.*

Why Round 7 Matters: Strategic Expansion for State and Federal Needs

Round 7 marks an important shift toward deeper integration with state and federal priorities. The selected projects:

- Address new, urgent capability gaps identified by federal mission partners
- Strengthen Ohio's research institutions in critical, high-growth disciplines
- Support Ohio National Guard modernization in autonomy, sensing, and resilience
- Support development of the State of Ohio's quantum R&D infrastructure
- Advance NASA's goals for propulsion, materials, and spaceflight systems
- Build supply-chain readiness for defense, aerospace, and energy sectors
- Create new commercialization pathways for Ohio companies
- Expand the state's technical workforce through multidisciplinary R&D

Moreover, the selected projects span critical technology areas—hypersonics, human performance, aerospace power systems, commercial space, quantum technologies, autonomy, and advanced materials—and represent collaborations among 7 Ohio research institutions and 11 industry partners. Collectively, the projects are projected to create 64 new jobs, generate more than $69 million in follow-on funding, and leverage over $3.5 million in cost share commitments.

Thus, this round strengthens Ohio's role as a national leader in defense and aerospace innovation and ensures that the state continues to meet rising federal demands in next-generation systems, space technologies, and mission-critical R&D.

Appendices

Appendix 1: Round 6 (FY24-25) Portfolio Results

Portfolio Engagement

The OFRN continued a monthly cadence with the current portfolio. The OFRN Executive Director 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 Executive Director 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 (SME) within the various federal agencies.

Increased SBIR/STTR Connectivity

In addition to the over $27M 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. Matchmaking services were provided between multiple universities and small businesses to develop teams to submit for SBIR/STTR opportunities throughout this reporting period. Both selected and non-selected OFRN teams were referred to the APEX partnership intermediary agreement for assistance with Air Force and Space Force SBIR opportunities and follow-on transition support.

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 (Figure 12)

To accomplish our goals to increase SBIR/STTR Connectivity and BAA Awareness Connectivity, OFRN offered its first Opportunity Day on February 3, 2022, on the topic of NASA Quantum Communications and AFRL Digital Engineering. Since then, the Opportunity Days have become an ongoing quarterly virtual event that further connects and enlarges our network of government, academic, and industry partners, based on posted opportunities and customer discussions. These events feature thought leader presentations from Federal Partners, Academia, and Industry, networking, program status updates from OFRN leadership, and Q&A sessions. Since the inception of the Opportunity Days in 2022, there have been

- 11 Opportunity Day events

Figure 12: OFRN Opportunity Days Sept. 2024 - May 2025

- 29 thought leader presentations
- 900+ participants

During this fiscal year, OFRN's hosted three virtual Opportunity Days that had over 250 attendees from industry, government, and academia. Thought leaders from AFRL, NASA GRC, Defense Innovation Unit (DIU), Dayton Development Coalition, and Parallax Advanced Research presented topics such as Hypersonics, Autonomy, and Human-Machine Teaming.

Expanding New Horizons with the Air Force Research Laboratory (AFRL) and OFRN (Figure 13)

To accomplish our goal to increase Connectivity, on September 23, 2024, key stakeholders in aerospace and defense joined to expand collaborative research and innovation between AFRL and OFRN. The aim of the event was to broaden and deepen mutual awareness and collaboration opportunities between AFRL and the Industrial and Academic communities in Ohio as enabled by the OFRN program.

The event took place at the Hope Hotel located in Dayton, OH near the gate to AFRL at Wright-Patterson Air Force Base. The event included an OFRN overview presentation by Mark Bartman, Maj Gen (Ret.), USAF, OFRN Executive Director; followed by briefings from OFRN's federal partners located at WPAFB: NAMRU-D Overview by Dr. Richard Arnold, Director, Naval Aerospace medical Research Laboratory (NAMRUL); NASIC overview by Steven Zech, Director, Future Capabilities and Assessment (A9) and Chief Data Officer; and an AFRL Overview by Brian McJilton, AFRL Small Business Director. The federal partner overviews were then followed by OFRN Rounds 5, and 6 project presentations with Q&A. In the afternoon, participants were shuttled to WPAFB where they toured the AFRL 711 HPW and RX facilities.

Figure 13: AFRL/OFRN Expanding New Horizons Briefing

Celebrate Ohio!

On February 19, leaders from government, academia, and industry came together at the Ohio Statehouse not just to reflect, but to highlight the future of research and innovation in Ohio. ***Celebrate Ohio!,*** hosted by the OFRN, showcased cutting-edge technologies and partnerships that are driving economic growth, national defense innovation, and research excellence. The event brought attention to *OFRN*'s critical role in connecting institutions and catalyzing impact across Ohio.

From Groundbreaking Research to Real-World Impact The event highlighted Round 6 OFRN-funded projects, with teams presenting their technologies to an audience that included members of the Ohio Legislature, federal partners, academia, and representatives from ODHE, JobsOhio, and the Governor's Office. Table displays highlighted innovations from Ohio's universities, small businesses, and research institutions, while speakers emphasized how public-private-academic partnerships are strengthening the state's national and global competitiveness.

Partnerships

"The OFRN has served as a nucleus over the last 10 years – bringing federal partners together, aligning future goals, and synthesizing that into coherent, cross-agency activities."

