

IITM Technology Available for Licensing

METHODS OF DISTRIBUTED ACOUSTIC SENSING BASED ON RAYLEIGH SCATTERING IN OPTICAL FIBERS

PROBLEM STATEMENT

- Distributed Acoustic Sensing (DAS) based on Rayleigh scattering in optical fibers is attractive for perimeter sensing as well as civilian applications including oil/gas/water pipeline monitoring, environment monitoring, & structural health monitoring.
- Several versions exist in prior literature, but they are not preferred due to requirement of costlier equipment (high-speed digitizer), low signal to noise ratio & fading issues.
- The present innovation aims to address the above issues.

TECHNOLOGY CATEGORY/ MARKET

Technology: DAS in an optical fiber

Industry: Infrastructure (Hardware), Oil, Gas, Power & Utility, & etc.

Market: The global Distributed Acoustic Sensing (DAS) market is projected to grow at a **CAGR of 11.58%** during the forecast period from **2022 to 2030**.

TECHNOLOGY

- Present invention describes a **method of distributed acoustic sensing** in an **optical fiber based** on low noise and machine learning
- The method includes launching a pulse into an optic fiber from either end which is connected in a **loop configuration**.
- Backscattered signals from the optical fiber are fed **to an optical receiver** through an **optical circulator**.
- The phase signals are extracted by mixing the **backscattered signals** from the fiber with signals from a **laser light source** in a mixer, thereby performing a **correlation operation**.

IMAGES

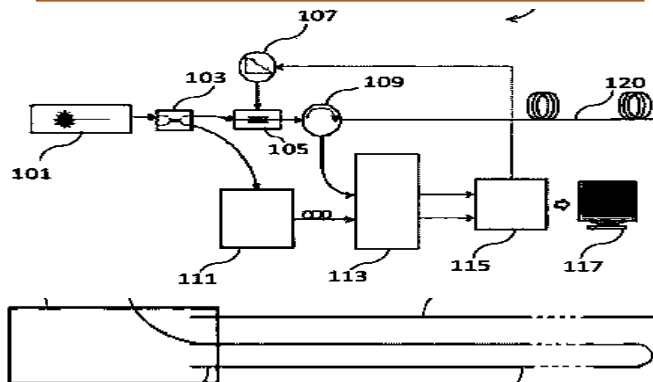


Fig. 1: Illustration of our DAS system using optical fibers (top) & sensing optical fiber with loop termination within same DAS (bottom)

KEY FEATURES / VALUE PROPOSITION

❖ **Technical Perspective:**

1. **Perturbations** to the optical fiber are **identified** by observing **phase changes** in the backscattered signal as shown in Fig. 2.
2. In the embodiments, detector comprises a **machine learning module** to sense perturbations or improve resolution or both

❖ **Industrial Perspective:**

1. **Enhanced** spatial resolution & **improved** signal to noise ratio (**SNR**) leading to **accurate detection of events**.

INTELLECTUAL PROPERTY

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TRL (TECHNOLOGY READINESS LEVEL)

TRL- 3, Proof of Concept ready, tested;

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