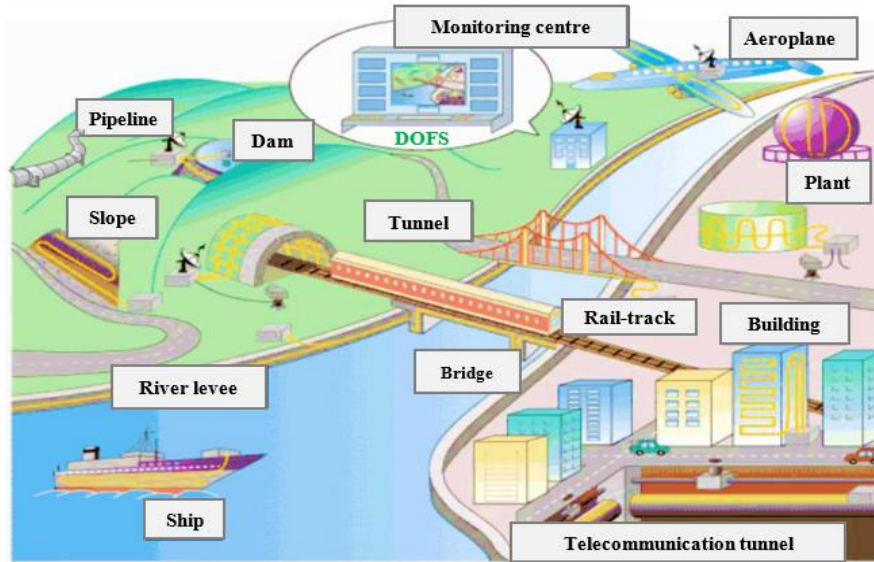


Infrastructure Sensing for Intelligent Transportation and Energy Systems (INSITES)



UNIVERSITY OF PITTSBURGH

INSITES

INFRASTRUCTURE SENSING for
INTELLIGENT TRANSPORTATION and
ENERGY SYSTEMS CONSORTIUM

Faculty Director: *Prof. Paul Ohodnicki*, Mechanical Eng. & Mat. Science SSOE

Contact: insites@pitt.edu

Pitt Research

Website: www.engineering.pitt.edu/insites

US Infrastructure is Aging and Facing Unprecedented Challenges...

Duquesne Light Transformer, 2023



Fern Hollow Bridge, 2022



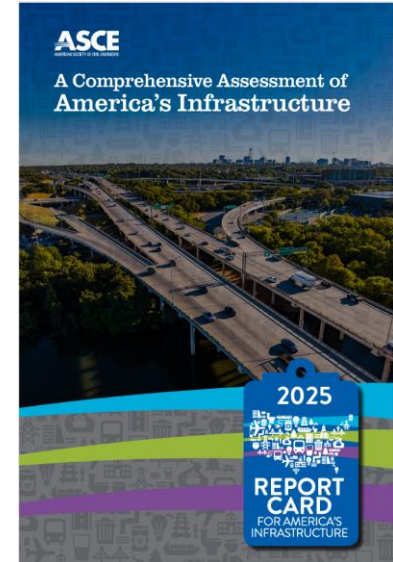
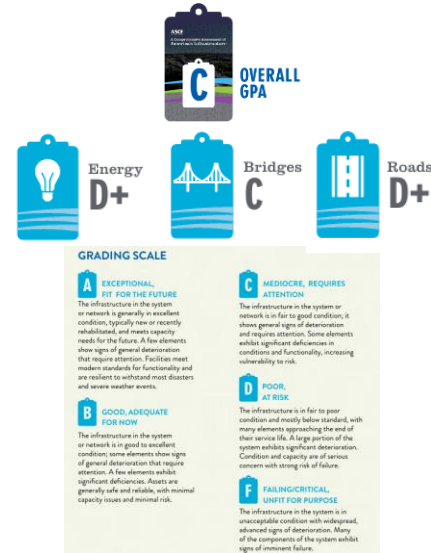
Power Outages
Alone Cost the
US \$150B/year

