

Low-noise operation method of fiber optic spectrometer





Overview

This study proposes a deep-learning-based denoising method for fiber-optic sensors, which involves pre-processing the sensor spectrum into a 2D image and training with a cycle-consistent generative adversarial network (Cycle-GAN) model. Traditional spectrometers operate by mapping input signals of different wavelength to different spatial locations. In most implementations, signals within a spectral band are mapped to a specific area where a detector is placed to measure its intensity. Operated by a Raspberry Pi, the fiber-based spectrometer system uses the increased computing power to provide versatile modes of operation and powerful data processing, while maintaining a small size. Specifically crafted for basic chemistry and biology lab setups, where fibers allow measurements.



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(PDF) Raman Spectrometry with Fiber-Optic Sampling

Introduction Fiber optic probe based in-vivo spectroscopy techniques are fast and highly objective methods for intraoperative diagnoses and minimally

Fiber Optic Spectroscopy

The combination of Linear Array Detector and Spectrometer has become the system of choice for spectroscopy. Spectral Products computer-based miniature array

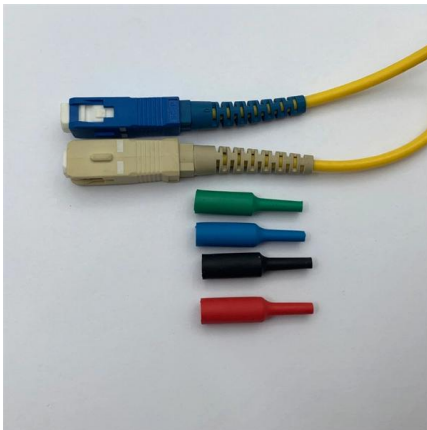


High spectral range, high speed fiber optic spectrometer

Newly, high-speed fiber-optic spectrometer (HSFOS) has been investigated. Operation of this type of spectrometer is based on conversion of spectral-domain signal into time-domain by a

Review of acousto-optic spectral systems and applications

Acousto-optic spectroscopy systems are becoming more and more relevant to our lives. With the development of various new technologies, the

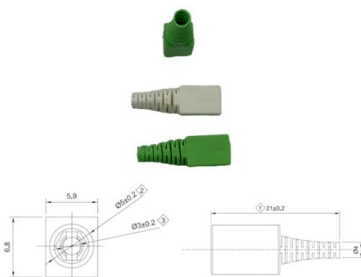


Closed-loop, low-noise fiber-optic rotation sensor.

This performance is consistent with the photon-noise limit for our setup. The length of the fiber is 200 m, and the coil diameter is 19 cm. Nonreciprocal phase modulation is accomplished with an electro-optic

Using a multimode fiber as a high resolution, low loss spectrometer

We propose and demonstrate that a conventional multimode fiber can function as a high resolution, low loss spectrometer. The proposed spectrometer consists only of the fiber and a camera that images



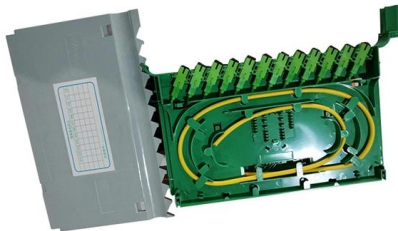
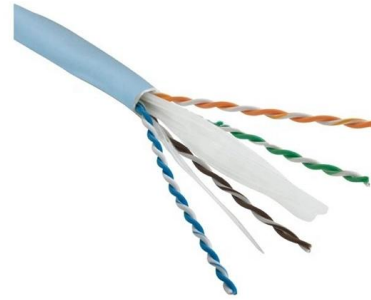
Optical fiber-based open source low cost portable spectrometer

Operated by a Raspberry Pi, the fiber-based spectrometer system uses the increased computing power to provide versatile modes of operation and powerful data processing, while



High spectral range, high speed fiber optic spectrometer

Fiber optic sensors have been developed recently. Among them, some encompass high speed and the others broadband spectral response. Newly, high-speed fiber-optic spectrometer



High-resolution optical spectroscopy using multimode

Here we introduce a compact spectrometer based on multimode interference (MMI) that simultaneously achieves high resolving power of $R > 10^4$ ($R > 10^5$) in the visible (near-infrared)

Multimode optical fiber based spectrometers

Finally, we demonstrate a method to reduce the spectrum reconstruction error and increase the bandwidth by separately imaging the speckle patterns of orthogonal polarizations. The multimode



Portable Optical Fiber Coupled Low Cost Visible Spectrometer

We developed, implemented and tested a portable low cost spectrometer that covers the visible wavelength range between 400-800nm. The system is intend



