UPISC UNIVERSITY OF PITTSBURGH INFRASTRUCTURE SENSING

COLLABORATION WORKSHOP

NATIONAL ENERGY TECHNOLOGY LABORATORY

2026 UPISC Annual Workshop Introduction

Prof. Paul R. Ohodnicki, Jr.

University of Pittsburgh

Dr. Ruishu Wright

National Energy Technology Lab.

Date: June 2, 2026

Cathedral of Learning University of Pittsburgh

2026 UPISC Annual Workshop

GOALS

The goals of the workshop are to increase awareness of existing on-going research and collaborations with University of Pittsburgh and regional stakeholders in the following areas:

1. Development of novel sensor technologies as solutions to infrastructure sensing needs;
2. Regional collaboration to promote workforce development in the emerging sensor area for near term R&D capability needs and future deployment and commercial needs;
3. Engagements with industry and stakeholders, regarding sensor technologies and related technology transfer;
4. Team and collaboration partnerships capable of responding to funding agencies' and industry's call for sensor technologies.

Voice of Industry and Government Stakeholders	Technology Maturation and Technology Transfer	Workforce Development

2026 UPISC Annual Workshop

SCOPE

The workshop particularly seeks to focus on the following areas:

1. Multiple sensing platforms with spatially distributed sensing capability (e.g. optical fiber sensing, passive wireless sensors, electrochemical sensors, chip sensors)
2. Spanning sensor technology development areas from fundamental principles of sensor materials to prototypes in field validations, prototypes in field validations,
3. Coupling with physics-based modeling and artificial intelligence (AI)-enabled sensor networks and digital twin technologies for specific infrastructure needs.

IMPACTS

The workshop seeks to promote intelligent infrastructure sensing for the following impacts:

1. Predictive monitoring before infrastructure failures occur (structural, electrical, etc.)
2. Mitigation of green-house gas emissions,
3. Enabling large-scale H2 transportation,
4. Supporting needs for a robust and resilient electricity and natural gas transportation and delivery system,
5. Early detection of environmental contamination

2026 UPISC Annual Workshop

STEERING COMMITTEE MEMBERS

The steering committee is a group of prominent scientists and leaders that were carefully selected to represent key segments and application areas of critical importance to the UPISC objectives. The advisory group provides the faculty and leadership team with insights about emerging needs and trends within relevant industries and across various agencies.

Chris Moore, GTI, Leader of Strategic Technical Programs, cmoore@gti.energy
Jessica Valentine, Duquesne Light Company, Manager Advanced Grid Technology, jvalentine@duqlight.com
Susan Maley, Electric Power Research Institute, Program Manager, smaley@epri.com
Robert Lieberman, Lumoptix, President, rlieberman@lumoptix.com
Gary Choquette, Pipeline Research Council International (PRCI), gchoquette@prci.org
Arvind Tiwari, GE Vernova, Program Manager, Arvind.tiwari1@ge.com
Joshua Carter, Naval Surface Warfare Center, Lead Photonic Engineer, joshua.e.carter29.civ@us.navy.mil
Christopher Good, Naval Surface Warfare Center, christopher.a.good8.civ@us.navy.mil
Mat Podskarbi, Aveva, Strategic Account Executive, mat.Podskarbi@aveva.com
Kalyan Sharma, Synopsys Inc, Senior Manager, kalyan.Sharma@synopsys.com

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Natural Gas, Oil, & H_2 Transport & Storage

Civil (Road, Bridges, Water)

Electricity Grid Transport & Storage

Power Generation

Mission: UPISC Seeks to Pursue Research and Innovation, Workforce Development, and Technology Transfer in the Area of Critical Infrastructure Sensing and Monitoring