Dr. Timothy J. Bunning, chief technology officer, Air Force Research Laboratory

Key Messages from Featured Speakers:

Mike Duffey, Chancellor, Ohio Department of Higher Education

- Emphasized the economic impact of research and OFRN's role in job creation
- Highlighted the connection between innovation and workforce development

Rodney Rogers, President, Bowling Green State University

- Underscored the value of linking university research to national and industry needs

> *"The creativity you're hearing about from those individuals that are part of these projects makes me pretty excited about where the puck is headed," said Rodney K. Rogers, Ph.D., president, Bowling Green State University pointing to the real potential for innovation when research is deeply connected to industry and national needs.*

Timothy Bunning, Chief Technology Officer, Air Force Research Laboratory

- Highlighted OFRN's role as a central hub for aligning federal goals and fostering coordinated, cross-agency collaboration over the past decade

Dean Zody, CEO, GhostWave Inc.

- Represented the small business perspective and value of *OFRN*-funded collaborations

Tehran Davis, Senior Research Scientist, Kairos Research

- Shared how collaboration with Wright State and Sinclair has led to lasting research opportunities

Maj. Gen. Mark Bartman (Ret.), Executive Director, *OFRN*

- Discussed *OFRN*'s role in aligning federal priorities with regional research strengths
- Their collective message: collaboration between research institutions and federal agencies isn't just a smart strategy, it's essential.

Partnerships

"It's not just about the projects themselves – it's about the partnerships that are forming. The work we've been doing with Wright State and Sinclair has translated into other opportunities… and those partnerships will exist long after this particular project is over."

Tehran Davis, Ph.D., senior research scientist, Kairos Research.

A Hub for Connections—And Growth

Many attendees spoke about OFRN's success in convening the right people at the right time to drive innovation. The project teams present shared how their collaborations, supported by OFRN funding, have already opened doors for additional research, commercialization opportunities, and continued federal partnerships.

Outreach – Event Participation

National Advanced Air Mobility Industry Forum (August 20-21, 2024) was an event hosted by the Dayton Development Coalition (DDC) at Clark State College's Performing Arts Center/Hollenbeck Bailey Creative Arts and Conference Center and the Springfield-Beckley Municipal Airport. OFRN in partnership with Parallax Advanced Research and the Ohio Aerospace institute was a sponsor of the event. The event featured exhibits from a variety of AAM industry members, flight demonstrations, static displays, speakers and panelists, and eVTOL and UAV aircraft, manufacturers, and suppliers.

2025 State of Tech (February 6, 2025) This was the second annual OhioX State of Tech event and was held in Columbus, Ohio. OFRN/Parallax Advanced Research was a sponsor of this event that offered participants a prime opportunity to connect with key leaders in Ohio's technology sector, gain insights into the latest developments, and hear exciting plans for 2025 and beyond. Participants had the chance to network and build relationships with tech-focused leaders and professionals from across Ohio. The symposium featured an educational workshop, an update on AAM innovation in Ohio, a networking reception, a career panel and a keynote from Joby.

5th Annual Ohio Air Mobility Symposium (February 25, 2025). This student organized event was held at the Blackwell Inn located on The Ohio State University campus. The annual event highlights Ohio's ongoing commitment to advancing air mobility. The goal of the event was to engage and connect Oho

State students with the growing advanced air mobility industry.

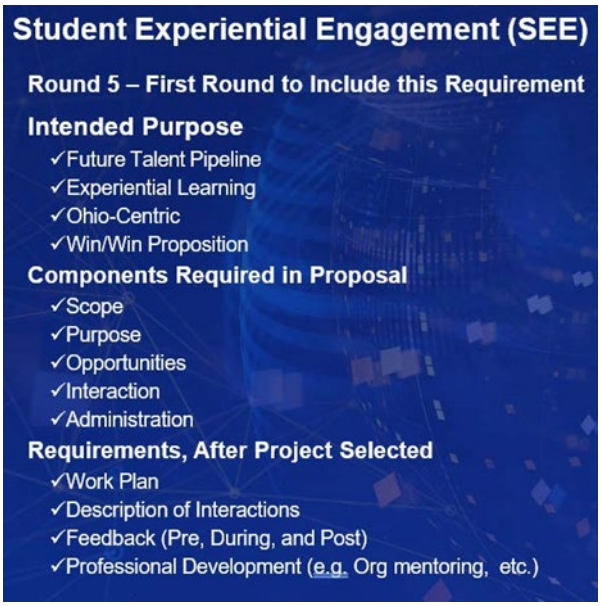
In addition to formal panels and exhibits, OFRN was also represented by Maj Gen (Ret) Mark Bartman throughout the fiscal year at the following events:

