



# Ohio Federal Research Network

*Driving Innovation Through Strategic Partnerships*

Visit us online! [www.ohiofrn.org](http://www.ohiofrn.org)



# OVERVIEW

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**Administered by:**



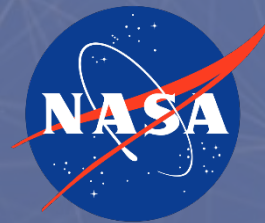
**Funded by:**



# OFRN Partners



- Federal Partners
  - AFRL
  - NASIC
  - Naval Medical Research Unit-Dayton (NAMRU-D)
  - NASA Glenn
  - Ohio National Guard
- 21 universities and community colleges
- 97 businesses



# OFRN: Mission and Core Services



## Mission

*To stimulate Ohio's innovation economy by building vibrant, statewide university / industry research collaborations that meet the requirements of Ohio's federal partners, resulting in the creation of leading-edge technologies that drive job growth in Ohio.*

## Services:

- Commercialization & Workforce Development
- Federal Funding
- Networking & Collaboration
- Education & Training

**Goal: Move Ohio into the top 10 in federal research and development funding.**

# Governor's Aerospace and Defense Pillars

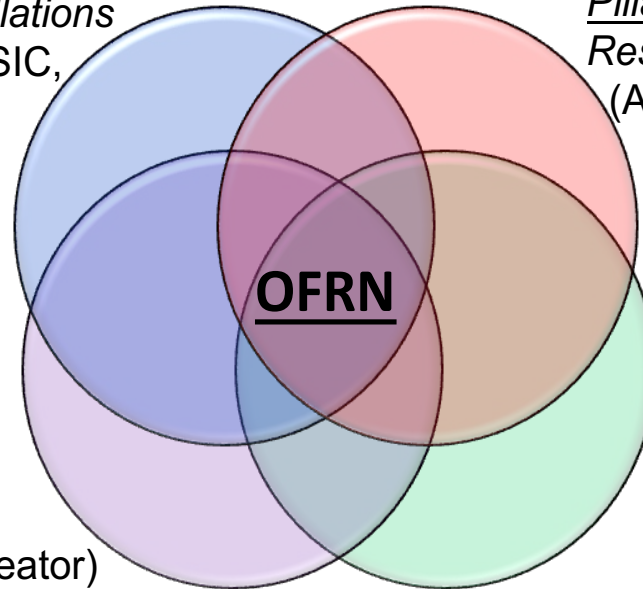


## Pillar 1

*Defense & Federal Installations*  
(AFRL, NASA-GRC, NASIC,  
NAMRU-D, ONG)

## Pillar 2

*Research & Development*  
(AAM, Space, Intelligence,  
Warfighter support)



## Pillar 3

*Industry and Jobs*  
(Small business  
incubator & job creator)

## Pillar 4

*Workforce Transformation*  
(Student Experiential  
Engagement & STEM  
promotion)

