UPISC UNIVERSITY OF PITTSBURGH INFRASTRUCTURE SENSING
COLLABORATION WORKSHOP

NATIONAL ENERGY TECHNOLOGY LABORATORY

Distributed Fiber Sensor Interrogators for Multi-Parameter Monitoring

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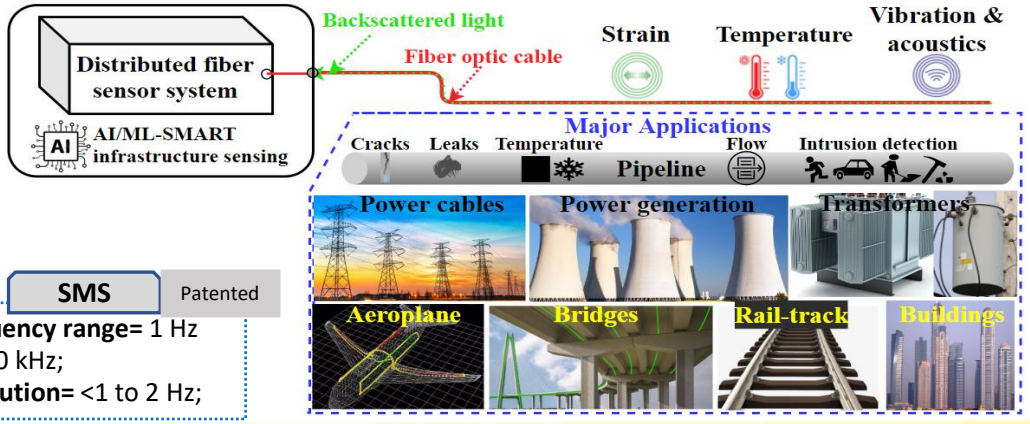
Distributed fiber optic sensors allow the measurement of structural parameters; such as strain, temperature, and vibrations at thousands of locations along a single-fiber sensor. The distributed/quasi-distributed fiber sensors include;

- Brillouin optical time domain analysis (BOTDA).
- Phase-sensitive optical time domain reflectometry (ϕ-OTDR), also called distributed acoustic sensor (DAS).
- Single-mode–multi mode–single-mode (SMS) fiber sensor.



BOTDA

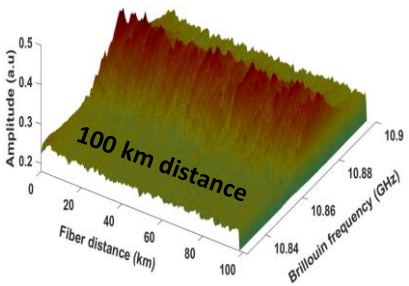
Sensing range = >100 km;
Spatial resolution = <5 m;
Measurable parameters: strain and temperature

ϕ-OTDR/DAS Patented

Sensing range = >10 km;
Spatial resolution = <1 m;
Measurable parameters: vibration/acoustics

SMS Patented

Frequency range= 1 Hz to 400 kHz;
Resolution= <1 to 2 Hz;

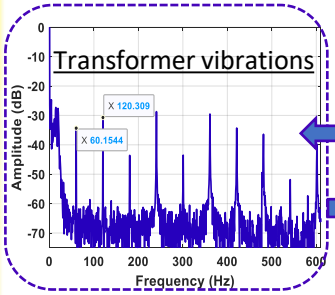


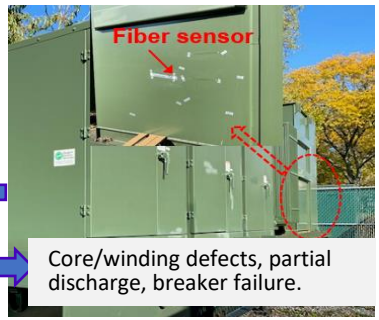
Advantages

- Compact size
- EMI resistance
- Withstands harsh environments
- Real-time and remote monitoring
- High accuracy and stability
- Enhanced structural safety

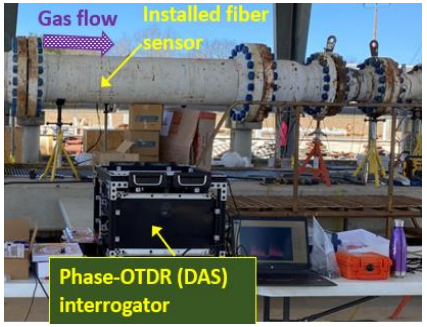
Field Validation

Power Transformer
Natural Gas Pipeline





Core/winding defects, partial discharge, breaker failure.



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