- 2024 Innovation & Capital Summit, Columbus, OH (July 11, 2024)
- IEEE Conference, Dayton, OH (July 18, 2024)
- Ohio Cyber Conference, Columbus, OH (July 22, 2024)
- LCID/WDI, Dayton, OH (July/August 2024)
- NDIA Emerging Technology Conference, Washington DC (August 7-9, 2024)
- National Advanced Air Mobility Industry Forum, Springfield, OH (August 20, 2024)
- National Guard Association of the United State Conference, Detroit, MI (August 23-25, 2024)
- Orbit Ohio Space Industry Roundtable, Cleveland, OH (August 28, 2024)
- OFRN Opportunity Day, Hypersonics, Virtual (September 12, 2024)
- Air, Space and Cyber Conference, Washington DC (September 15-18, 2024)
- AFRL/OFRN Expanding New Horizons, Dayton, OH (September 23, 2024)
- Innovation Day Panel at Youngstown State University (October 11, 2024)
- AI Horizons Conference, Pittsburgh, PA (October 14-15, 2024)
- 6th Annual Ohio Cyber Range Institute Symposium, Cincinnati, OH (October 16, 2024)
- Institute for Cybersecurity and Digital Trust Annual Symposium, Ohio State University (October 22, 2024)
- Keystone Space Collaborative Conference, Panel Member, Pittsburgh, PA (October 28-29, 2024)
- Ohio AI Summit, Columbus, OH (November 20, 2024)
- CyberOhio Summit, Columbus, OH (December 5, 2024)
- Ohio Aerospace and Aviation Subcommittee Testimony on OFRN, Columbus, OH (December 10, 2024)
- OFRN Brief to YSU President and Provost, Youngstown, OH (January 15, 2024)
- 2025 State of Tech, Ohio X, Columbus, OH (February 6, 2025)
- OFRN Brief for Research Officers Council Meeting, Virtual (February 10, 2025)
- OFRN Celebrate Ohio!, Statehouse, Columbus, OH (February 19, 2025)
- Ohio Space Industry Roundtable, virtual (February 20, 2025)
- Ohio Air Mobility Symposium, Springfield, OH (February 25, 2025)
- OFRN Testimony to Ohio House Workforce and Higher Education Committee, Columbus, OH (February 26, 2025)
- OFRN brief to T3 Summit, Dayton, OH (March 13, 2025)
- Ohio X GovTech Industry Roundtables, Statehouse, Columbus, OH (April 9, 2025)
- 2025 AIAA Defense Forum, Johns Hopkins Applied Physics Laboratory, MD (April 14-17, 2025)
- 2025 Ohio Tech Summit, Columbus, OH (May 8, 2025)
- OFRN Testimony to Ohio Senate Higher Education Committee, Columbus, OH (May 15, 2025)
- AFRL Quantum Discussion, virtual (May 21, 2025)
- OFRN Testimony to Ohio Senate Finance Committee, Columbus, OH (May 29, 2025)
- Ohio Chamber Aerospace and Aviation Summit, Columbus, OH (June 3, 2025)

- Quantum Strategy Meeting with IBM, AFRL, JobsOhio & Industry, Dayton, OH (June 31, 2025)

Workforce Development

The Student Experiential Engagement Experience (SEE), Figure 14, 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.



Round	Total	Ph.D.	Masters	Undergrad
6	75	14	12	49
5	95	13	24	58
Total	**170**	**27**	**36**	**107**

Figure14: OFRN SEE Components and Participation

The SEE has had student interns from:

- Air Force Institute of Technology (AFIT)
- Bowling Green State University
- Case Western Reserve University
- Central State University
- Kent State University
- Miami University
- Ohio University
- The Ohio State University
- Sinclair Community College
- University of Akron
- University of Dayton
- University of Toledo
- Wright State University
- Youngstown State University

Students gained hands on experience during their internships. Some examples of hands-on experience include (Figures 15 & 16):

- ARCTOS student interns had a variety of roles including developing AM test samples, conducting material tests, processing material test data, and assisting in test part builds.
- The Ohio State University project 609 “Structural Materials Joining in Space” had students that were a part of a LUNARWELD team that traveled to Santa Maria, California where they conducted parabolic flights to simulate microgravity and lunar gravity conditions in a vacuum chamber.

Figure 15: OSU Lunar Weld Parabolic Flight Student Team

Eugene Choi said, "I'm incredibly fortunate to be at the forefront of a groundbreaking industry. This research isn't just about pushing boundaries; it's a pivotal leap towards constructing structures on lunar surfaces and beyond, shaping the future of space exploration. I'm deeply grateful to be part of this project—it means everything to me to contribute to something that could fundamentally change how we explore and utilize space."

Figure 16: OSU Lunar Weld Team Member Eugene Choi on Parabolic Flight

Sarah Huetter also said, "Being part of this project has truly realized my dream of working with NASA. It's an incredible opportunity to be involved in this research that could redefine space manufacturing. Every challenge and learning moment here is a testament to how far we've come, and I'm deeply grateful for the chance to contribute to this effort."

A complete story can be found at https://ohiofrn.org/news/blogs/ohio-federal-research-network-funds-ohio-states-structural-materials-joining-space.

- GhostWave project 602 had students throughout the project. The largest contributions came from the MS and PhD students. The project benefited in data analysis and deeper understanding of FPGA functionality along with simulation and modelling. With the collaboration for Ohio State and UDRI, Ohio is expanding work with Quantum Sensor utilization.

One aspect of the Student Experiential Engagement Experience (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.
- AlphaMicron project 529: Jacob Huff, a student intern for the project, stayed in Ohio after graduation. He was hired as an electrical product engineer by Aptiv, located in Warren Ohio, where he models and designs automotive, solid state electrical centers.
- Safran project 550: Two students were hired as full time employees. Both completed multiple co-op rotations, taking on increasing levels of responsibility. Today, they support industrialization and design efforts for new product development at the Twinsburg facility.

Improved Processes

Through state-wide engagement with our stakeholders, we are committed to continuous improvement and have continued to identify and make improvements throughout the fiscal year to continue to satisfy the 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 2025, we continued the in-person Expanding Horizons event focusing on AFRL. 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.

Round 7 Solicitation - FY25 Timeline

The OFRN Round 7 Solicitation was released on February 4, 2025, with a pre-release on December 27, 2024. The solicitation process will conclude in FY26.

OFRN received 47 proposals. Below is a timeline of the RFP process.

- August 22, 2024 – Federal Partners meet in person for AOI planning.
- October 24, 2024 – Federal Partner SMEs meet in person to begin planning AOI subtopics
- December 27, 2024 – OFRN Round 7 Opportunity Announcement Pre-Release
- February 4, 2025 – OFRN Round 7 Opportunity Announcement Released
- February – March 2025 – OFRN Round 7 proposer sessions:
    - Feb. 10, 25, & Mar. 20, 2025 – virtual information sessions and Q&A with Federal Subject Matter Experts (SME)
    - Mar. 6, 2025 - virtual bidders conference and proposal training
- April 28, 2025 – Proposal submission deadline
- May 12 – 23, 2025 - Federal SMEs screen proposals for federal alignment. All proposals went forward as Finalists.
- May 28, 2025 - Technical Review Council (TRC) review kick off meeting. TRC begins their individual reviews of the Finalist proposals.
- June 17, 2025 – TRC met to collectively discuss/review proposals and make award recommendations. One proposal from each AOI was recommended for award.
- July 31, 2025 – Executive Review Board (ERB) will meet in person. TRC chair will present award recommendations for approval.
- August 5, 2025 - Award projects and contracting process began.