# OFRN Program Impact



21

Universities &  
colleges engaged

4+1

Government  
Partners

97

Business partners  
engaged

1,100+

Indirect jobs created

340+

Direct jobs created

13

Spin out  
companies  
created

\$51.4M

State of Ohio  
Investment - ODHE

\$355+M

Follow-on Funding  
Awarded

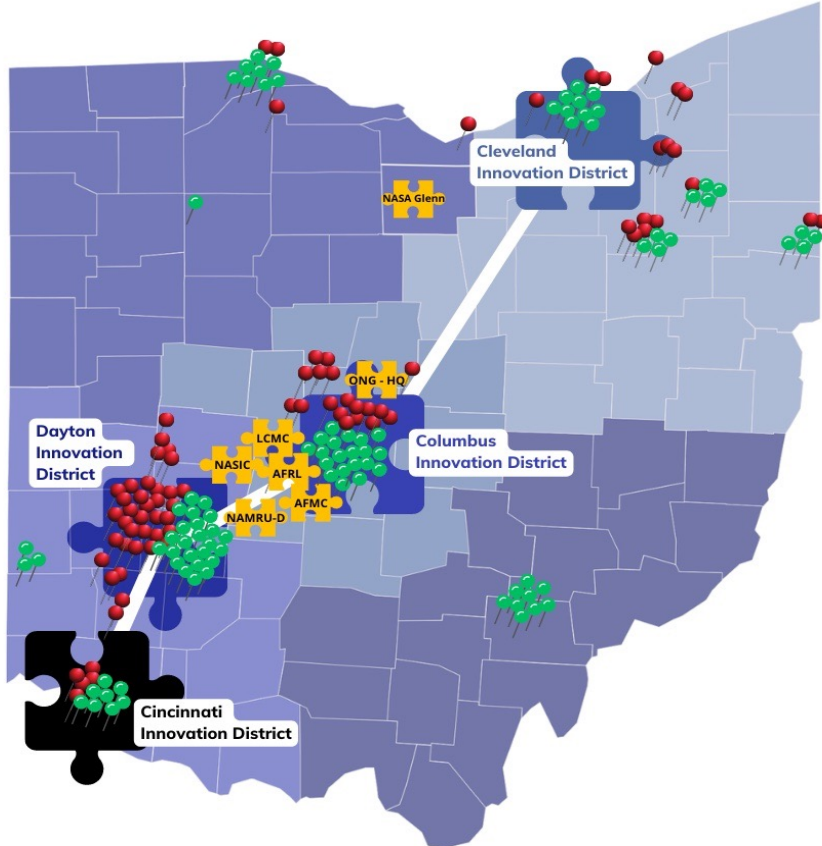
\$36M

Cost Share

# OFRN: Round 6 Areas of Interest



Areas Of Interest	Topics
Hypersonics	<ul style="list-style-type: none"> <li>- Additive manufacturing of structures with gradient thermal properties</li> <li>- High temperature joining techniques with "warm" or "cold" adjacent structures</li> </ul>
Human Performance	<ul style="list-style-type: none"> <li>- Physiological and environment monitoring for ocular health and human performance</li> <li>- XR telemedicine / patient care in austere/isolated environments</li> </ul>
High Power Energy	<ul style="list-style-type: none"> <li>- Affordable DC emulation and digital engineering</li> <li>- B-Ga203 substrate development</li> <li>- High voltage to low voltage DC energy conversion</li> </ul>
Digital Engineering Tools	<ul style="list-style-type: none"> <li>- Techniques to convert between model fidelity levers or utilization of multifunctioning models</li> <li>- Methods (low cost) model validation and assessment of digital maturity models</li> </ul>
Commercial Space Research - LEO	<ul style="list-style-type: none"> <li>- Materials joining automation in LEO</li> <li>- In-orbit biomanufacturing and repurposing of space-based materials</li> </ul>
Quantum Technologies	<ul style="list-style-type: none"> <li>- Quantum sensing: e.g., magnetic, electric field and photonics</li> <li>- Integration of at least two sensors</li> </ul>



### Government Partners

#### Glossary

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



### Ohio Federal Research Network Industry Collaborations

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



### Ohio Federal Research Network University Collaborations

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



### Innovation Districts



Northwest



Central



Northeast



Southwest



Southeast



# Thank you

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Mark Bartman, Maj Gen (Ret.)  
Program Executive, OFRN/APEX

<https://ohiofrn.org>





# Back-up Slides

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# Parallax

ADVANCED RESEARCH

## Family Network



2023

2015



Ohio Federal Research Network  
*Driving Innovation Through Strategic Partnerships*

