NETL's Transformer Watchman Sensor for Grid-Scale Transformers Helps Ensure a Resilient Power Grid

The Transformer Watchman sensor system, invented by NETL and partners, monitors transformer operations, ensuring the resilience, stability and security of the electric power grid.

Transformer Watchman ——— To Protect the Power Grid ———

An Integrated Optical Fiber Sensor System for Multi-parameter Monitoring
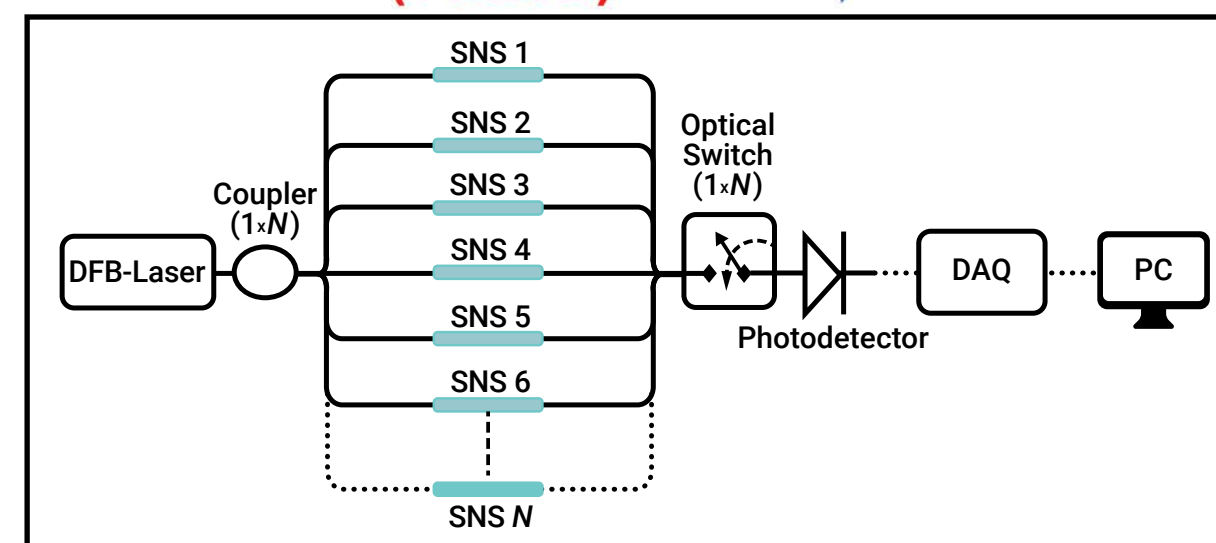
Portable Interrogator

Multi-parameter Sensor

- On watch 24/7
- No more oil sampling
- No need to wait for lab analysis
- Multi-parameter measurements with one system
- Predictive analysis with AI technology
- Distinguish overheating from arc faults
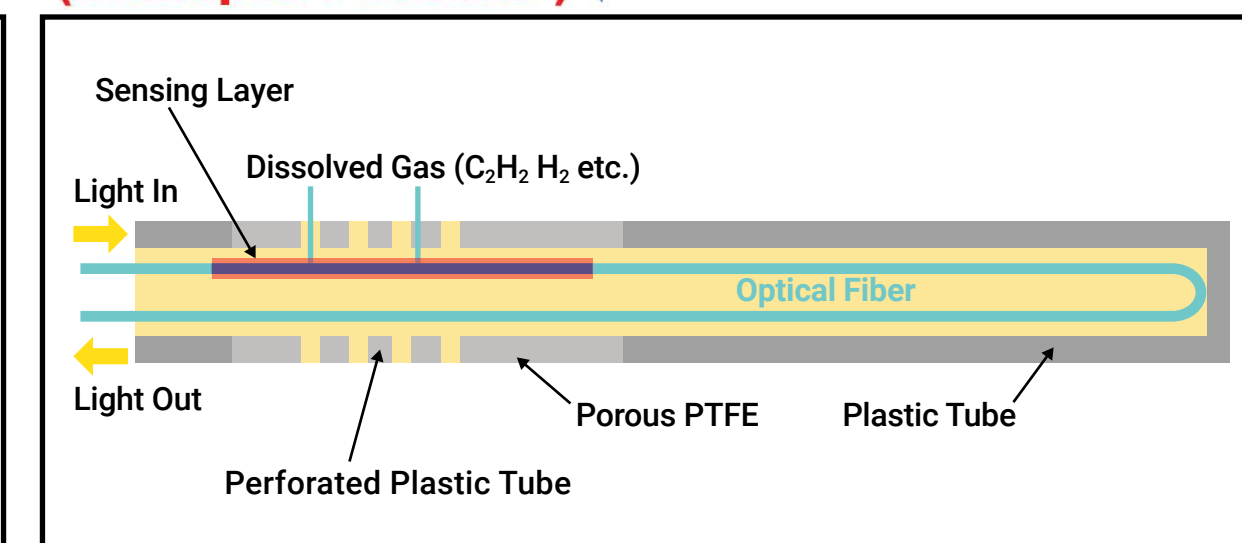- Enable dynamic loading with increased confidence

Multi-point Sensing
(Patent)

SNS 1, SNS 2, SNS 3, SNS 4, SNS 5, SNS 6, SNS *N*
Coupler (1×*N*), DFB-Laser, Optical Switch (1×*N*), Photodetector, DAQ, PC

Sensor Probe
(Multiple Patents)

Sensing Layer, Light In, Dissolved Gas ($C_2H_2\,H_2$ etc.), Optical Fiber, Light Out, Perforated Plastic Tube, Porous PTFE, Plastic Tube

- Cost of power outages to the U.S.: $150B
- Global transformer market: $46B
- Hourly outage cost to a large manufacturer: $5M
- Regional U.S. market: $5.3B
- 60% increase in blackouts over past five years

An innovative sensor technology developed by the NETL and its partners:

- Helps to make the power grid a more valuable asset for the future of the energy sector.

- Ensures the continuous operation of critical infrastructure such as hospitals, traffic signals and communications.

- Can contribute to the decarbonization of the power sector and address the effects of climate change by enhancing the reliability and predictability of the power grid during the integration of renewable energies.

- Could enhance current infrastructure performance, prevent power outages, and result in significant savings in repair costs and time, as well as the prevention of disastrous failures.

- Won a 2023 R&D 100 Award.

DOE PROGRAM

Transformer Resilience and Advanced Components

NETL PARTNERS

University of **Pittsburgh**

SENSIBLE PHOTONICS

U.S. Department of ENERGY™

NETL NATIONAL ENERGY TECHNOLOGY LABORATORY

25 Years Powering Energy Innovation