invisensing

WE SENSE THE WORLD FOR YOU

Advanced optical fiber sensing
& data analysis technologies

YOUR CHALLENGES

Do you need early detection of blockage in your pipelines?

Do you need an online health assessment of your motors?

Do you need permanent and remote monitoring for the railways?

Do you need a smart solution on perimeter protection?

INVISENSING CAN HELP YOU!

INVISENSING's SOLUTIONS

We deliver high-precision & industrial-grade distributed acoustic sensing system and AI-powered analysis software to increase the safety and productivity of infrastructures.

DAS interrogator

Acoustic wavefield acquisition proprietary technology, turning standard optical fiber into a sensitive microphone array. Our DAS interrogator has world-class performance for its high signal-to-noise ratio and broad dynamic range.
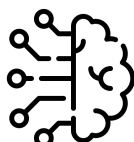
Real-time data processing

We reconstruct spatial-temporal features of the acoustic field in real-time. We use intelligent algorithm to extract the relevant information.
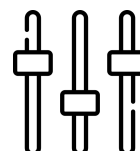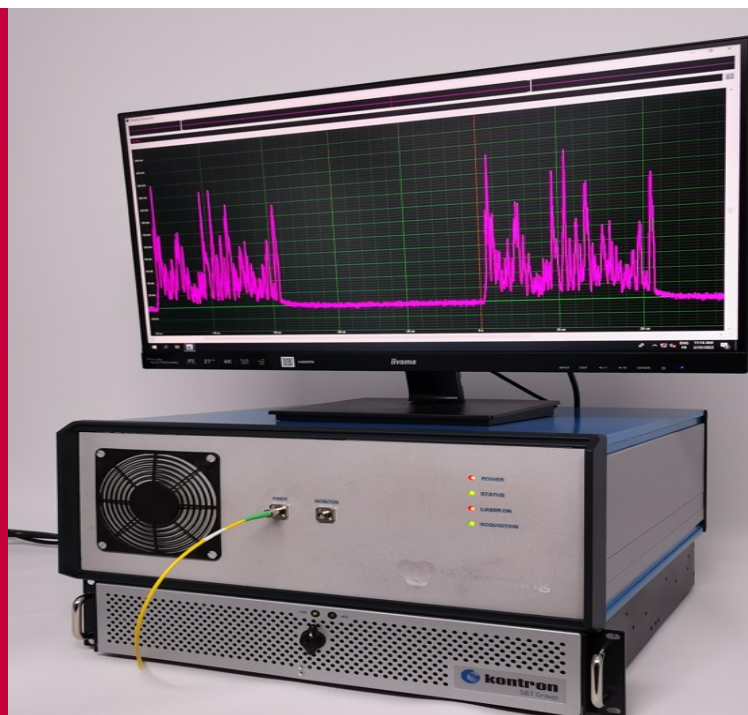
Integration with control system

We integrate our DAS data processing with customized control system to provide added value for end-user.

Specifications

Sensing distance	10 km (up to 40 km)
Spatial resolution	1-10 m
Frequency range	2 Hz - 25 kHz
Noise level	$10^{-3}\ rad/\sqrt{Hz}$
SNR at 1 kHz	> 50 dB
Dynamic range at 1 kHz	> 60 dB

PIPELINE MONITORING

Remote & Long-Distance Flow Monitoring, Increased Productivity

INVISENSING's DAS provides continuous acoustic measurement of long-distance pipeline. AI-powered data processing provides flow analysis enabling operators to monitor the fluid flowing in the pipeline, for example, detecting condensation or leakage at early stage. In combination with control system, we help operators to increase productivity by stabilizing flow rate. Our technology can also help operators to detect threats to pipelines due to geohazard effects or human intrusions at the earliest stage.

Customer value

- Staff security
- Asset integrity at unmanned & harsh condition
- Increased productivity
- Reduction in long-term maintenance cost

Functions

- Collection of acoustic waveform generated by the fluid flowing in the pipeline
- Automatic flow adjustment to stabilize flow rate

Technologies

- *INVISENSING*'s high-sensitivity DAS: sensing range up to 40 km & acoustic frequency up to 25 kHz
- Flow characterization (flow debit, speed, pressure and density of flowing material, etc.) from DAS
- Automatic close-loop control

Deliverables

- User-friendly interface displaying continuous and real-time flow characteristics
- Leak alert
- Blockage prediction & alert
- Control on pipeline choke or injection valve

INDUSTRY ASSET ASSESSMENT

Online Health Monitoring of Critical Assets

INVISENSING's high performance optical fibre sensors can provide insights into the operating status of online critical equipment. This helps to minimize downtime and provides maintenance team reliable information for preventive maintenance.

Customer value

- Preventive maintenance of critical rotation equipment
- Minimized downtime
- Optimized life management of critical assets

Functions

- Online collection of motor vibration (industrial equipment, train drive equipment, maritime transport, etc.)
- Regular or punctual measurement

Technologies

- *INVISENSING's* high-performance DAS at broad vibration frequency range
- Advanced vibration waveform analysis

Deliverables

- Map/Chart display of all monitored sites
- Health assessment report
- Recommendations for operation improvement

INFRASTRUCTURE HEALTH MONITORING

Predictive Maintenance & Infrastructure Integrity

For critical infrastructures, *INVISENSING's* distributed acoustic fiber sensor allows a long-distance and permanent surveillance, providing reliable insights of infrastructures for preventive maintenance and protection of people.

Customer value

- Asset integrity
- Warn of dangers caused by natural hazards or internal stress
- Predictive maintenance

Functions

- Permanent infrastructure surveillance at long distance up to 40 km (railways, bridges, highways, etc.)
- Monitoring of damage induced by dynamic loads

Technologies

- *INVISENSING's* high-sensitivity DAS
- Optical fiber embedded in infrastructure for permanent monitoring

Deliverables

- Remote user interface for data visualization
- Analytics for predictive maintenance
- Alarm with location accuracy of ±2 m

PERIMETER PROTECTION

Low False Alarm Rate and High Accuracy

DAS can sense the acoustic field along the fiber cable and process the data to recognize intrusion and to locate the threats along the perimeter. *INVISENSING*'s AI-powered data processing algorithm can detect intrusion events and determine their nature with a high level of accuracy.

Customer value

- Permanent and automatic perimeter detection of intrusion
- Efficiency thanks to low rate of false alarm
- Accuracy of intrusion location
- Flexibility to be integrated with existing surveillance system in-situ

Functions

- Perimeter protection of highly sensitive areas, e.g. borders, oil & gas facilities, power plants, military strict areas, etc.
- Intrusion event detection
- Event type identification
- Event localization

Technologies

- *INVISENSING*'s low-noise DAS
- Real-time demodulation
- Machine learning algorithm for rapid event identification
- Perimeter length up to 10 km per device
- Sensing cables can be buried or/and installed on fences

Deliverables

- Real-time alert of intrusion
- Event type identification: human being, animals, vehicles, digging, fence climbing or other intrusions
- Intrusion location (±2 m) reported by zone number, GPS coordinates and visualized in 2D or 3D map

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