2015

LAUNCH  
DAYTON



2019



**APEX**  
ACADEMIC PARTNERSHIP ENGAGEMENT EXPERIMENT

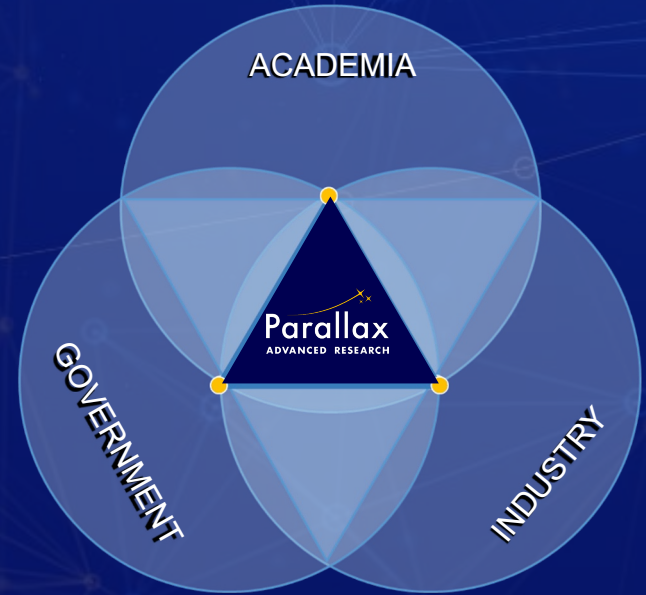
# Mission and Program Family



## A Parallax Triple Helix Model for Innovation

### Mission

*We deliver innovative research and provide technology, human and business solutions via The Science of Intelligent Teaming for government, industry, and academic clients with critical challenges.*



# A Triple Helix Model of Innovation

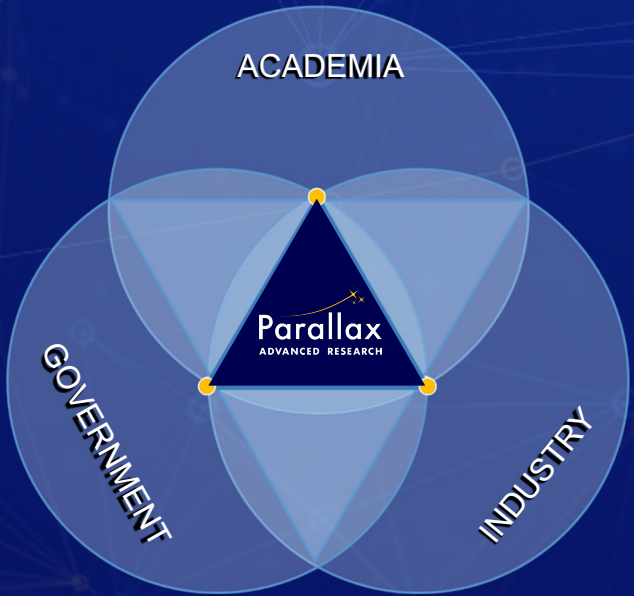


*Parallax aims to establish itself as the integrated applied research entity for the State of Ohio*

Parallax is a 501(c)(3) nonprofit research institute that tackles global challenges by accelerating innovation and developing technology and solutions through strategic partnerships with government, industry, and academia across Ohio and the Nation.

Together with:

- **academia**, Parallax accelerates innovation that leads to new breakthroughs.
- **government**, Parallax tackles critical global challenges and delivers new solutions.
- **industry**, Parallax develops groundbreaking ideas and speeds them to market.



## 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

## 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"

## 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 UAVs"
- R5 - Safran Power USA, LLC  
"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"

## 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 (ALTIITUDE)"
- R5 - Asymmetric Technologies, LLC  
"Autonomous Capabilities for CASEVAC and Resupply in Urban Environments (ACCRUE)"

## 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  
"Super Conducting Brushless Motors"

## COMMUNICATION

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

## AEROSPACE AWARENESS

- R2 - Wright State University  
"Human-Centered Big Data Trustworthiness"
- R3 - University of Cincinnati  
"RouteMaster - A Collision Avoidance and Traffic Management Digital Infrastructure"
- R4 - GhostWave  
"Integrated Optical-Radar Sensor Fusion System for Air Space Awareness"
- R6 - Flightproffler  
"Low Altitude Weather Network (LAWN)"

## COMMAND & CONTROL

- R1 - Wright State University  
"Augmented UAV Operator Human Machine Interface (A-MI)"
- R2 - University of Cincinnati  
"Advanced Cognitive and Physical Gesture Sensing for Operators"
- R4 - CAL Analytics  
"Interoperable, In-the-Modern UAS Traffic Management Architecture"
- R4 - Rivers of Research  
"Computer-Human Interaction for Rapid Program Analysis through Cognitive Collaboration"