Appendix 2: Round 6 Projects

Hypersonics: Gradient Alloy Processing in Laser Powder Bed Fusion for Hypersonic Applications	
OFRN Project Number: 625	**Status:** Completed
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 5	**Total Jobs Created:** 4
Total Follow-on Funding: $1,200,000	**Total Cost Match:** $110,649
Lead: ARCTOS Technology Solutions	**Federal Partner:** NASA GRC
Team: Ohio University, University of Toledo, GoHypersonic Inc., Hyphen Innovations	

Project Description (Figure 17): 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.

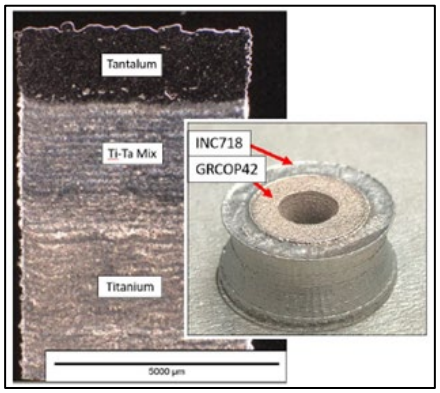


Figure 17: Gradient Alloy Processing

Results to Date: ARCTOS designed and installed multi-hopper powder deposition systems specific to LPBF AM printers1 at Ohio University (OU) and University of Toledo (UT). The schools then printed, tested and characterized-various coupons and tensile bars of the 17-4SS, In718, and TNIA alloys, and their mixtures. With this data GoHypersonic, Inc. (GHI) modeled and designed representative HS LE parts to be built by the universities and then evaluated by GHI in a thermomechanical test rig of their own design. In practice, both Ohio universities were able to collect valuable data on the as-printed alloys and their mixtures, and OU was able to print two example LE parts with different styles of transition between the high-temperature (In718) and high-strength (17-4SS) regions of the part. UT was able to create graded test coupons but could not complete full LE parts from TNIA to In718. Due to complications during the building process, not related to the transition region, the OU parts could not be fully evaluated on GHI's rig.

Impact on Ohio: The execution of the project impacted the State by establishing competence in GAP methodology at two Ohio universities at a key moment for the development of this technology of critical interest to Defense and Ohio's major Federal institutions. The project created 4 and retained 3 jobs across the team, and set several students, via co-ops and internships, on the path of working in these areas. $1.2M in follow-on funding was secured during the project and an additional $3-5M is projected.

Human Performance: Ocular and Physio-Temporal Indicators for Cognitive State (OPTICS)	
OFRN Project Number: 624	**Status:** Completed
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 6	**Total Jobs Created:** 3
Total Follow-on Funding: $1,350,397	**Total Cost Match:** $912,908
Lead: Kairos Research LLC	**Federal Partner:** AFRL, NAMRU-D
Team: Sinclair Community College, Wright State University, The Entrepreneurs' Center	

Project Description (Figure 18): 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).

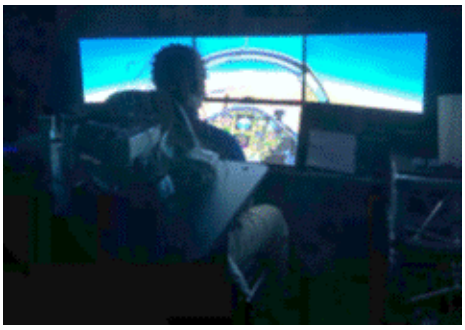


Figure 18: Experimental Setup In AFRL Lab To Study Fatigue In Long-Haul Flight Tasks

Results to Date:

OPTICS developed a TRL6 prototype real-time fatigue detection system using eye-tracking and physiological indicators. The system achieved effective predictive performance (AUC =0.78) through a computationally inexpensive machine learning approach and featured a configurable dashboard to provide continuous monitoring and timely intervention alerts, facilitating operator performance and mission effectiveness. The OPTICS system successfully integrates commercial-off-the shelf sensors through open-source frameworks, enabling deployment across different operational contexts while maintaining cost-effective scalability for widespread use.

Impact on Ohio: Intellectual property development is underway with provisional patent applications planned for our fatigue detection methodology and integrated sensor-to-dashboard architecture. Through collaboration with Ohio federal partners, the project strengthened Ohio's position in human performance monitoring and cognitive state analytics research.

High Power Energy Conversion: High Bandwidth Light Weight Modular GaN Based Utility Interactive DC Emulator	
OFRN Project Number: 619	**Status:** Completed.
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 4	**Total Jobs Created:** 0
Total Follow-on Funding: $2,769,000	**Total Cost Match:** $434,871
Lead: University of Akron	**Federal Partner:** AFRL, NASA GRC
Team: Case Western Reserve University, PC Krause & Associates	

Project Description (Figure 19): 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.