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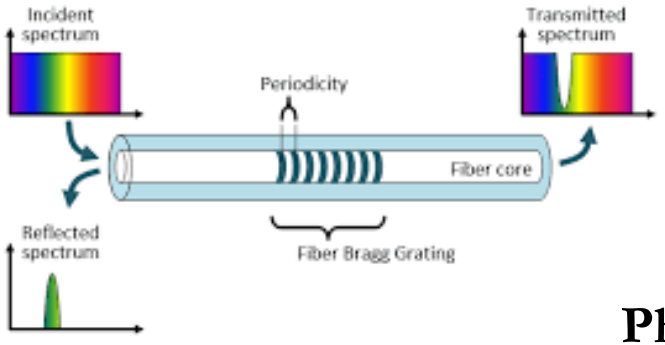
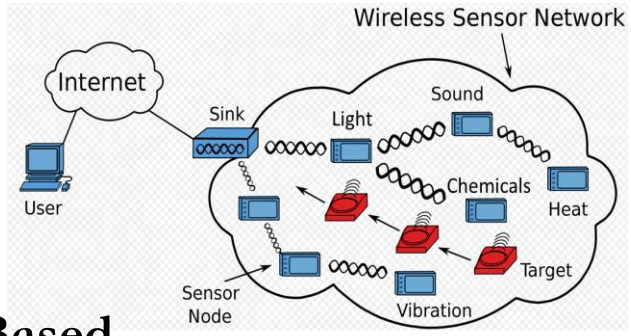
Optical Fiber Sensing



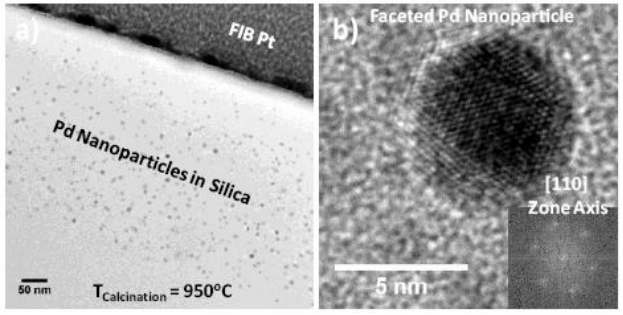
Passive Wireless Sensing



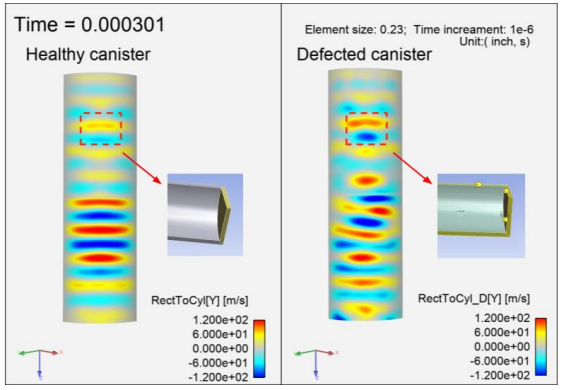
https://en.wikipedia.org

Physics Based

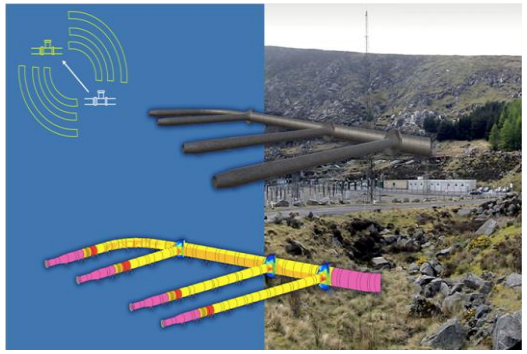
Novel Sensing Materials



Machine Learning & AI



Digital Twin Models



Enabling Technologies: UPISC Scope Encompasses all Aspects of Critical Infrastructure Sensing Spanning Enabling Technology, Hardware, Communications, Data, and Analytics.