## PLANNING

- R1 - Wright State University  
"Regional UAV Live-Virtual-Constructive Enterprise"



# OFNR: Rounds 1-5 Funded Projects

<https://www.ohiofrn.org/ohio-federal-research-network-rd-projects>



# OFRN Round 1 Awards



Project Title	Awarded	Follow-On	Lead	Subs	Final Report Status
Regional LVC Enterprise	\$ 648,455	\$5,045,000	WSRI	WSU, UT, CWRU, UC, Orbita, Rubix, Metro Health	Complete
Sliding-Scale Autonomy Through Physiological Rhythm Evaluations (SAPHYRE)	\$ 850,467	\$20,270,000	WSU	UT, AFIT, Perduco	Complete
High Performance Plastic Substrates for Flexible Electronics	\$ 666,726	\$14,719,907	UA	UT, OU, Purdue (previously UA), Akron Polymers, Orbital Research, Lucintech, EMS Adhesives, UTC	Complete
Adaptive Bio-Inspired Aerospace Structures Actuated by Shape Memory Alloys	\$ 666,958	\$1,260,000	UT	OSU, CWRU, RegenFix, Norman Noble, GE Aviation, Lincoln Electric	Complete
High Temperature Magnetic Materials	\$ 666,312	\$3,255,000	CWRU	UC, UT, YSU, Inorganic Product Partners, Lakeshore Cryotronics, Fenix Magnetics, Powdermet, GE Aviation	Complete
Hybrid Electric Propulsion and Power	\$ 1,467,545	\$13,075,000	OSU	OSU, UA, GE Aviation	Complete
Control Architecture for Intelligent Aviation Electric Power Systems	\$ 535,455	\$10,714,000	OSU	OSU, UA, UDRI, Ford, ABB, Caterpillar, GE EPISCenter, AEP, GE Aviation, UTRC	Complete
High Energy Density Li-Ion Battery Based on Advanced Silicon Anodes	\$ 649,961	\$3,225,000	UA	OSU, UT, ph Matter, CAR Technologies, Akron Polymer	Complete
High Energy/Power, Long Cycle Life, Thermally Safe, Li-S Battery	\$ 499,990	\$5,133,363	UD	CWRU, CRG, UES, Xerion	Complete
Hi-Performance Multifunctional Structural Energy Storage	\$ 499,997	\$1,363,000	CWRU	CWRU, UDRI, Event38, CSA America, CRG	Complete
<b>Total</b>	<b>\$ 7,151,866</b>	<b>\$78,060,270</b>			

# OFRN Round 2 Awards



Project Title	Awarded	Follow-On	Lead	Subs	Final Report Status
Intelligence Channel Sensing	\$ 800,002	\$4,500,690	WSU	OU, UT, AFIT, Comsat Architects, GIRD	Complete
Test & Evaluation of Autonomous Systems (TEAS)	\$ 1,300,000	\$19,248,000	WSU	OU, AFIT, Galois	Complete
Human-Centered Big Data (HCBD)	\$ 1,200,000	\$10,043,184	WSU	OSU, CWRU, DataScience.com, Kairos Research, NCR Labs, Tenet3, Design Knowledge, Illumination Works, Columbus Collaboratory, Amperand, MatchTx, Perduco, HP, Lexis Nexis, Ipsos, Nuance, Heureka Software, IBM TJ Watson Research Ctr	Complete
Advanced Cognitive and Physical Sweat Biosensing	\$ 915,001	\$1,165,000	UC	OSU, UT, WSU, Eccrine Systems	Complete
Motion Sickness Interactions with Spine Disorders (MOSSD)	\$ 1,200,000	\$17,044,000	OSU	UC, WSRI, Bertec Corp, SpineDynX	Complete
Low Cost Manufacturing for Limited Production Aircraft Composite Structures	\$ 1,097,197	\$6,249,941	UDRI	CWRU, UC, OU, WSU, YSU, NONA Composites, Orbital-ATK, GE Aerospace, Lockheed Martin	Complete
Advanced Turbine Cooling	\$ 999,838	\$10,202,000	OSU	UC, AFRI, Miami, Innovative Scientific Solutions (ISSI), Honeywell	Complete
UAV Icing Protection	\$ 1,000,000		OSU	UDRI, CWRU, Battelle Memorial Institute	Complete
Total \	\$8,512,038	\$68,452,815			

