Fiber Optic Sensor Color Recognition



Overview

Fiber-optic color sensor | IEEE Conference Publication | IEEE XploreThe sensor achieves an accuracy of 100% for painted objects, over 73% for clothes and 7.

Key Takeaways

Fiber optic sensors identify color by measuring the wavelength and intensity of reflected light, using techniques like comparison and triangulation for high-precision detection.

Working Principle

Fiber optic color sensors consist of a light source, optical fiber, and photodetector. Light is transmitted through the fiber to the object surface, where it is reflected or scattered back into the fiber and converted into an electrical signal. The wavelength characteristics of the reflected light allow the sensor to determine the object's color, as shorter wavelengths appear bluer and longer wavelengths redder.

Color Detection Techniques

Comparison Method: The sensor compares the detected color to preset reference colors. This method is simple but sensitive to ambient light and requires predefined color references. Triangulation Method: A more precise approach measures reflected intensity in red, green, and blue bands, converts them to color coordinates, and calculates the color position.

This method typically uses three light sources (red, green, blue) and provides higher accuracy and adaptability.

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Advantages of Fiber Optic Color Sensors

High precision and fast response, capable of detecting thousands of colors with fine discrimination. Stable detection even when the distance to the target changes or the target is tilted, unlike conventional photoelectric sensors where intensity varies with distance. Durable and flexible, suitable for harsh environments, high temperatures, humidity, or confined spaces, as the fiber cables themselves contain no electronics.

Compact and easy to mount, making them ideal for industrial automation and robotics applications.

Applications

Fiber optic color sensors are widely used in industrial automation, such as: Quality control: Checking color consistency of parts or products. Bottle cap detection: Identifying presence and color of caps on production lines. Registration mark detection: Detecting grayscale levels or color contrast for precise alignment.

Example Models

The Banner R55

F series is a high-resolution fiber optic color sensor capable of detecting 16 levels of grayscale and multiple visible beam colors, offering enhanced durability and heat resistance for industrial applications. In summary, fiber optic color sensors combine optical measurement of reflected wavelengths with advanced detection techniques to provide accurate, reliable, and fast color identification, making them essential in modern automation and quality control systems.

Article Content

Fiber-optic color sensor | IEEE Conference Publication | IEEE Xplore

The sensor achieves an accuracy of 100% for painted objects, over 73% for clothes and 74% for plastics in recognizing 62 defined colours. It is inherently compact and suitable for remote sensing, has high

Fiber-optic color sensor

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How fiber optic sensors detect color

Fiber optic sensors rely on optical principles to detect object properties such as reflection and scattering. They can identify color based on the wavelength characteristics of reflected light.

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Integrated sensing and colour expression of spatial status using a ...

In this study, a dissipative optical fibre sensor pair was embedded in a deformable, translucent silicone to achieve sensing and active colour-based expression of spatial deformation.

ams AS7341 – 11-Channel Spectral Color Sensor

AS7341 is an 11-channel multi-spectral sensor for color detection and spectral analysis applications. The spectral response is defined in the wavelengths from

Fiber Optic Color Sensor with Photodiode, 5-50mm

High-performance fiber optic color sensor with photodiode, featuring a built-in high-brightness white LED light source. Combined with an M6 fiber optic probe and

Fiber Optic Color Sensors

The Colour Sensor is a fibre optic amplifier made specifically for recognition of 1 or 1 to 4 colours. Teaching of the colours is easily performed by means of the “Teach-in ” function.

fiber optic color sensor

At its heart, a fiber optic color sensor system consists of three primary components: a light source (often LEDs or broadband sources), a bundle of optical fibers for light transmission, and a photodetector

Industrial color sensors & analysis | Micro-Epsilon

The colorSENSOR CFO is a new controller for precise color recognition in industrial measurement tasks. The CFO series is distinguished by high color accuracy,

Application of machine learning in optical fiber sensors

This paper presents the latest advancements in ML-based optical fiber sensors, outlines the problems faced by conventional demodulation methods and the common ML algorithms applied

Optical Fiber Sensors: Working Principle, Applications,

Brief theory of sensing principle, fabrication method, applications, advantages and disadvantages of the different fiber-optic sensors, are

Fiber-optic color sensor | IEEE Conference Publication | IEEE Xplore

A novel extrinsic fiber-optic color-recognition sensor which incorporates three lasers as the light sources, PIN diodes in the receiver and multimode step-index optical fibers as the transmission media is

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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 essentially related to the optical fiber properties, i.e., small, lightweight,

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 flexibility and can be used is in a variety of environments.

RGB Fiber Optic Color Sensor, NPN/PNP

RGB fiber optic color sensor is equipped with a dedicated fiber optic sensor head, featuring micro-color difference recognition function. It supports triple 16-bit

Fiber Optic Sensor

Fiber optic sensors are defined as devices that utilize optical fibers to measure a variety of stimuli, including mechanical, thermal, electromagnetic, radiation, chemical, and flow characteristics. They

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 advantages over traditional

Fiber Optic Sensor For Color Detection

The design and implementation of a novel fiber-optic sensor which detects the color of a remote object is described. The sensor is inherently more sensitive than conventional color sensors

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