

Fiber Optic Sensor Heart Rate



Article Overview

Fiber optic heart rate sensors use light transmitted through optical fibers to non-invasively detect heartbeats with high sensitivity and immunity to electromagnetic interference.

Principles of Operation

Fiber optic heart rate sensors (OFS) detect heart activity by converting mechanical or physiological changes into optical signals. The main types include:

- Intensity-based sensors: Measure changes in light intensity caused by bending, displacement, or polishing of the fiber, which correlates with heartbeats .
- Interference-based sensors: Use interferometry to detect minute vibrations or displacements of the chest wall caused by heartbeats .
- Fiber Bragg Grating (FBG) sensors: Incorporate periodic variations in the fiber core's refractive index. Heart-induced strain changes the Bragg wavelength, which is measured to determine heart rate .

Design and Materials

FBG sensors are often encapsulated in flexible polymers like polydimethylsiloxane (PDMS) to protect the fiber and improve comfort when attached to the chest . Polymer optical fibers (POFs) are increasingly used due to their flexibility, biocompatibility, and electrical isolation, making them suitable for wearable or smartphone-integrated devices . These sensors can be embedded in mattresses, straps, or 3D-printed housings for non-invasive monitoring

Article Content

All-Fiber Michelson Interferometer for Heart Rate and Breath Monitoring

Heart rate (HR) and breath monitoring technology based on optical fiber sensors have been widely developed in the field of

Optical fiber sensors for heart rate monitoring: A review of

This paper summarizes the development of recent fiber-optic HR monitoring technology, introduces the sensing principles and

Optical fiber sensors for heart rate monitoring: A review of

In this paper, we report the integration of low-cost plastic optical fibers in smartphones for the measurement of respiratory rate and

Wearable Cardiorespiratory Sensor for Real-Time Monitoring With ...

In this study, we propose a novel portable wearable cardiorespiratory sensor integrated with a smartphone, fabricated from plastic

Non-invasive heart rate variability measurement during sleep based

A non-invasive measurement method based on fiber optic sensor (FOS) is proposed as a good substitute for the traditional

Deep Learning-Enabled Noninvasive Human ECG and Long-Term Heart Rate ...

Optical fiber sensors, known for their small size, lightweight, and resistance to electronic interference, are widely used in various

Measurement heart rate based on plastic optical fiber sensor

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Non-Contact Short-Term Heart Rate Variability Analysis Under Paced Respiration Based on a Robust Fiber Optic Sensor System

Flexible misaligned fiber-optic sensor for respiration and heart rate ...

Abstract In this paper, a flexible fiber-optic sensor based on a misaligned structure is proposed for monitoring respiration

Contactless Arrhythmia Detection and Short-Term HRV Analysis

This article presents a noncontact ballistocardiogram (BCG) monitoring system utilizing a fiber optic sensor (FOS) for PAC

Noncontact Monitoring of Heart Rate Variability Using a Fiber Optic

BCG signals can reflect the mechanical activity of the heart, from which the beat-to-beat interval (BBI) can be extracted

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