# OFRN Round 3 Awards



Project Title	Awarded	Follow-On	Lead	Subs	Final Report Status
UAS Detect and Avoid Sensor Fusion of Stealthy Radars and Vision	\$ 1,344,597	365,000	Ghostwave	OSU, Sinclair, Converge Technologies, Event38, Lockheed Martin	Complete
Brushless Doubly-fed Machine and Drive System for Aviation Application	\$ 2,001,862	540,000	OSU	UDRI, Safran	Pending
Regional Unmanned Traffic Management System (RUTMS)	\$ 968,947	825,000	UC	Sinclair, Demeter, Simlat	Complete
Autonomous/Remote Cirrus SR22 Aerial Surveillance Platform and Personnel Air Vehicle "Air Uber" System	\$ 1,998,349	29,586,000	PSS	Ohio University, WSU, Autonodyne, Bosma Tech, MacAir Aviation, MacNaughtan Development	Pending
<b>Total Awarded</b>	<b>\$ 6,313,755</b>	<b>31,316,000</b>			



# OFRN Round 4 Awards



Project Title	Awarded	Follow-On	Lead	Subs	Final Report Status
A Hybrid Fuel Cell–Battery–Capacitor Power Source for UAS	\$ 1,214,202	\$597,000	KSU	UD, WSU, CWRU, Event38	Proj On-going
Computer-Human Interaction for Rapid Program Analysis through Cognitive Collaboration (CHIRP2C)	\$ 1,176,717	\$500,000	Riverside Research	UC, UD, Unmanned Science	Proj On-going
Interoperability, Resiliency, and Contingency Management for Ohio UAS Operations	\$ 1,399,882	\$2,062,000	CAL Analytics	KSU, OSU, Resiliencx, TruWeather Solutions, Kongsberg	Proj On-going
Resilient and Secure UAS Flight Control	\$ 1,450,071	\$3,380,000	Asymmetric	OSU, OU, Lockheed Martin	Proj On-going
Geometrically-Complex 3D Printed Antennas for UAVs	\$ 972,877	\$150,000	YBI	KSU, Event38, Universal Technology Corp.	Proj On-going
Multi-purpose Mast/Aerial 360O radar/optical fused sensors for Perimeter Monitoring and Aerial Detect & Avoid	\$ 1,262,622	\$330,000	Ghostwave	OSU, Sinclair, AFIT, Converge Technologies, Sivers, Stream DSP	Proj On-going
Academic Partnership Engagement Experiment	\$0	\$12,400,000	Parallax	OAI, YBI, Brite, OSU, TEC, WSU, and DAI	Proj Ongoing
<b>Total Awarded</b>	<b>\$ 7,476,371</b>	<b>\$19,419,000</b>			

# OFRN: Round 5 Awardees



Project Title	Lead	Team	Govt Partner
LAWN (Low Altitude Weather Network)	Flight Profiler	OSU, OU	AFRL, NASA & NAMRU-D
ALTITUDE: Affordable LIDAR Technologies for IntegraTion and Unmanned Deployment	OSU	Sinclair, UD, SK Infrared	AFRL
Autonomous Capabilities for CASEVAC and Resupply in UrbanEnvironments (ACCRUE)	Asymmetric	OSU, OU, Lockheed Martin	AFRL
Electronically Dimmable Protective Eyewear	AlphaMicron	BGSU, KSU, Miami	AFRL
Thin-film Crystals for High-speed Optical Modulation	OSU	UD, Gooch & Housego Ohio	AFRL
Advanced High Voltage DC Generator System for Aerospace with Rapid Dynamic Response	Safran	OSU, YSU, YBI	AFRL & NASA
High Reliability, Low EMI, Wide Bandgap Power Conversion for Air & Space Applications	Miami University	OSU, GE Aviation, PC Kraus & Assoc.	AFRL