Pitt Research



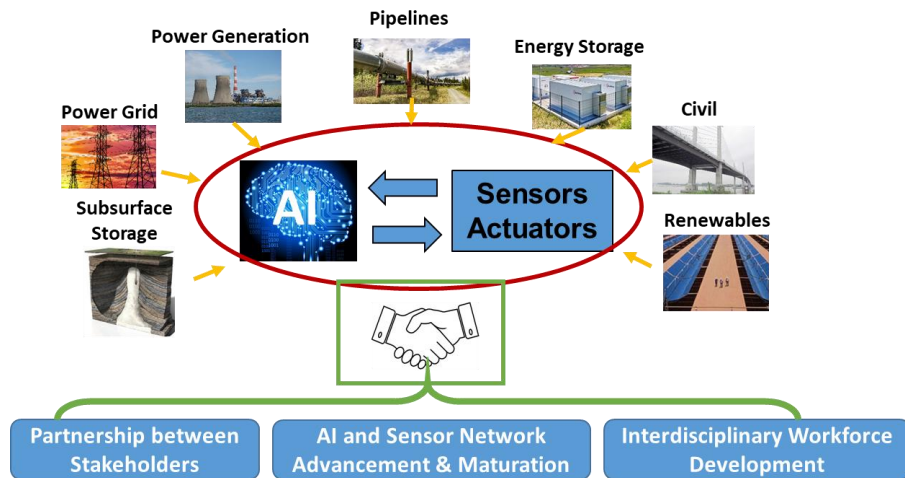
Revolution Pipeline, Beaver, 2018

Status Quo
Manual Inspections and
Qualitative Rank Assessment...



2025 Infrastructure Report Card | ASCE

Partnerships with Regional and National Stakeholders for Impact...



www.engineering.pitt.edu/UPISC



2022 Memorandum of Understanding!
Pitt Research

Annual Collaborative Workshop



~100 Attendees, ~40 Organizations

Novel Infrastructure Sensing and Digital Technologies...

Low-Cost and Multiparameter Fiber Optic Sensing Technology



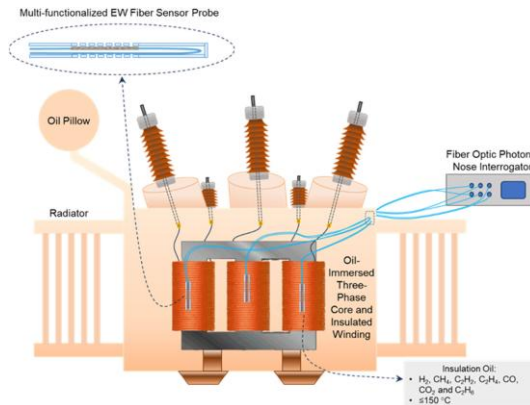
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Pittsburgh



NATIONAL
ENERGY
TECHNOLOGY
LABORATORY



Transformer
Watchman



SOLAR ENERGY
TECHNOLOGIES OFFICE
U.S. Department Of Energy



GRID
MODERNIZATION INITIATIVE
U.S. Department of Energy

Novel Fiber Optic Sensing Technology for Grid Reliability & Resilience

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Novel Infrastructure Sensing and Digital Technologies...

Ultrasonic Acoustic Fiber Optic Sensing and AI-based Interpretation

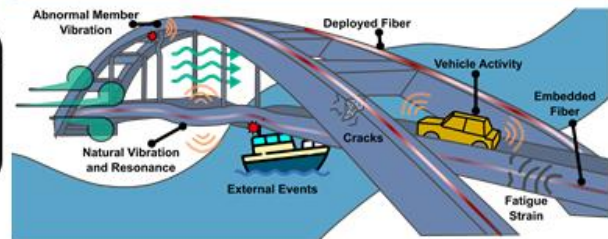
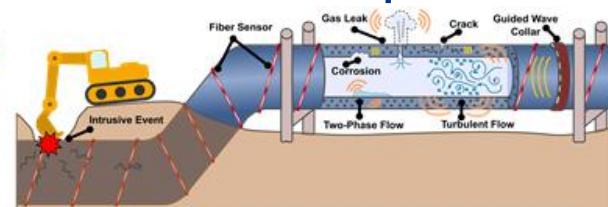
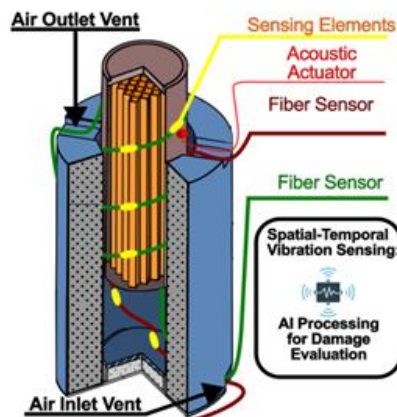
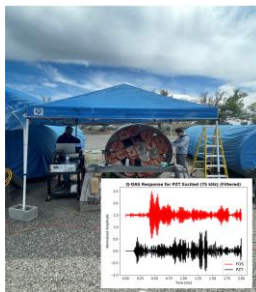