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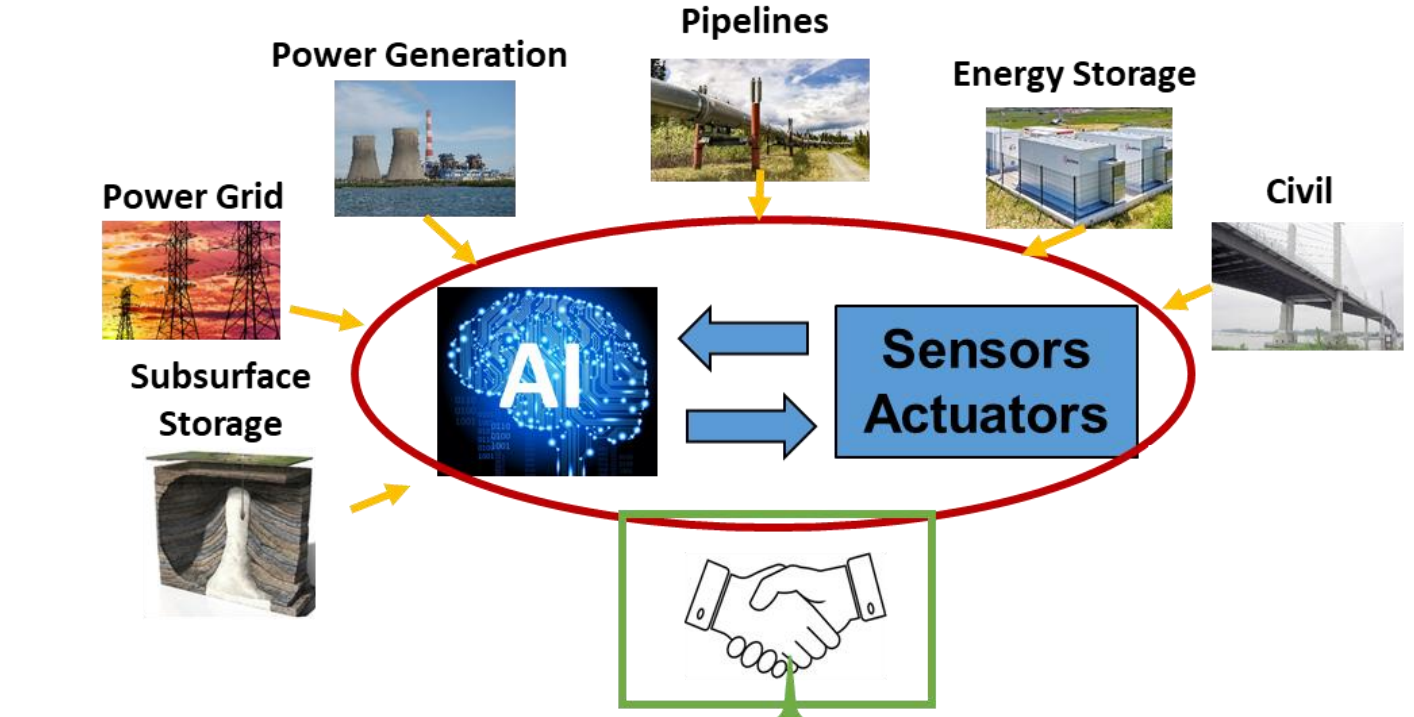
Objective of UPISC Workshop : Community and Partnership Development



University, Lab, Industry, and Government Partnerships are Necessary to Maximize Impact

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2022 UPISC Inaugural Workshop : August 2022

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UPISC Inaugural Workshop

August 2022

Energy Innovation Center

www.engineering.pitt.edu/UPISC

75 Registered Attendees

Strong Feedback and Dialogue Encouraged Annual Offering as Well as Action Items Into the Future

Highly Successful Initial Workshop Held in 2022 Confirmed the Need and Opportunity

2022 UPISC Inaugural Workshop : August 2022

PITT | SWANSON ENGINEERING

NATIONAL ENERGY TECHNOLOGY LABORATORY

NRECA America's Electric Cooperatives

Pitt SCI School of Computing and Information

DLC DUQUESNE LIGHT CO.

