

Fiber optic sensor for height measurement



AI Overview

Fiber optic sensors can measure height or liquid levels with high precision using light-based interferometry or Bragg grating techniques, offering robust, maintenance-free operation in challenging environments.

Working Principles

Fiber optic sensors measure height or displacement by detecting changes in light properties transmitted through optical fibers. Two common approaches are:

- Hydrostatic Pressure-Based Measurement:** Sensors measure the pressure exerted by a liquid column, which is proportional to its height. Systems like Opsens Solutions' WaterSens use White Light Polarization Interferometry (WLPI) to detect minute pressure changes, converting them into precise height measurements with accuracies better than ± 1 mm. These sensors are immune to electromagnetic interference, drift-free, and suitable for long-term monitoring in remote or harsh environments.
- Fiber Bragg Grating (FBG) and Interferometric Sensors:** FBG sensors have periodic variations in the fiber's refractive index. When strain or displacement occurs, the reflected Bragg wavelength shifts, allowing measurement of vertical displacement or structural height changes. Fabry-Perot interferometers use partially reflective surfaces to create interference patterns; changes in the gap between surfaces due to height or pressure variations are detected optically.

Advantages

- High Sensitivity and Accuracy:** Capable of detecting sub-millimeter changes in height or liquid level.
- Remote Sensing:** Light signals can travel long distances without degradation, enabling monitoring in inaccessible or hazardous locations.
- Robustness:** Resistant to electromagnetic interference, lightning, and harsh environmental conditions.
- Maintenance-Free Operation:** Many fiber optic height sensors are designed for decades of service without recalibration.

Applications

- Liquid Level Monitoring:** Fuel tanks, water reservoirs...

Article Content

Optical Fibre-Based Sensors—An Assessment of Current Innovations

Optical fibre sensors are an essential subset of optical fibre technology, designed specifically for sensing and measuring several physical parameters. These sensors offer unique

Strain-based reinforcement corrosion assessment using quasi

This study proposes a strain-based approach for quantitatively assessing the reinforcement corrosion using a quasi-distributed fiber Bragg grating (FBG) sensing system. A three

A Review of Railway Infrastructure Monitoring using Fiber Optic Sensors

Fiber optic-based monitoring systems use quasi-distributed and continuously distributed sensing techniques for real time measurement and long term assessment of structural properties.

Fiber-optic Sensors – Buyer's Guide & Supplier List

This buyer's guide for fiber-optic sensors provides technical background, comparison of major types, selection criteria, and an overview of suppliers.

FIBER-OPTIC SENSORS

Our global manufacturing network for fiber optic sensors in Ayabe (Japan), Shanghai (China) and Nufringen (Germany) focuses on continuously optimising methods for small and large volume

Fiber-optic axial-strain sensor based on in-cavity micro-bubble fabry ...

Abstract In this paper, a novel fiber-optic axial-strain sensor based on a micro-cavity Fabry-Perot interferometer (FPI) is proposed and experimentally realized. This micro-cavity FPI is

DTSX1 Fiber Optic Heat Detector | Yokogawa Electric Corporation

DTSX1 fiber optic heat detector stores the functions required for heat detection in one box. DTSX1 analyzes the temperature data with high accuracy by measuring with fiber optic sensor cable and

Fiber Optic Sensors | KEYENCE America

Learn all about various sensors—including fiber optic sensors, photoelectric sensors, laser sensors, and contact sensors—with detailed information on measurement principles and applications.

Optical Fiber Sensing

Optical fiber sensing refers to the use of optical fibers to measure various parameters such as temperature, strain, and pressure by detecting changes either in the properties of the optical fiber

Turning Fiber into a Sensing System: The Magic of

Fiber sensing technology emerged in the 1970s. In 1976, the first fiber optic gyroscope (FOG) for angular velocity measurement, exploiting the Sagnac

Fiber Bragg Grating Sensors for Structural and Railway Applications

Fiber optic-based monitoring systems use quasi-distributed and continuously distributed sensing techniques for real time measurement and long term assessment of structural properties.

A Scalable Architecture for Multi-role Uavs Utilizing a Fiber Optic ...

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DTSX200 Distributed Temperature Sensor

What Is Distributed Temperature Sensing? Distributed temperature sensing (DTS) measures temperature distribution over the length of an optical fiber cable using

Fiber-optic sensor

A fiber-optic sensor is a sensor that uses optical fiber either as the sensing element ("intrinsic sensors"), or as a means of relaying signals from a remote sensor to the electronics that process the signals

Fiber-Optic Level Measurement

Discover fiber-optic level sensors from Polytec: precise, maintenance-free, drift-free, ATEX-safe and immune to EMI for industry, research & medical.

Selecting an Inertial Measurement Unit (IMU) for UAV

Inertial Measurement Unit Technologies There are many types of IMU, some of which incorporate magnetometers to measure magnetic field strength, but the

Remote and high precision step height measurement with an optical

The proposed optical fiber multiplexing interferometric system, which includes a Fizeau interferometer and a Michelson interferometer is suitable for remote and absolute measurement of

Fiber Optic Sensors: Types, Working Principle

Explore fiber optic sensors: their working principles, types (intrinsic, extrinsic, hybrid), and diverse applications in mechanical, chemical, and structural health

18 Fiber Optic Sensor Manufacturers in 2026

18 Fiber Optic Sensor Manufacturers in 2026 This section provides an overview for fiber optic sensors as well as their applications and principles. Also, please take a look at the list of 18 fiber optic sensor

Development of fiber optic sensor technology

Fraunhofer IPT develops fiber-optic sensors for challenging measurement tasks such as measuring the smallest of boreholes. Using fiber-integrated beam

Evaluating the Future of the Civilian Fiber Optic Gyroscope Market ...

What is Civilian Fiber Optic Gyroscope Market? A Civilian Fiber Optic Gyroscope (FOG) is an advanced sensor used for precise angular velocity measurement, utilizing the interference of light

Soft 2D tactile sensor based on fiber Bragg gratings and machine ...

Abstract Soft 2D tactile sensors are becoming increasingly important in robotics and human-machine interaction. In this paper, we propose a new approach to develop a soft tactile

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