

THE PROBLEM ADDRESSED

Fiber optic sensors rely on various physical phenomena (Rayleigh, Brillouin, and Raman scattering) to extract information such as temperature, strain, and vibration.

Each scattering mechanism typically requires a dedicated interrogator with specific optical and electronic configurations. This leads to increased system complexity and cost, redundancy in instrumentation, and limited flexibility in multi-parameter sensing applications.

TECHNOLOGY

Our technology leverages a **single agile and optimized laser source** integrated into one compact instrument, which provides:

- **Unified multi-parameter sensing** (Rayleigh, Brillouin, and Raman) without the need for multiple interrogators.
- **Reduction in system complexity and cost** by eliminating redundant hardware.
- **Enhanced flexibility** for diverse applications such as temperature, strain, and vibration monitoring. Improved sensitivity and potentially higher resolution, thanks to dynamic laser tuning and optimized signal processing.
- **Scalable and easy-to-integrate** design, enabling compact, robust solutions for industrial and research environments

COMPETITIVE ADVANTAGES

All-in-one solution

- Combines multiple sensing modalities in a single compact architecture
- Multi-parameters sensing capabilities
- Improved spatial and temporal resolutions
- Lower hardware cost

APPLICATIONS

- Optical instrumentation for distributed fiber optic sensors applied to sectors such as traffic monitoring (road or rail), dynamic monitoring of civil engineering structures, or seismic monitoring



DEVELOPMENT STATUS

- TRL3/4
- Agile laser sources for multi-parameter measurements

INTELLECTUAL PROPERTY

- On-going evaluation

INVENTORS & CONTACTS

- Kamel MERGHEM, Professor
kamel.merghem@telecom-sudparis.eu
- TTO: Pauline PORTIER,
pauline.portier@telecom-sudparis.eu

PUBLICATIONS

- Y. Driouche - Optics Express Vol. 33, 4, 2025 <https://doi.org/10.1364/OE.545131>
- Google scholar : <https://urlr.me/DyhVQf>

LOOKING FOR

- Partnership for application validation
- Industrial development and implementation