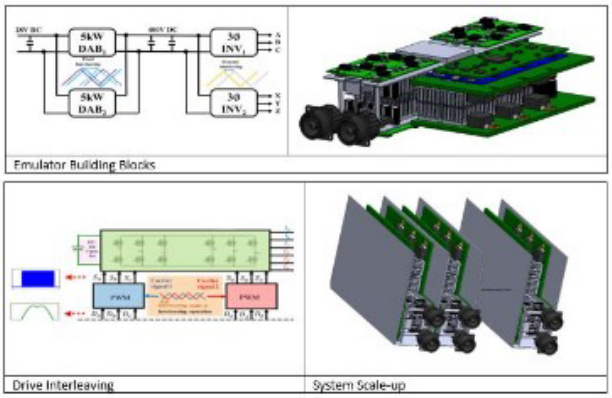


Figure 19: Project 619 Technical Concept and Approach

Results to Date: All promised tasks and milestones have been successfully delivered. The project team has designed, built and demonstrated the operation of two 5 kW Dc Emulator synthesizing 5 kHz waveforms for bi-directional power flow. Throughout the duration of the project, the team concentrated on broadening the implementation of DAB converters in a variety of sectors. A notable application included integrating the converter with a three-phase inverter, specifically designed to enhance motor drive operations in UAVs. This innovative approach has led to the development of a high-performance 10 kW electric machine drive tailored for UAV applications. This achievement enabled the establishment of a startup company, Star Phase Technologies which will be utilized to commercialize the modified emulator.

Another application involves utilizing the converter for energy mapping of battery packs in electric vehicle (EV) applications, which could also be adapted for aerospace purposes.

Impact on Ohio: A provisional patent has been submitted for this aspect of the converter's use. The Project team received new industry and federal funding. The most prominent one is the US DOE ARPA-E funding from the recent Vision program for $2.3M.

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:** Completed
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 5	**Total Jobs Created:** 5
Total Follow-on Funding: $2,380,000	**Total Cost Match:** $171,917
Lead: CFD Research	**Federal Partner:** AFRL
Team: Air Force Institute of Technology (AFIT), Wright State University, Dr. Bill Oberkampf	

Project Description (Figure 20): 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.

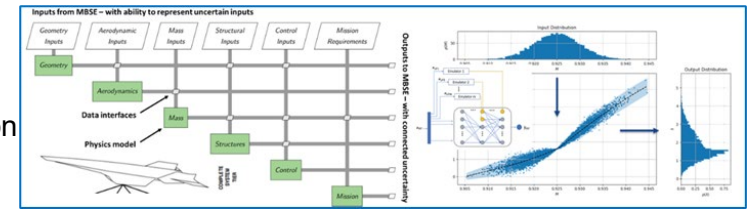


Figure 20: Project 268 Technical Concept and Approach

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 OFRN effort afforded the opportunity to pursue digital engineering technology focused on uncertainty quantification. Under the effort we were able to implement a first-of-its-kind framework which directly coupled system engineering models with modeling and simulation tools to provide interactive assessment of system performance with quantified uncertainty. Further, we utilized machine learning techniques in the form of surrogate models to provide the assessment more rapidly. Under the effort we demonstrated the uncertainty quantification for a hypersonic vehicle.

Impact on Ohio: The present OFRN effort led to direct creation of two full-time roles for a pair of engineers at CFD Research Corporation. Over the course of the project, we actively pursued multiple opportunities to build upon the capability developed in the present effort and its constituent technologies. The technology and expertise developed under the OFRN effort contributed to our ability to pursue, and ultimately obtain, projects with the Department of Defense. $2.38M of additional funding has created five jobs for our office in Dayton.

The OFRN effort afforded the opportunity to pursue digital engineering technology focused on uncertainty quantification. Under the effort we were able to implement a first-of-its-kind framework which directly coupled system engineering models with modeling and simulation tools to provide interactive assessment of system performance with quantified uncertainty. Further, we utilized machine learning techniques in the form of surrogate models to provide the assessment more rapidly. In addition to the technical takeaways, the OFRN effort afforded opportunities to grow collaboration between CFD Research and multiple Ohio-based Universities. The professors at the Air Force Institute of Technology and Wright Statue University brought unique expertise to the effort. We have pursued follow-on efforts with these researchers, and we plan to look for future opportunities to collaborate. Finally, our team was able to meet regularly with AFRL/RQ personnel and their Digital Engineering Working Group. Technology transition discussions are ongoing with AFRL.

Commercial Space in Low Earth Orbit: Structural Materials Joining in Space	
OFRN Project Number: 609	**Status:** Completed
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 3	**Total Jobs Created:** 12
Total Follow-on Funding: $1,502,999	**Total Cost Match:** $218,807
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 (Figure 21): 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.

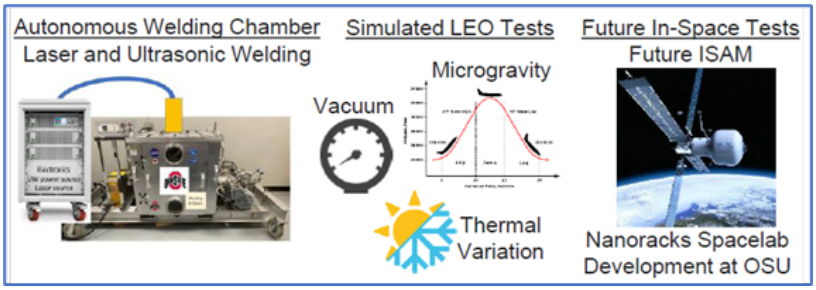


Figure 21: Project 609 Technical Concept and Approach

Innovator

"The Ohio Federal Research Network award has greatly improved Agile Ultrasonic's technology and standing in the composites industry as a result of new data it was able to produce during the Welding in Space effort lead by OSU."