Ansys

AKSELOS

UNIVERSITY OF PITTSBURGH The DIETRICH School of Arts & Sciences

THE SEAL OF THE CITY OF PITTSBURGH 1816 BENIGNO NUMINE

Pacific Northwest NATIONAL LABORATORY

Sandia National Laboratories

EPRI ELECTRIC POWER RESEARCH INSTITUTE

PRCI Pipeline Research Council International LEADING PIPELINE RESEARCH

gti GAS TECHNOLOGY INSTITUTE

Aquatech

Examples of Organizations in Attendance at 2022 UPISC Workshop

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Key Prioritized Action Items from 2022 UPISC Workshop

1. Consider UPISC leading a new study on this topic (National Academy?)
2. New activity focused on field testing digital twins (data normalization, experimental facilities, etc.)
3. Pursue concepts for a more formalized collaboration (center, major proposals, etc.)
4. Increase opportunities and targeting of workforce training in universities.
5. Identify potential stakeholders to engage in the future
6. Improve the path from R&D through commercialization and technology transfer.
7. Compile best practices for technology and knowledge dissemination and adoption.
8. Establish a public access data repository to collect and share information among stakeholders
9. Work toward data integration and synergy standardization across infrastructure segments
10. Establish a comprehensive list of industry needs
11. Work to improve sensor diagnostics and reliability, potentially even self-diagnosing sensors.
12. Develop specific mechanisms to enhance collaboration of industry, academia, government, others.
13. Improve communication between users and developers.

Discussed "Top Three" in December 2022 Steering Committee Meeting

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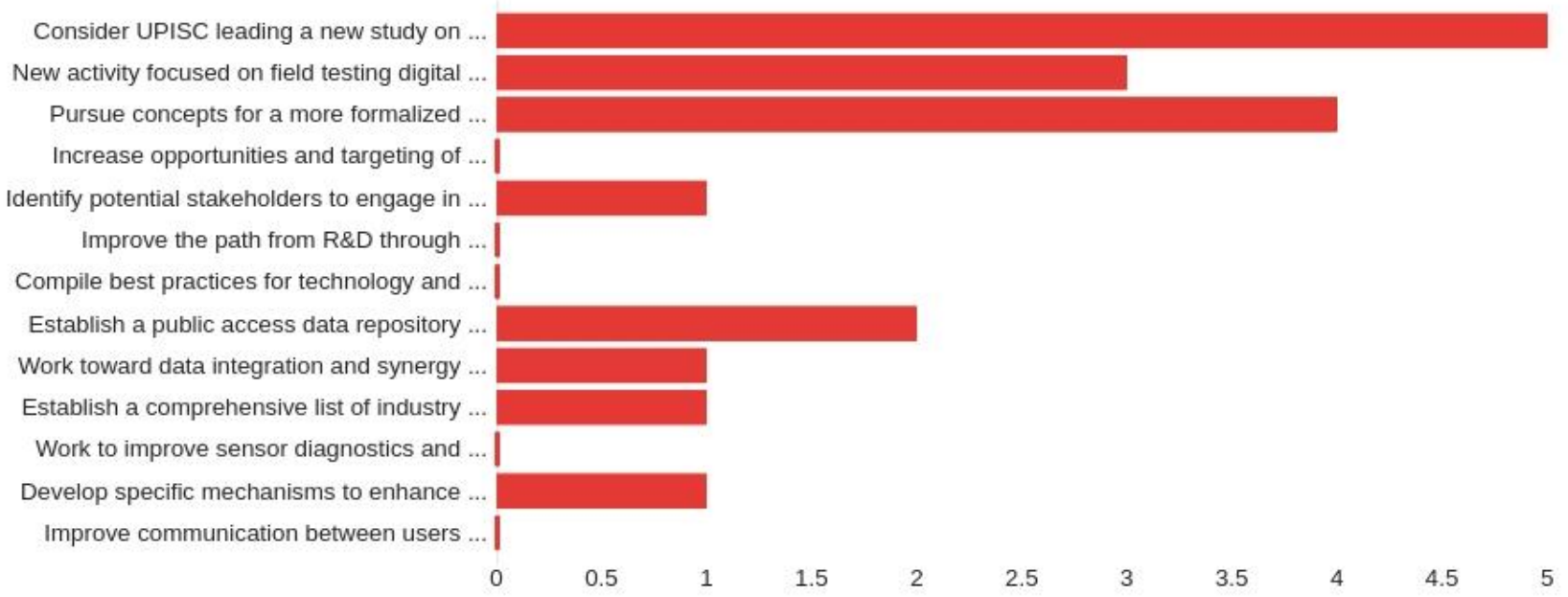
UPISC Survey Results of Steering Committee "Action Item" Recommendations