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Pittsburgh



NATIONAL
ENERGY
TECHNOLOGY
LABORATORY

UltraSonic Photonics



U.S. Department of Energy

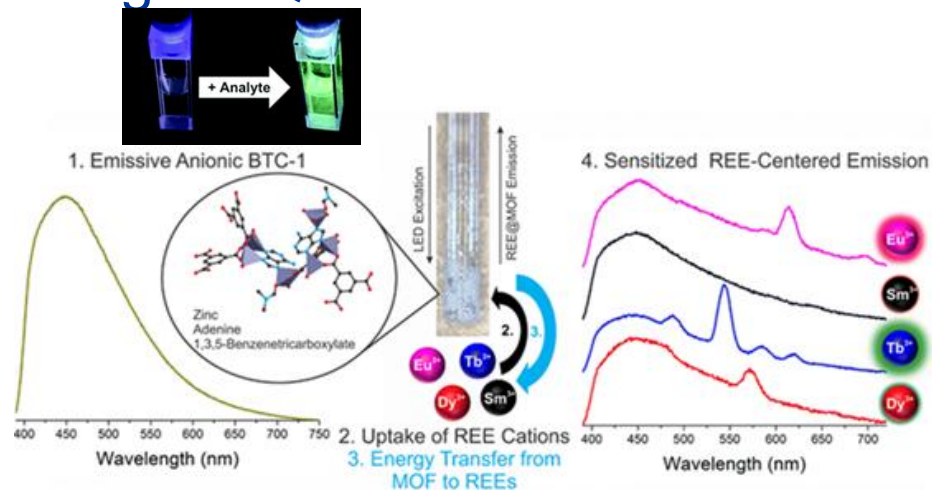
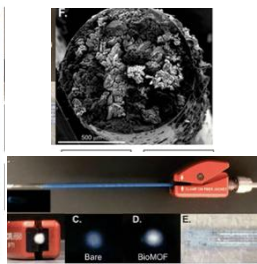
Fiber Optic Structural Health Monitoring of Energy and Civil Infrastructure
Pitt Research

Novel Infrastructure Sensing and Digital Technologies...

Emission-Based Fiber Optic Sensing for Quantification



eMission Critical Sensor



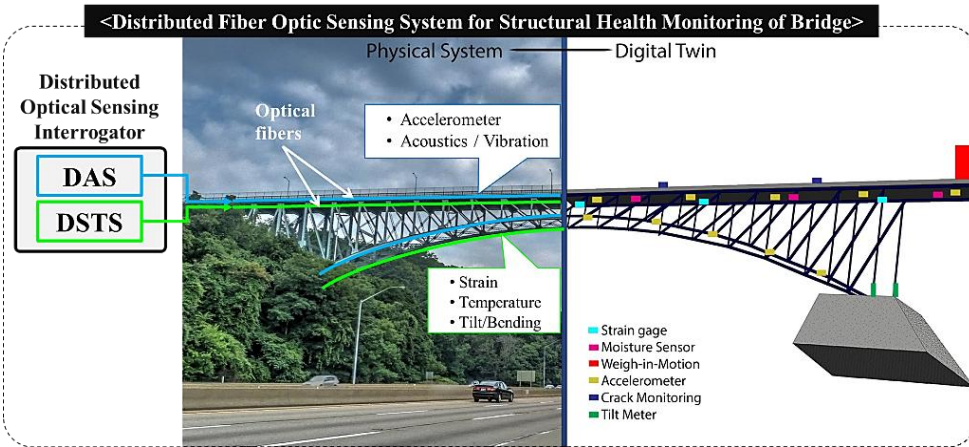
U.S. DEPARTMENT OF
ENERGY

Fossil Energy and
Carbon Management

Real-Time Sensing for Critical Material Prospecting and Processing

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INSITES Consortium Technology, Community, Workforce...