Jim Stratton
President
Agile Ultrasonics

Results to Date:

- Instrumentation for simulating space conditions was complete and used to produce unique experimental data for welding in space conditions with a variety of materials.
- Startup company Fuse-X LLC spun out for welding in space and has already submitted a NASA SBIR proposal in collaboration with industry.
- Agile has product sales of $100,000.
- More SEE students are engaged than was originally planned.
- 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 monthly

Impact on Ohio: The project helped establish Ohio as a national leader in ISAM technologies. It catalyzed more than $11M in potential follow-on funding from agencies, and contributed to partnerships with other companies like Nanoracks, Agile Ultrasonics, and Lincoln Electric. The work developed in this work will enable the development of a welding system intended for future deployment aboard the Starlab space station being developed in Columbus, OH. This places the state in the leadership position in space manufacturing.

Quantum Sensing Technology: Quantum Sensor System using Rydberg Atoms	
OFRN Project Number: 602	**Status:** Completed
Project Start: 10/29/2023	**Projected Project End:** 6/30/2025
Current TRL: 4	**Total Jobs Created:** 2
Total Follow-on Funding: $380,000	**Total Cost Match:** $168,765
Lead: GhostWave	**Federal Partner:** AFRL and NASA
Team: The Ohio State University, University of Dayton Research Institute, Converge Technologies, Infleqtion	

Project Description (Figure 22): 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 fidelit 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.

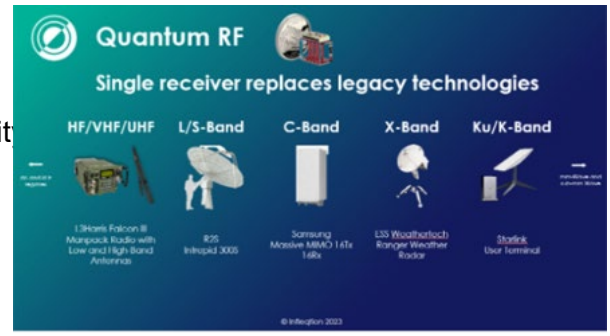


Figure 22: Project 602 Technical Concept and Approach

Results to Date: Both the classical antenna (gain 3 dBi at 2.5 GHz) and Rydberg sensor successfully detected the GhostWave waveform and resulted in successful "detection" response from the processing FPGA system.

Impact to Ohio: Because of this project, the team was able to meet with Ohio legislature on advancing Quantum Sensors awareness in the state of Ohio. The team is pursuing follow-on funding to improve sensor SWAP and Ruggedization. Commercialization is still a few years away due to the TRL level. However, the team is engaged with AFRL and NASA.

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

Appendix 3: Partners

Federal Government

1. Air Force ResearchLaboratory
2. NASA Glenn
3. National Air and Space Intelligence Center
4. Naval Medical Research Unit-Dayton
5. Ohio National Guard

Federal & State Collaborators

1. Air Force Material Command
2. Ohio National Guard
3. Ohio Department of Transportation
4. Ohio Department of Development
5. Ohio Innovation Fund
6. Ohio Academy of Science
7. Ohio Space Grant Consortium
8. Ohio Aerospace Institute

Academic Collaborators

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

Industry Collaborators

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

Appendix 4: Program Expenditures & Costs

Funds Expended Report – As of 30 June 2025 (Figures 23 - 26)

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, 2024 - June 30, 2025

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	$22,123	$371	$0	$22,494
THE OHIO STATE UNIVERSITY PROJECTS (303) & ADMIN	$2,180,596	$2,180,596	$0	$0	$2,180,596
FLIGHTPROFILER (PROJECT 502)	$29,731	$29,731	$0	$0	$29,731
ASYMMETRIC (PROJECT 528)	$113,006	$113,006	$0	$0	$113,006
MIAMI UNIVERSITY (PROJECT 552)	$19,667	$19,667	$0	$0	$19,667
THE OHIO STATE UNIVERSITY (PROJECT 542)	$8,636	$8,636	$0	$0	$8,636
TOTAL	$6,900,000	$6,899,629	$371	$0	$6,900,000

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 23: OFRN Funds Expended Report Round 3

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, 2024 - June 30, 2025

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	$2,136,370	$22	$331	$2,136,392
TOTAL	$9,578,500	$9,578,147	$22	$331	$9,578,169

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 24: OFRN Funds Expended Report Round 4

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, 2024 - June 30, 2025

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	$1,739,488	$0	$0	$1,739,488
ASYMMETRIC TECHNOLOGIES (PROJECT 528)	$1,233,998	$1,233,998	$0	$0	$1,233,998
ALPHAMICRON (PROJECT 529)	$849,999	$849,999	$0	$0	$849,999
THE OHIO STATE UNIVERSITY (PROJECT 542)	$951,943	$951,943	$0	$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	$2,661,804	$49,941	$0	$2,711,745
TOTAL	$9,900,000	$9,850,059	$49,941	$0	$9,900,000

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 25: OFRN Funds Expended Report Round 5

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)
Note: OFRN Round 5 administration time and effort moved back to round 5: $215,641.89 (FY25)

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, 2024 - June 30, 2025

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)	$1,020,120	$321,957	$533,412	$164,751	$855,369
THE OHIO STATE UNIVERSITY (PROJECT 609)	$1,223,710	$115,534	$762,844	$345,332	$878,378
UNIVERSITY OF AKRON (PROJECT 619)	$1,150,607	$14,668	$779,440	$356,499	$794,108
KAIROS (PROJECT 624)	$1,190,000	$327,857	$862,143	$0	$1,190,000
ARCTOS (PROJECT 625)	$1,198,492	$312,608	$760,964	$124,921	$1,073,572
CFD (PROJECT 628)	$1,234,926	$198,192	$842,559	$194,176	$1,040,750
FLIGHTPROFILER (PROJECT 502)	$71,969	$71,969	$0	$0	$71,969
ASYMMETRIC (PROJECT 528)	$106,850	$106,850	$0	$0	$106,850
THE OHIO STATE UNIVERSITY (PROJECT 542)	$14,641	$14,641	$0	$0	$14,641
SAFRAN (PROJECT 550)	$190,920	$190,920	$0	$0	$190,920
MIAMI UNIVERSITY (PROJECT 552)	$301,432	$301,432	$0	$0	$301,432
OFRN ADMINISTRATION	$2,646,333	$1,299,289	$871,094	$475,950	$2,170,383
TOTAL	$10,350,000	$3,275,916	$5,412,456	$1,661,628	$8,688,372

