

# Measuring Rotation Speed Using a Fiber Optic Sensor



## AI Overview

Fiber optic sensors can measure and control rotation speed using non-contact methods such as Sagnac interferometers or intensity-modulated displacement sensors.

### Types of Fiber Optic Rotation Sensors

1. Sagnac Interferometer-Based Sensors These sensors operate on the Sagnac effect, where two light beams travel in opposite directions along a looped fiber and recombine to produce a phase shift proportional to the rotation rate. The phase difference is directly related to the angular velocity of the rotating object, allowing precise measurement of rotation speed. This approach is highly sensitive and suitable for applications requiring high accuracy and immunity to electromagnetic interference . 2. Fiber Optic Displacement Sensors (FODS) Extrinsic intensity-modulated fiber optic displacement sensors can measure the distance between a sensor probe and a rotating shaft. By monitoring changes in light intensity reflected from the rotating surface, the sensor system can calculate rotational speed. These sensors are non-contact, robust, and can operate over a wide range of speeds, such as 200–3000 RPM for DC motors . 3. Fiber Bragg Grating (FBG) Sensors FBGs are primarily strain sensors but can be adapted for rotational measurements by correlating torsion or twist in a shaft to strain in the fiber. They offer multiplexing capabilities, allowing multiple sensors along a single fiber, and are immune to electromagnetic interference, making them suitable for harsh industrial environments

## Article Content

Apr 06, 2026

Optical fiber sensor used for measuring the rotation angle of the ...

The fiber-optic angle sensor designed in this study was installed together with the high-precision MK415B Hall angle

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(PDF) Fiber-Optic Sensors for Measurements of Torsion, Twist and ...

Optical measurement of mechanical parameters is gaining significant commercial interest in different industry sectors. Torsion, twist

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Advanced Optical Measurement Techniques for Rotating Machinery ...

Keywords Optical measurement, rotating machinery, laser Doppler vibrometry, fiber-optic sensors, crystal-optical method, infrared

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Fiber Optic Sensors: Fundamentals, Principles & Applications

Extrinsic Fiber Optic Sensors Fiber is Only an Information Carrier To and From a Black Box Light Signal Generation in Black Box

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Event-Based Angular Speed Measurement and Movement Monitoring

However, traditional vision sensors collect a significant amount of data to process and measure the rotation of high

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Fiber Optic Current Sensors and Optical Current Transformers

The basic principle of Fiber Optic Current Sensors (FOCS) and Optical Current Transformers (OCTs) is to measure

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Fiber-Optic Rotation Sensors. Tutorial Review

A highly precise rotation sensor may be used to measure any changes in the length of the day and to detect torsional oscillations in

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Fiber optic sensor embedded in robotic systems for 3-D orientation ...

Moreover, optical fiber-based 3-D rotational sensors are still difficult to achieve as well as challenging to integrate into

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Fiber-Optic Sensors for Measurements of Torsion, Twist and Rotation:

Recently, twist/torsion/rotation sensors have become a topic of intense fiber-optic sensor research. Various sensing

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Fiber Optic Sensor for Measuring Rotation

The two arms consist of optical fiber wound in circular shape. Each laser beam propagates in opposite direction to the other. When

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The fiber-optic gyroscope, a century after Sagnac's experiment: The ...

Abstract Taking advantage of the development of optical-fiber communication technologies, the fiber-optic gyroscope

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Fiberoptic Rotation Sensor: Analysis of Effects Limiting Sensitivity ...

Fiberoptic Rotation Sensor: Analysis of Effects Limiting Sensitivity and Accuracy. In: Ezekiel, S., Arditty, H.J. (eds) Fiber-Optic

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Non-contact torque measurement of rotating shafts using optical ...

Monitoring of shaft speed and torque is commonly done using a variety of sensors. Although non-contact techniques

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Intensity-modulated rotation angle sensor based on multi-core fibers ...

By leveraging the optical spatial distribution properties of EDCF and SCF, combined with the light intensity modulation

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All fiber torsion and displacement sensor based on image detection

We propose an all-fiber-optic sensor for simultaneous rotation and displacement measurement based on elastic-optic

Nov 29, 2025

Design and Development of Fiber Optic Sensor System for Rotational ...

Abstract: In this paper, a fiber optic sensor system (FOSS) is proposed for the measurement of the rotational speed of a DC motor. It

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Fiber-optic rotation sensor technology

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What is a Fiber Optic Sensor?

A fiber optic sensor operates with an optical fiber cable connected to a dedicated light source. These sensors offer great mounting

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Design and Development of Fiber Optic Sensor System for Rotational ...

A vision- and fringe pattern-based rotational speed measurement system was proposed to measure the instantaneous

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Wireless optical rotation speed sensor tachometer

This allows the sensors to monitor the rotation speed of multiple parts in a large machine in parallel, or the rotation speed of multiple

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A ber Optic Sensor for NOncontakt Measurement of Shaft Speed,

he speed, torque and power of a rotating shaft has been fabricated and tested. The sensor provides a dlrectmeasurement of shaft

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optical rpm sensor

Optical RPM Sensor: Revolutionizing Speed Measurement Abstract: In this article, we delve into the fascinating world of optical RPM

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Instantaneous rotational speed sensing method based on cam angle

The core principle of this method is to use an optical coherence system to detect the changes in optical path difference

Nov 09, 2025

Fiber optic sensor embedded in robotic systems for 3-D orientation ...

We integrated three rotational sensors on a single optical fiber to measure rotation of roll, pitch, and yaw and installed

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Optical Speed Measurement and applications

In addition to optical encoders, potentiometers, synchros, resolvers and other sensors capable of measuring rotation can be used as

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Optical Fiber Sensors and Sensing Networks: Overview of the Main

Optical fiber sensors present several advantages in relation to other types of sensors. These advantages are

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