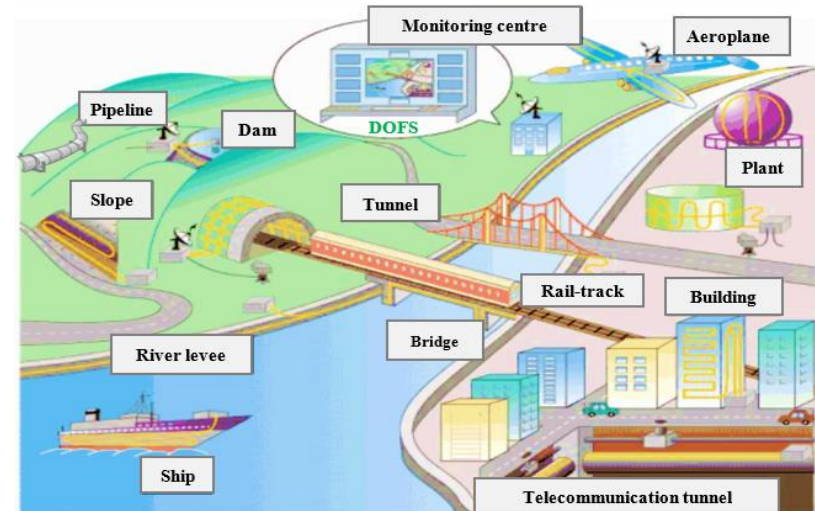
Distributed Sensing & Networking
AI-Based Analytics & Digital Twins

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INTELLIGENT TRANSPORTATION and
ENERGY SYSTEMS CONSORTIUM



Applied Physics Reviews **6**, 041302 (2019);
<https://doi.org/10.1063/1.5113955>

INSITES Consortium Ecosystem and Business Model...

INSITES
Membership

Federal
Proposals

Industry
Projects

Others (e.g.
Foundations)

Major Centers
(NSF, DOT, DOE)

Core Capabilities

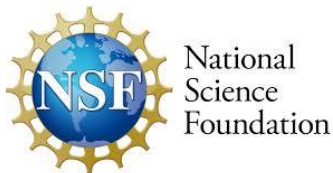
Distributed Sensing & Networking
AI-Based Analytics & Digital Twins
Domain Specific Physics & Science

UPISC UNIVERSITY OF PITTSBURGH
INFRASTRUCTURE SENSING
COLLABORATION WORKSHOP

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY

NATIONAL ACADEMY OF ENGINEERING

Annual Stakeholder
Workshop with NETL



U.S. DEPARTMENT OF
ENERGY

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UNIVERSITY OF PITTSBURGH
INSITES

Pitt Research Diversified Portfolio and Business Model for Longevity and Impact

Team and Stakeholders Industry, Government, Non-Profits...



Dr. Paul Ohodnicki
(SSOE MEMS / ECE)



Dr. Piervincenzo Rizzo
(SSOE CEE)



Dr. William Harbert
(DSAS Geophysics)



Dr. Zachary Harris
(SSOE MEMS)



Dr. Amy Babay
(SCI)



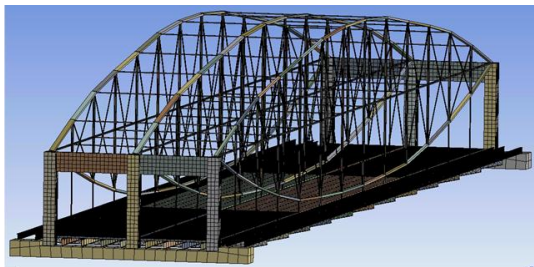
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See more faculty and details at: www.engineering.pitt.edu/insites

Seed Research Thrusts

Integrate Capabilities for Momentum...

Thrust #1: *Critical infrastructure sensing integrated with digital twin modeling*

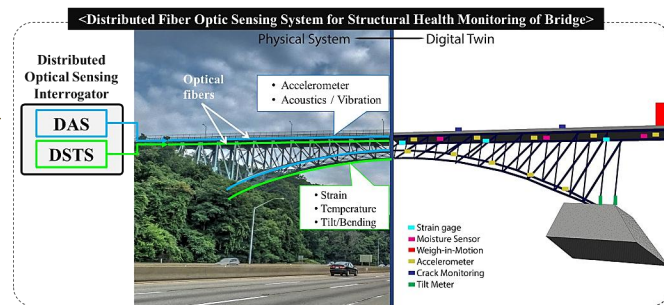


Finite Element Model of **Smithfield Street Bridge**.