1. Consider UPISC initiating a new study on this topic (e.g. National Academy study)
2. Pursue concepts for a more formalized collaboration (i.e. an industry consortium)
3. New activity focused on field testing digital twins and distributed sensors

Subsequent "Top Three" Vote to Determine Prioritized Next Steps with UPISC

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2023 UPISC Annual Workshop : Overall Statistics

1. Approximately 80 Attendees
2. Extremely Positive Feedback
3. Robust Poster Session
4. Industry, Government (Local and Federal), Academic Participation
5. Additional Progress and Refinement of Actions

2024 Revised Action Items Prioritized By the UPISC Steering Committee

➢ Prioritized Action Items from 2023

1. *Consider UPISC initiating a new study on this topic*
2. *Pursue concepts for a more formalized collaboration*
3. *New activity focused on field testing digital twins / sensors*

Note: Blue highlighted items below were carried forward from 2023 action items and updated based on steering committee discussion and 2023 workshop outcomes.

➢ Updated Action Items for 2024

1. *Plan and execute a National Academies Member-Led Workshop in Collaboration with UPISC 2024*
2. *Establish a formal participation agreement with partners and formalize a "Consortium"*
2. *Establish a pilot project within the City of Pittsburgh and SW PA region with stakeholders*

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NATIONAL ENERGY TECHNOLOGY LABORATORY

NATIONAL ACADEMY OF ENGINEERING

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2024 UPISC Annual Workshop Registered Attendee Organizations

1. Approximately 100 Attendees
2. Engagement and Participation from National Academy of Engineers
3. Robust Poster Session
4. Industry, Government (Local and Federal), Academic Participation

2024 UPISC Annual Workshop : Key Themes for Workshop

1. National Academy of Engineering : Plenary Session (11/12)
   - Increase Awareness of UPISC Initiative and Goals
   - Highlight Importance of Regional – State – Federal Considerations
   - Emphasize Synergy Across Sectors (Energy, Transportation, Civil, etc.)
   - Incorporate Policy and Federal Programs Into Workshop Program

2. 2024 UPISC Workshop Morning Session (11/13)
   - NAE Perspective & NETL / Pitt Updates on Sensor Research
   - Quantum Sensing and Applications for Infrastructure Sensing

3. 2024 UPISC Workshop Afternoon Session (11/13)
   - Crosscutting : Analytics, Digital Twins, Silicon Photonics, Cybersecurity
   - Industry Panel on Sensing Across Infrastructure Sectors

2024 UPISC Annual Workshop Registered Attendee Organizations

THE CITY OF PITTSBURGH
Bechtel Plant Machinery, Inc. Quality, Integrity, Excellence
PEOPLES NATURAL GAS
Carnegie Mellon University
INL Idaho National Laboratory
U.S. DEPARTMENT OF ENERGY
arpa·e CHANGING WHAT'S POSSIBLE
ARPA·I ADVANCED RESEARCH PROJECTS AGENCY • INFRASTRUCTURE
OAK RIDGE National Laboratory
sensience ADVANCED SENSING TECHNOLOGIES
DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA
gecko robotics
NAVAL NUCLEAR LABORATORY
ofs
DLC DUQUESNE LIGHT CO.
NEAR EARTH AUTONOMY
Sandia National Laboratories
NATIONAL ACADEMIES Sciences Engineering Medicine
Westinghouse
S&B USA CONSTRUCTION
EPRI ELECTRIC POWER RESEARCH INSTITUTE
NRECA America's Electric Cooperatives
MSource
UPCAM CENTER FOR ADVANCED MANUFACTURING
PITT SWANSON ENGINEERING
QUANTUM CATALYZER
Pitt SCI School of Computing and Information
GE VERNOVA
PRCI Pipeline Research Council International
GTI ENERGY
EATON Powering Business Worldwide
AIM PHOTONICS
SENSIBLE PHOTONICS
NREL NATIONAL RENEWABLE ENERGY LABORATORY
University of Pittsburgh Dietrich School of Arts and Sciences