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 26: OFRN Funds Expended Report Round 6

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).
Note: OFRN Round 5 administration time and effort moved back to round 5: $215,641.89 (FY25)

Cost Share Contribution Report – As of 30 June 2025 (Figures 27 – 30)

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, 2024 - June 30, 2025

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 27: OFRN Cost Share Contribution Report Round 3

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 133rd G.A.

Recipient:	Parallax Advanced Research
Project:	Ohio Federal Research Network - Cost Share Contribution
Reporting Period:	July 1, 2024 - June 30, 2025

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 28: OFRN Cost Share Contribution Report Round 4

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.: 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, 2024 - June 30, 2025

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	$218,065	$0	$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	$1,097,702	$0	-$14,176	$1,097,702
ALPHAMICRON (PROJECT 529)	$349,688	$350,000	$0	-$313	$350,000
THE OHIO STATE UNIVERSITY (PROJECT 542)	$287,559	$323,585	$0	-$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	$4,087,634	$0	$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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 29: OFRN Cost Share Contribution Report Round 5

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, 2024 - June 30, 2025

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	$85,134	$83,631	$198,870	$168,765
THE OHIO STATE UNIVERSITY (PROJECT 609)	$181,951	$9,257	$209,551	-$36,857	$218,808
UNIVERSITY OF AKRON (PROJECT 619)	$346,059	$15,471	$419,401	-$88,812	$434,871
KAIROS (PROJECT 624)	$810,000	$299,528	$613,381	-$102,908	$912,908
ARCTOS (PROJECT 625)	$108,031	$52,353	$58,296	-$2,618	$110,649
CFD (PROJECT 628)	$76,704	$2,547	$157,655	-$83,498	$160,202
TOTAL	$1,890,379	$464,290	$1,541,914	-$115,825	$2,006,204

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: 12/8/2025

Typed Name: Dennis Andersh

STATE USE ONLY BELOW THIS LINE

CAP: _____

Project Administrator: _____ Date: _____

Figure 30: OFRN Cost Share Contribution Report Round 6

Appendix 5: Finances – OFRN Funds Allocation (Figures 31 – 32)