Low-power, agile electro-optic frequency comb spectrometer for

Here, we present an on-chip spectrometer that leverages an integrated thin-film lithium niobate modulator to produce a frequency-agile electro-optic frequency comb for interrogating chip-scale



Fiber-Optic Sensor Spectrum Noise Reduction Based on a

This study proposes a deep-learning-based denoising method for fiber-optic sensors, which involves pre-processing the sensor spectrum into a 2D image and training with a cycle



Optical fiber-based open source low cost portable spectrometer

This article explores the development of a small, compact fiber-based spectrometer system designed to overcome the limitations of standard spectrometers, such as the high cost and



Wall Mount Cabinet Server Racks



Ultra-low noise optical frequency combs

Ultra-low noise optical frequency combs Mamoru Endo, Tyko D. Shoji and Thomas R. Schibli Abstract--The invention of optical frequency combs (OFCs) based on femtosecond (fs) mode-locked



Realization of Hollow-Core Photonic-Crystal Fiber Optic

Mainly focusing on the demand for a novel resonator optic gyro based on a hollow-core photonic-crystal fiber (HC-RFOG), we achieve a multi



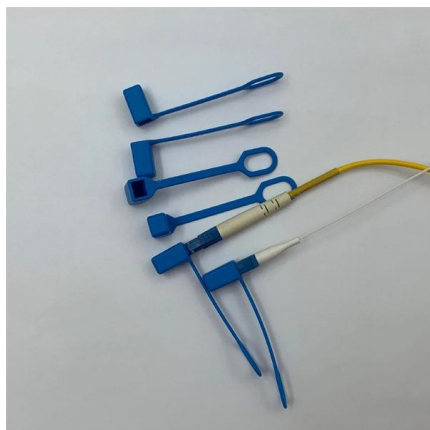
Noise Suppression Method of Fiber Optic Sensors Driven by

In this letter, an innovative method for reducing noise in white-light-driven sensors is proposed. This structure fully utilizes the broad spectrum of white light and the wavelength selectivity



A Method for Detecting Nanometer Length Oscillations in Fiber-Optic

Abstract A method for detecting changes in the length of an optical cavity is proposed for fiber-optic sensors based on the Fabry-Perot interferometer scheme. The possibility of detecting



Closed-loop, low-noise fiber-optic rotation sensor

This performance is consistent with the photon-noise limit for our setup. The length of the fiber is 200 m, and the coil diameter is 19 cm. Nonreciprocal phase modulation is accomplished with an electro-optic



Fiber Optic Gyroscope

The short-term sensitivity of a several-kilometers long fiber-optic gyroscope is limited mainly by thermal phase noise and relative intensity noise. Increasing the phase modulation frequency decreases the



Closed-Loop Method Based on Faraday Effect in Resonant Fiber Optic

The closed-loop method based on the Faraday effect is realized with a low coherence-noise resonator in resonance fiber optic gyro (RFOG). The resonator based on spun-fiber (SF) is designed and

Practical application of optical fibers in spectro-photometric analysis

The employment of optical fibers is a natural outgrowth of these past optical measurement methods. Whether sensing for contamination by domestic fuel oils in residential soils or remote



(PDF) Raman spectrometry with fiber-optic sampling

Fiber-optic probes enhance Raman spectrometry for complex samples and reduce fluorescence interference. Recent advancements include 1064-nm Nd:YAG



(PDF) Ultra-low noise phase measurement of fiber optic

In this study, a low noise phase measurement of a fiber optic sensor conducted via weak value amplification is experimentally demonstrated.



High precision and low noise demodulation scheme using adaptive

A fast real-time demodulation method based on the coarsely sampled spectrum is proposed for transient signals of fiber optic extrinsic Fabry-Perot interferometers (EFPI) sensors.



A Novel Fiber-Optic Parametric Amplifier Scheme with

We propose a novel scheme of a fiber-optic parametric amplifier (FOPA) with a weak signal, a strong pump, a control pump and a weak idler, to switch between high gain and low-noise



Ultralow-Noise Single-Frequency Fiber Laser and

A 1.5 μm ultralow-noise single-frequency fiber laser (SFFL) is realized based on a delay fiber phase-locked method and the nonlinear amplification



Optical fiber-based open source low cost portable spectrometer

This article explores the development of a small, compact fiber-based spectrometer system designed to overcome the limitations of standard spectrometers, such as the high cost and restricted accessibility.



All-fiber spectrometer based on speckle pattern reconstruction

Abstract: A standard multimode optical fiber can be used as a general purpose spectrometer after calibrating the wavelength dependent speckle patterns produced by interference between the guided



Multimode optical fiber based spectrometers

Abstract: A standard multimode optical fiber can be used as a general purpose spectrometer after calibrating the wavelength dependent speckle patterns produced by interference between the guided



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