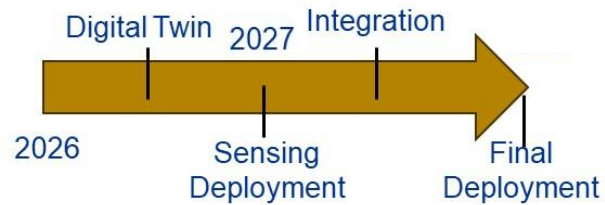


Wireless discrete sensors on the **Smithfield Street Bridge**, Pittsburgh. Photo credits: P. Rizzo

Seed Effort
2026-2028



Distributed Optical Fiber Sensor Bridge
Deployment + Digital Twins + AI Based Analytics



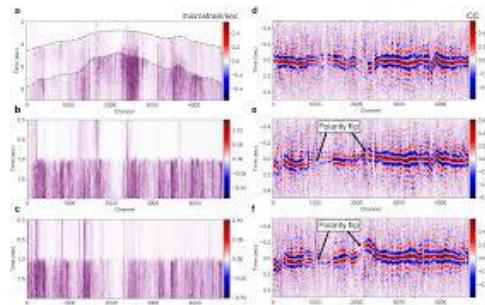
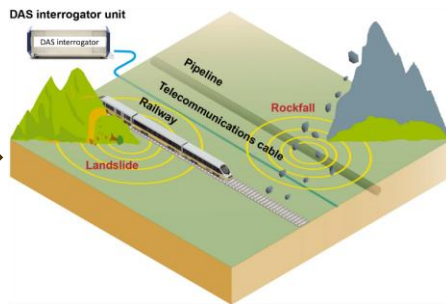
Seed Research Thrusts

Integrate Capabilities for Momentum...

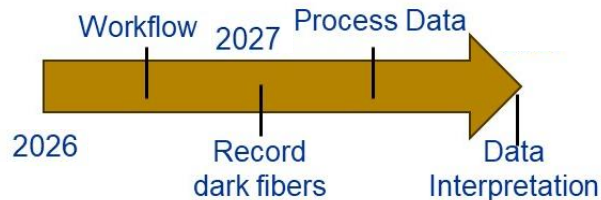
Thrust #2: *Geophysical monitoring of hazards and environmental risks via distributed sensing*



Seed Effort
2026-2028



Dark Fiber Interrogation Using Commercial and Custom Interrogation Systems



Energy and Fiber-Optic Networks – Emerging Partnerships - DQE Communications

Pitt Research

Kumar, Abhash, Harbert, William and Hammack, Richard, 2022, Surface Seismic Monitoring of CO₂ injection operations at multiple field sites around the United States, 2022 SAGE/GAGE Community Science Workshop, organized by IRIS and UNAVCO, Pittsburgh, PA.

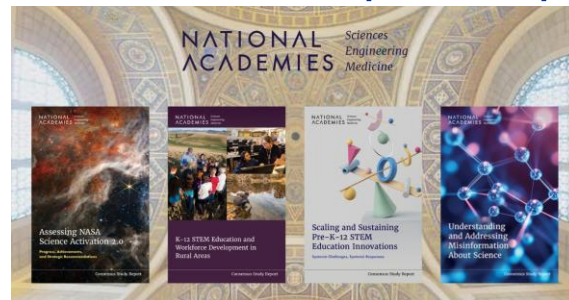
Seed Stakeholder Thrusts

Build National Leadership Position...

Thrust #3: Enhancing and Formalizing National Leadership on Topic of Infrastructure Sensing



Seed Effort
2026-2028



Collaborations to Establish Leadership in
National Initiatives



NATIONAL ACADEMY
OF ENGINEERING



Annual Workshop Building
Community and Consensus

Pitt Research

Thank You For Your Interest!

Next Steps:

- 1) Foundational Participants in Current Discussion with INSITES Leadership
- 2) INSITES Industry Participation Agreements Available in 2026
- 3) INSITES / UPISC Workshop in June 2026
- 4) Contact Us Now to Get Involved!

Email: insites@pitt.edu

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