

Optical Module Distance Detection



Article Overview

Optical modules detect distance by emitting light and measuring its reflection, using methods like time-of-flight, triangulation, or phase measurement to calculate precise distances.

Principles of Optical Distance Detection

Optical distance sensors measure the space between the sensor and a target without physical contact. The main methods include:

- Time-of-Flight (ToF): Measures the time a light pulse takes to travel to the target and back. Direct ToF (dToF) uses single-photon detectors for high accuracy and low power, while indirect ToF (iToF) measures phase shifts of modulated light signals . Frequency Modulated Continuous Wave (FMCW) is another variant for precise distance measurement .
- Triangulation: Uses the angle of reflected light on a sensor array to calculate distance, suitable for short-range, high-precision applications .
- Phase Measurement: Determines distance by analyzing the phase difference between emitted and reflected light, often used in medium-range sensors .

Sensor Module Architectures

Optical modules can vary in design depending on range and application:

- Single emitter with sensor array: Compact and suitable for consumer electronics.
- Emitter and sensor arrays: Enable faster multi-point measurements.

Article Content

Distance Sensors Modules | Jenoptik

Compact and easy-to-integrate optical distance measurement solutions for industrial automation suppliers

Optical Distance Sensors Explained: What They Are,

Discover how optical distance sensors work, including laser triangulation and ToF methods. Compare

Functionality and technology of optical distance sensors | Baumer USA

How does a laser distance sensor work? A laser distance sensor, also known as a laser displacement sensor, measures distances to

Optical distance measurement

Pulsed Time-Of-Flight MeasurementPhase Shift MeasurementEye-Safe, Independent of Lighting Conditions, ScanningThe pulsed time-of-flight (ToF) method delivers a strong signal and allows the detection of several objects positioned behind each other (multi-echo). For example, measurements can be taken through vegetation or fog. The measurement rates are in the megahertz range and the distance resolution in the millimeter range. The measurement range extends to 100m. See more on ipm aunhofer KEYENCE America

4 Types of Distance Sensors and How to Choose the

Learn about the four main types of distance sensors, their applications, and how to choose the best one for

Distance Sensing

Distance Sensing Overview Distance and proximity sensing allow you to easily detect the whereabouts of

Key Technologies Optical Sensing Technology | OMRON Device □ Module ...

Optical Sensing Technology detects objects, distance, and displacement with high precision, offering efficient solutions for stable and

How to Estimate an Optical Module's Transmission Distance | FiberMall

Optical modules distinct from one another in their transmission distance, a feature that should be taken into account in

Introduction to Time-of-Flight Long Range Proximity and Distance

The OPT3101-based systems are capable of operating over a wide range of target distances (from a few mm to 10s of meters) based

Fiber Sensors

Coaxial Reflective Fiber Units These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than

Optical distance sensors | Leuze

To meet these diverse needs, the operating principles of triangulation, propagation time measurement and

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THE OPTICAL DISTANCE SENSORS MEASURE DISTANCES QUICKLY AND PRECISELY WITH A RED LIGHT LASER. The LAT

Laser distance sensor

Laser distance sensor O1D100 O1DLF3KG/IO-LINK Reliable optical distance measurement with long ranges up to 10 m Two

Time-of-flight sensor technology

Accurate distance measurements are used in many applications e.g. presence detection, obstacle

Distance Sensors Modules for system integration | Jenoptik

Compact and easy-to-integrate optical distance measurement solutions for industrial automation suppliers and system integrators.

Optical Sensor Features and Applications | TE Connectivity

Our portfolio of optical sensors are suitable for use in harsh environments, and in applications such as distance measurement, light

Optical Distance Sensor Modules with a Particularly Large Field of

They achieve a detection range of at least 10 mm up to a maximum of 5.000 mm and recognize objects in a very wide

Optical Distance Sensor Modules with Large Field of View

They achieve a detection range of at least 10 mm up to a maximum of 5.000 mm and recognize objects in a very wide

Distance measurement | Hamamatsu Photonics

Distance measurement There are various methods of optical distance measurement, including TOF (Time

LIDAR, optical distance & time of flight sensors

A range of approaches exist to directly measure distance as the length of the reflected optical path from

Optical Sensor Types, Working Operation, Application Guide

Optical Sensor Types, Working Operation, Application Guide 2025-08-18 20708
Optical sensors are useful in

Understanding Optical Modules: Working Principles, Structures, and ...

Explore the working principles, structures, and performance metrics of optical modules, essential components of

Functionality and technology of optical distance sensors | Baumer ...

A laser distance sensor, also known as a laser displacement sensor, measures distances to detect objects within a certain

Fiber Optic Displacement Sensors | MTI

MTI Instruments provides high-performance fiber optic sensors and probes engineered for applications requiring large measurement

What Are the Key Parameters of Optical Modules

Understand the key parameters of optical modules, including transmission rate, distance, wavelength, and fiber

Key Technologies Optical Sensing Technology | OMRON Device □ Module ...

Designed for European applications, Optical Sensing Technology ensures precise detection of objects, distance, and displacement

Distance

Infrared sensors detect reflected IR light to determine the presence and distance of objects. They're simple and affordable, ideal for

Contact Us

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