~120 Registered Attendees From More than 35 Organizations!

2026 UPISC Annual Workshop : Overall Statistics

1. Agenda and Invited Speakers Organized by UPISC Steering Committee

2. Close Collaboration Between NETL and U. Pitt. for Organization

3. Navy Engagement in Organization and Planning (New for 2026!)

4. >100 Registered Guests for In-Person Attendance (No Remote Option)

5. ~20 Technical Posters from U. Pitt. and NETL Students and Researchers

6. Sponsored by the New INSITES Consortium for 2026
(INSITES Seed Funds Provided by Office of Senior Vice Chancellor for Research)

2026 UPISC Annual Workshop Registered Attendee Organizations

THE CITY OF PITTSBURGH
Bechtel Plant Machinery, Inc. Quality, Integrity, Excellence
S&B USA
Carnegie Mellon University
NAVSEA WARFARE CENTERS
pjm
U.S. DEPARTMENT OF ENERGY
University of Pittsburgh
Mascaro Center for Sustainable Innovation
Swanson School of Engineering
EQT
Pittsburgh Water Collaboratory
Research · Education · Outreach
DLC DUQUESNE LIGHT CO.
DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA
Smart Infrastructure Solutions, LLC
NAVAL NUCLEAR LABORATORY
Hepburn and Sons LLC
ArQSensors
UNIVERSITY OF MARYLAND
LUNA
NATIONAL ACADEMIES Sciences Engineering Medicine
S&B USA CONSTRUCTION
EPRI ELECTRIC POWER RESEARCH INSTITUTE
Westinghouse
PITT SWANSON ENGINEERING
National Laboratory of the Rockies
Lightera
PRCI Pipeline Research Council International
LEADING PIPELINE RESEARCH
GTI ENERGY
BRNO UNIVERSITY OF TECHNOLOGY
West Virginia University
GE VERNOVA
Fluor Marine Propulsion, LLC
SENSIBLE PHOTONICS
leidos
University of Pittsburgh
Dietrich School of Arts and Sciences

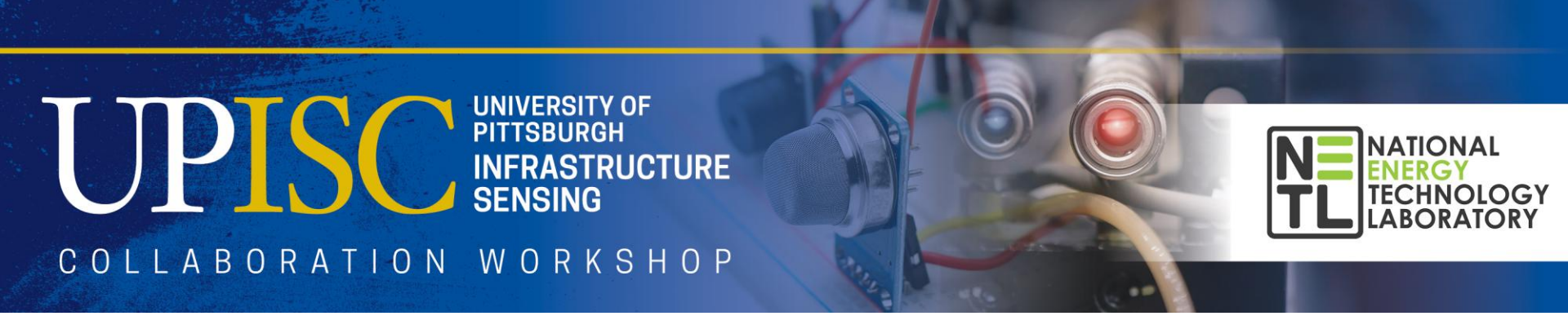
>100 Registered Attendees From More than 30 Organizations!