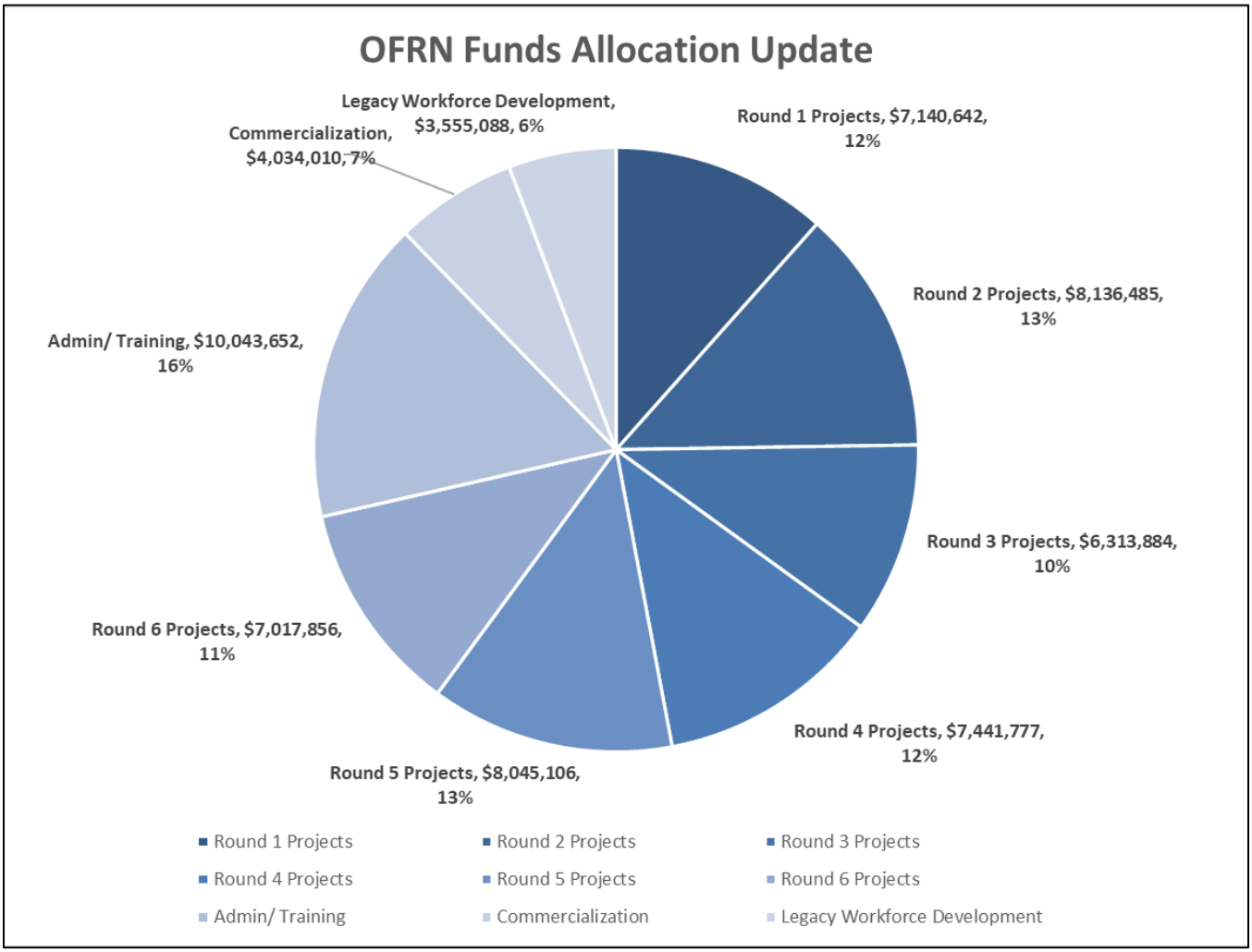


Figure 31: OFRN Funds Allocation update 6/30/2025

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 FY25. Figure 11 shows the percentage breakdown by category.

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	$22,123	$371	$0	$22,494							$9,445	$13,049		$22,494	-$22,494	$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	$29,731	$0	$0	$29,731					$29,731					$29,731	-$29,731	$0
ASYMMETRIC (PROJECT 528)	$113,006	$113,006	$0	$0	$113,006					$113,006					$113,006	-$113,006	$0
MIAMI UNIVERSITY (PROJECT 552)	$19,667	$19,667	$0	$0	$19,667					$19,667					$19,667	-$19,667	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$8,636	$8,636	$0	$0	$8,636					$8,636					$8,636	-$8,636	$0
TOTAL	**$6,900,000**	**$6,899,629**	**$371**	**$0**	**$6,900,000**	**$0**	**$0**	**$6,313,884**	**$0**	**$171,040**	**$0**	**$245,636**	**$169,440**	**$0**	**$6,900,000**	**-$6,900,000**	**$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	$2,136,370	$22	$331	$2,136,392							$1,172,409	$964,315		$2,136,723	-$2,136,392	$331
Subtotal	**$9,578,500**	**$9,578,147**	**$22**	**$331**	**$9,578,169**	**$0**	**$0**	**$0**	**$7,441,777**	**$0**	**$0**	**$1,172,409**	**$964,315**	**$0**	**$9,578,500**	**-$9,578,169**	**$331**

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	$1,739,488	$0	$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	$849,999	$0	$0	$849,999					$849,999					$849,999	-$849,999	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$951,943	$951,943	$0	$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	$2,661,804	$49,941	$0	$2,711,745							$2,625,695	$86,050		$2,711,745	-$2,711,745	$0
Subtotal	**$9,900,000**	**$9,850,059**	**$49,941**	**$0**	**$9,900,000**	**$0**	**$0**	**$0**	**$0**	**$7,188,254**	**$0**	**$2,625,695**	**$86,050**	**$0**	**$9,900,000**	**-$9,900,000**	**$0**

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)	$1,020,120	$321,957	$533,412	$164,751	$855,369						$1,020,120				$1,020,120	-$855,369	$164,751
THE OHIO STATE UNIVERSITY (PROJECT 609)	$1,223,710	$115,534	$762,844	$345,332	$878,378						$1,223,710				$1,223,710	-$878,378	$345,332
UNIVERSITY OF AKRON (PROJECT 619)	$1,150,607	$14,668	$779,440	$356,499	$794,108						$1,150,607				$1,150,607	-$794,108	$356,499
KAIROS (PROJECT 624)	$1,190,000	$327,857	$862,143	$0	$1,190,000						$1,190,000				$1,190,000	-$1,190,000	$0
ARCTOS (PROJECT 625)	$1,198,492	$312,608	$760,964	$124,921	$1,073,572						$1,198,492				$1,198,492	-$1,073,572	$124,921
CFD (PROJECT 628)	$1,234,926	$198,192	$842,559	$194,176	$1,040,750						$1,234,926				$1,234,926	-$1,040,750	$194,176
FLIGHTPROFILER (PROJECT 502)	$71,969	$71,969	$0	$0	$71,969					$71,969					$71,969	-$71,969	$0
ASYMMETRIC (PROJECT 528)	$106,850	$106,850	$0	$0	$106,850					$106,850					$106,850	-$106,850	$0
THE OHIO STATE UNIVERSITY (PROJECT 542)	$14,641	$14,641	$0	$0	$14,641					$14,641					$14,641	-$14,641	$0
SAFRAN (PROJECT 550)	$190,920	$190,920	$0	$0	$190,920					$190,920					$190,920	-$190,920	$0
MIAMI UNIVERSITY (PROJECT 552)	$301,432	$301,432	$0	$0	$301,432					$301,432					$301,432	-$301,432	$0
OFRN ADMINISTRATION	$2,646,333	$1,299,289	$871,094	$475,950	$2,170,383							$2,582,411	$63,922		$2,646,333	-$2,170,383	$475,950
Subtotal	**$10,350,000**	**$3,275,916**	**$5,412,456**	**$1,661,628**	**$8,688,372**	**$0**	**$0**	**$0**	**$0**	**$685,811**	**$7,017,856**	**$2,582,411**	**$63,922**	**$0**	**$10,350,000**	**-$8,688,372**	**$1,661,628**

Grand Total	$61,728,500	$54,603,751	$5,462,790	$1,661,960	$60,066,540	$7,140,642	$8,136,485	$6,313,884	$7,441,777	$8,045,106	$7,017,856	$10,043,652	$4,034,010	$3,555,088	$61,728,500	-$60,066,540	$1,661,960

Figure 32: OFRN Budget and Expense Breakdown by Funding Round

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 cost of $330k for work performed July 1, 2023, through December 31, 2023 (FY24)