2026 UPISC Annual Workshop : Key Themes for Workshop

1. Opening Plenary Session with Featured Panelists (6/2)
   - Increase Awareness of UPISC Initiative and Goals
   - Highlight Key Areas of National and Regional Priority
   - Identify and Discuss National Imperatives Currently Prioritized in the US
   - Alignment of the Infrastructure Sensing Workshop with These Areas
   - Discussion Surrounding Potential Future "Calls to Action"

2. 2026 UPISC Workshop Morning Session (6/3)
   - NETL / Pitt Updates on Sensor Research
   - Overview of New INSITES Consortium Seed Activities
   - Condition Based Monitoring and Infrastructure Sensing

3. 2026 UPISC Workshop Afternoon Session (6/3)
   - Thematic Panel Sessions – Distributed Fiber Sensing, Infrastructure Connectivity
   - Invited and Keynote Presentations – On-Chip Photonics, Nuclear Applications



2026 UPISC Annual Workshop : Day 1 Agenda (June 2nd, 2026)

Time	Activity
1:00 p.m.	**Welcome Remarks – University of Pittsburgh** *Michele Manuel, U.S. Steel Dean of Engineering,* ***University of Pittsburgh***
1:10 p.m.	**Workshop Overview, Background, and Objectives** *Paul Ohodnicki - Director – Center for Energy -* ***University of Pittsburgh (U. Pitt)*** *Ruishu Wright - Technical Portfolio Lead -* ***National Energy Technology Laboratory (NETL)***
1:30 p.m.	**Plenary Panel: Emerging Priorities and Initiatives – Current State and Future Trends** **Moderator:** *Robert Lieberman, National Academy of Engineering, Lumoptix* *Bryan Morreale, Chief Research Officer, Research & Innovation Center,* ***National Energy Technology Lab*** *Aftab Khan - Chief Strategy Officer -* ***PJM Interconnection*** *Steven Wray, Director of Economic Development,* ***City of Pittsburgh***
2:30 p.m.	**Coffee and Networking Break**

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2026 UPISC Annual Workshop : Day 1 Agenda (June 2nd, 2026)

Time	Activity
3:00 p.m.	**Plenary Panel: National Imperatives – Quantum, AI, Electric Power Grid, and Nuclear** **Moderator:** *Paul Ohodnicki – Director – Center for Energy -* ***University of Pittsburgh (U. Pitt)*** *Kelly Rose, Senior Fellow, Computational Science and Engineering,* ***National Energy Technology Lab*** *Benjamin Kroposki, Director of Power Systems Engineering Center,* ***National Laboratory of the Rockies*** *Emma Wong, Nuclear Principal Lead for Innovation, Quantum Technologies, and International Engagement,* ***Electric Power Research Institute*** *Andrew Boulanger - Program Manager -* ***DOE Nuclear Energy***
4:00 – 4:30 p.m.	**Facilitated Discussion:** **How Can the Infrastructure Sensing Community Impact These National Objectives?**
4:30 – 5:30 p.m.	**Networking Social Hour and Light Refreshments Including Guided Laboratory Tours of the Energy Innovation Center**

2026 UPISC Annual Workshop : Day 2 Agenda (June 3rd, 2026)

Time	Activity
8:00 a.m.	**Registration and Networking**
8:30 a.m.	**Welcome Remarks and Introduction to the Workshop (Objective, Scope, Steering Committee)**
8:45 a.m.	**University of Pittsburgh and National Energy Technology Laboratory Welcome Comments** *Robie Lewis, Research Excellence and Institutional Planning,* ***National Energy Technology Lab - DOE*** *Paul Ohodnicki - Director – Center for Energy -* ***University of Pittsburgh (U. Pitt)*** *Joshua Carter - Lead Photonic Engineer and Researcher -* ***Naval Surface Warfare Center***
9:15 a.m.	**Infrastructure Sensing Technology Overview Presentations (U. Pitt. and NETL)** *Paul Ohodnicki – Director – Center for Energy -* ***University of Pittsburgh (U. Pitt)*** *Ruishu Wright - Technical Portfolio Lead -* ***National Energy Technology Laboratory (NETL)***
10:00 a.m.	**Coffee and Networking Break**

2026 UPISC Annual Workshop : Day 2 Agenda (June 3rd, 2026)

Time	Activity
10:15 a.m.	**INSITES Consortium – U. Pitt. Momentum Funds Project Overview and Update** *Zachary Harris - RK Mellon Faculty Fellow in Energy - **University of Pittsburgh (U. Pitt)*** *Piervincenzo Rizzo - Full Professor - **University of Pittsburgh (U. Pitt)*** *William Harbert - Professor of Geophysics - **University of Pittsburgh (U. Pitt)*** *Amy Babay - Assistant Professor - **University of Pittsburgh (U. Pitt)***
11:00 a.m.	**Panel on Condition Based Monitoring Across Infrastructure Segments** **Moderator:** Joshua Carter - Lead Photonic Engineer and Researcher - **Naval Surface Warfare Center** *Derek Brown - Director of Cybersecurity and Infrastructure - **EQT Corporation*** *Jason Esser - Senior Vice President - **Shikun & Binui*** *Andrew Boulanger - Program Manager - **DOE Nuclear Energy*** *Jonathan Burgess – Director - **Pittsburgh Water Collaboratory***
12:00 p.m.	**Lunch and Networking Break**

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2026 UPISC Annual Workshop : Day 2 Agenda (June 3rd, 2026)

Time	Activity
12:45 p.m.	**Panel on Distributed Fiber Optics and Infrastructure** **Moderator:** *Paul Ohodnicki - Director – Center for Energy -* ***University of Pittsburgh (U. Pitt)*** *Robert Clapp - Senior Staff Research Scientist -* ***GoogleX*** *John Ohanian - Senior Research Scientist -* ***LUNA*** *Steve Allen - Director of Specialty Marketing -* ***Lightera*** *Paul Dickinson - Chairman of Advisory Council -* ***Fiber Optic Sensing Association***
2:00 p.m.	**Invited Industry Speaker: AI - Optical Neural Networks and Distributed Sensing – On Chip Photonics** *Dmitry Kozak - Senior Engineer -* ***Naval Surface Warfare Center Crane Division***
2:30 p.m.	**Coffee Break**

2026 UPISC Annual Workshop : Day 2 Agenda (June 3rd, 2026)

Time	Activity
2:45 p.m.	**Keynote Industry Speaker: Sensing and Instrumentation for Nuclear Applications** *Luke Breon - Technical Leader -* ***Electric Power Research Institute (EPRI)***
3:30 p.m.	**Panel on Infrastructure Segment Connectivity and Sensing Needs** **Moderator:** *Ruishu Wright - Technical Portfolio Lead - National Energy Technology Laboratory (NETL)* *Melissa Bilec - Co-Director -* ***University of Pittsburgh Mascaro Center for Sustainable Innovation*** *Alexandra Hakala - Acting Director of Oil and Gas Center of Excellence -* ***National Energy Technology Lab*** *Jason Keller - Director, Grid Infrastructure and Engineering -* ***Duquesne Light Company (DLC)*** *Daniel Bain - Vice Chair -* ***Pittsburgh Water Collaboratory***
4:30 p.m.	**Looking to the Future and Next Steps**
5:00 p.m. – 6:30 p.m.	**Technical Poster Session with a Social Hour and Light Refreshments**

Thank you for taking the time to join us today!

Any questions, comments, or discussion?

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